



# **Ethiopian Herbal Medicine Research Article Profile**

## **Part 1**

**Traditional and Modern Medicine Research Directorate**

Addis Ababa, Ethiopia

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## **INTRODUCTION**

Plants have been used as medicinal sources since ancient times, and even today, plant based pharmacopoeias continue to play an essential role in world health care. The use of biological resources for various therapies has been documented in many different parts of the world, especially in remote regions where traditional medicines provide an alternative to "modern" health care system this perhaps may be sequel to the inability of orthodox medicine to comprehensively address most disease conditions plaguing mankind. The World Health Organization estimated that 80% of the world population relies on traditional medicine prepared mainly by the use of natural products (animals and plants) to meet their daily health requirements. WHO estimates that of the 35,000 – 70,000 species of plants that are used for medicinal purposes around the world, medicinal plants also play a major role and constitute the backbone of TM (Traditional System of medicine) practices. Hence, developing countries should endeavour to develop and utilize local medications that are most appropriate to their local circumstances especially for Primary Health Care (PHC) in order to cut down on huge cost associated with incessant drug importation.

Ethiopia is a centre of diversity for a number flora and fauna the sixth centers of biodiversity in the world. The country is endowed with rich flora, having more than 6,500 species of vascular plants out of which an estimated 12% are endemic and about 887 species are used as medicinal plants. The majority (80%) of Ethiopian people depends on traditional medicine for their health care, and more than 95% of traditional medicinal preparations made from plant origin. Ethiopia is also a home for many languages, cultures and beliefs that have in turn contributed to the high diversity of traditional knowledge and practice of the people, which, among others include the use of medicinal plants.

Herbal medicine in the simplest form are medicines or drugs made from herbs or plants and can be said to process several synonyms all of which refer to plants as the raw materials for medicine namely, phytomedicines, plant medicines, green medicines, traditional medicine portions, traditional remedies plant drugs and forest health products among others [6]. The World Health Organization also defined herbal medicine as finished labeled medicinal products that contain as active ingredients aerial or underground parts of plants or other plant materials or combinations thereof whether in crude juices, gums and fatty oils and other substances of this nature. Herbal

medicine may contain standard excipients in addition to the active ingredients. Medicines containing plant material combined with chemically defined active substances including chemically defined isolated constituents of plants are not considered to be herbal medicine. Exceptionally, in some countries herbal medicine may also contain by tradition, natural organic or inorganic active ingredients which are not of plant origin.

Through technological Research and Development, countries of the Far East Asia such as China, South Korea and India have been able to have been able to meet 75% of their health care needs through the development and utilization of herbal medicine and traditional medicine practice. China for instance is the World leading producer and exporter of herbal medicine. The annual industrial output for China In 1993 amounted to \$2.5 billion and reached to \$ 47.84 billion in 2010, up 29.5% from the previous year with a total profit of nearly \$ 4.52 billion in 2010. Complementary/alternative medicine sales in Australia totaled US\$ 1.12 billion in 2008.<sup>10</sup> In Japan, herbal medicine sales reached to US\$ 1.47 billion in 2008, in republic of Korea where annual expenditures on traditional medicine were US\$ 4.4 billion in 2004, rising to US\$ 7.4 billion in 2009.

The main aim of this document is to show the research profile of Ethiopian traditional medicines up to 2015 from published scientific studies in Ethiopia .

### **Rationale for Development of Herbal Remedies**

Over the past 100 years, the development and mass production of chemically synthesized drugs have revolutionized health care in most parts of the world. However, large sections of the population in developing countries still rely on traditional practitioners and herbal medicines for their primary care. In Africa up to 90% and in Ethiopia 80% of the population depend on traditional medicine to help meet their health care needs.

Herbal medicine has been commonly used over the years for treatment and prevention of diseases and health promotion as well as for enhancement of the span and quality of life. Plants and natural sources form the basis of today's modern medicine and contribute largely to the commercial drug preparations manufactured today, about 25% of drugs prescribed worldwide are derived from plants such as atropine, morphine, quinine, ephedrine, warfarin, aspirin, digoxin, vincristine, taxol, and hyoscine.

However, there is a lack of a systematic approach to assess their quality, safety and effectiveness. The holistic approach to health care makes herbal medicine very attractive to many people, but it also makes scientific evaluation very challenging because so many factors must be taken into account. Herbal medicines are in widespread use and although many believe herbal medicines are safe, they are often used in combination and are drawn from plant sources with their own variability in species, growing conditions, and biologically active constituents. Herbal extracts may be contaminated, adulterated, and may contain toxic compounds. The quality control of herbal medicines has a direct impact on their safety and efficacy. But, there is little data on the composition and quality of most herbal medicines, lack of adequate or accepted research methodology for evaluating traditional medicine.

Research is needed for screen out bioactive compounds, assuring the quality, safety, molecular effects, and clinical efficacy and development new products of the numerous herbs in common usage, providing training on traditional medicine and providing information and education of the community for improving their health care.

**Up to 1990**

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1. Pankhurst R. The history and traditional treatment of smallpox in Ethiopia. *Med Hist* 1965;9:343-346.
2. Pankhurst R. An historical examination of traditional Ethiopian medicine and surgery. *Eth Med J.* 1965;3(4):157-72.
3. Pankhurst R (1965) The history and traditional treatment of rabies in Ethiopia. *Med Hist* 9: 343-355.
4. Pankrust R: Historical reflections on the Traditional Ethiopian Pharmacopoeia. *J Ethiop Pharm Assoc* 1976, 2:29-33
5. Berhane-Selassie, T. 1971. An Ethiopian Medical Text Book written by Gerazmach Gabrawald Aragahan, Daga Damot. Addis Abeba University, Institute of Ethiopian Studies. Addis Abeba.
6. Abate, G. B., T. Gebre Egziabher & M. Tadesse. 1976. **A study on the medicinal plants of Ethiopia**, Unpublished. Science Faculty, Addis Abeba University.
7. Kloos, H. 1976. **Preliminary studies of medicinal plants and plant products in markets of central Ethiopia**. *Ethnomedicine* 4:63-102.
8. Tewolde-Berhan Gebre-Egziabher, Gelahun Abate and Mesfin Tadesse, 1976. A Study of the Medicinal Plants of Ethiopia, Part 1. Department of Biology, Addis Ababa University (mimeographed, in Amharic).
9. Kloos, H., A. Tekle, L. Yohannes, A. Yosef & A. Lemma. 1978. **Preliminary studies of traditional medicinal plants in nineteen markets in Ethiopia: use patterns and public health aspects**. *Ethiopian Medical Journal* 16:33-43.
10. Abegaz, B. and Dagne, E. (1978), Comparative bioassay studies of some traditional anthelmintic plants, plant extracts and modern drugs. *SINET: Ethiop.J.Sci* 1(2): 117- 121.
11. Tsega, E., Landells, J., Teklehaimanot, R., Berkassa, T., Tessema, D. (1978), Kosso toxicity in mice. *SINET: Ethiop.J.Sci* 1(2): 99-106
12. Slikkerveer LJ. **Rural health development in Ethiopia. Problems of utilization of traditional healers.** *Soc Sci Med* 1982;16(21):1859-72.

Abstract

In Ethiopia, a pluralistic complex of multiple and simultaneous medical care utilization has constituted the Ethiopian variant of medical pluralism in East Africa, where through a process of acculturation, Cushitic, Arabic and Amharic medical traditions co-exist with cosmopolitan medicine. On request of the central government, joint medical-sociological and anthropological research between in Universities of Addis Ababa and Leiden was conducted in the Eastern Highlands with the main objective to formulate recommendations for the improvement and extension of the health care facilities in the rural areas. The situational analysis revealed relatively low utilization rates of the "official" health services by the local population. Consequently a desire was expressed to undertake health services development research, particularly centered upon the functioning of the various medical systems and sub-systems in Hararghe. In order to assess the overall pattern of illness behaviour special consideration was given to the question "when, and to what extent do people use the available medical systems?". After the completion of the subsequent subjective and objective health surveys the concept of "distance reduction" between provider and consumer of health care was introduced in order to increase the utilization of the formal health services, taking into account the problems related to geographical, economic and socio-cultural distance. In this paper, a description will be given of the existing alternative health care resources. In addition, the positive contribution which the concept of medical pluralism could provide to rural health planning will be examined within the context of the research project. This will include a discussion of the problems encountered in connection with the utilization of traditional healers and the possibilities for their incorporation into a future syncretic type of national health care delivery system.

13. Berhanu Abegaz and P.G. Yohannes, 1982. Constituents of the essential oil of *Artemisia rehan*. *Phytochemistry*, 21: 1791-1793.
14. Yohannes, P.G., and Dagne, E. (1983), Comparative study of male and female flowers of *Hagenia abyssinica* Gmel. *SINET: Ethiop.J.Sci* 6(1): 31-34
15. Legasse wolde Yohannis (1983) Past and on growing agro botanical studies of Endod in Ethiopia.
16. Abebe W. **Traditional pharmaceutical practice in Gondar region, northwestern Ethiopia.** *J Ethnopharmacol*. 1984 Jun;11(1):33-47.

Abstract

The knowledge and skills of Ethiopian traditional healers in Gondar region on the pharmaceutical aspects of their practice were assessed using a questionnaire. Of the 86 healers interviewed, only 83 gave responses good enough to be considered in the analysis of results. It was shown that the healers obtained their drugs mainly from natural substances and these in descending order of frequency were plants, animals and minerals. The healers prepared the drugs in various dosage forms including liquids, ointments, powders and pills. They also prescribed drugs in a "non-formulated" form. They usually incorporated additives and more than one drug in a single dosage form. Drugs were administered using eight routes, the main ones being, topical, oral and respiratory. Most of the healers claimed to determine doses and to know about side-effects of drugs. When side-effects became severe, "antidotes" were claimed to be used. The healers imposed restriction when certain types of drugs were taken by patients. Most of them stored the drugs that should not be dispensed immediately after collection or preparation. Drugs were usually stored in containers such as bottles, papers, pieces of cloth, leaves and horns, and were kept anywhere at home. The results are discussed mainly in relation to modern pharmaceutical and medical practices and their importance to health care services among the people in Gondar region is also stated.

- 17.** Asres K, Phillipson JD, Mascagni P. **Two novel minor alkaloids from Ethiopian *Calpurnia aurea* Ssp. *aurea*. *Planta Med.* 1986 Aug;(4):302-4.**

Abstract

Two novel minor quinolizidine alkaloids 4 beta-hydroxy-13alpha- O-(2'-pyrrolylcarbonyl)-lupanine (digittine) and its amino alcohol, 4 beta, 13alpha-dihydroxylupanine, have been isolated from Ethiopian *Calpurnia aurea* ssp. *aurea*. The structures of these alkaloids were determined by chemical transformation and by means of spectroscopic techniques (UV, IR, CD, MS, (1)H-NMR and (13)C-NMR) including two dimensional NMR.

- 18.** Abebe, W. 1986. **A survey of prescriptions used in traditional medicine in Gondar Region, Northwestern Ethiopia: General pharmaceutical practice.** *Journal of Ethnopharmacology* 18:47-165.

Abstract : No

19. Abebe D: Traditional medicine in Ethiopia: the attempts being made to promote it for effective and better utilization. SINET Ethiopia J. Sci 1986, 9:61-69.
20. Tadesse, M. (1986), Some Medicinal plants of Central Shoa and South-Western Ethiopia, SINET: Ethiop.J.Sci., 9 (Suppl): 143-167.
21. Kloos H, Etea A, Degefa A, Aga H, Solomon B, Abera K, Abegaz A, Belemo G. **Illness and health behaviour in Addis Ababa and rural central Ethiopia.** *Soc Sci Med.* 1987;25(9):1003-19.

Abstract

This paper examines the results of health surveys among 544 randomly selected households (2829 people) in seven kebele (urban dwellers' associations) in Addis Ababa and Kaliti, an industrial suburb of Addis Ababa, and in four rural villages in two peasant associations. The major objective was to study illness distribution and health behaviour among different socioeconomic and cultural groups in urban and rural communities within the context of available health resources, national health policy and planning. Results show that in spite of the rapid expansion of health services since the Ethiopian revolution serious problems of allocation and access persist. Higher illness prevalence rates were found in rural areas (23.2%), Kaliti (25.5%) and in the low socioeconomic kebele in Addis Ababa (23.9%) than in the high socioeconomic kebele (16.5%), but rural/urban and intraurban differences were greater than reported here due to underreporting. One-third of all illnesses were treated by modern services, 19.9% by self care and 26.0% by traditional medicine and transitional healers, with 21.5% of all illnesses not being treated. Utilization rates varied with type and duration of illness, socioeconomic level, age, sex and place of residence. The role of distance and other contact barriers, treatment outcome and availability of private clinics and alternative health resources in utilization is also evaluated. Coverage of the modern health services was associated with socioeconomic status and mobility of patients as well as availability of health services.

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23. Bishaw, M. 1988. **Integrating Indigenous and Cosmopolitan Medicine in Ethiopia.** Southern Illinois University, Carbondale, Illinois.
24. Negussie B. Traditional wisdom and modern development: A case study of traditional perinatal knowledge among women in southern Shewa, Ethiopia. Doctoral dissertation, University of Stockholm, December 1988.
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26. Bishaw M. The implications of indigenous medical beliefs to biomedical practice. *Ethiopian J Health Dev.*1989;3:75–89.
27. Schneider P, Shewangizaw E, Taye E, Gebrehiwot T, Worku S, Oppermann J, Leupold W, Teka T. Traditional medicine in Ethiopia in childhood diseases. *Kinderarztl Praxis* 1989;57(8):393-9.
28. Bishaw M. **Attitudes of modern and traditional medical practitioners toward cooperation.** *Ethiop Med J* 1990 Apr;28(2):63-72.

#### Abstract

Between 1985 and 1987 a total of 103 modern and 91 traditional medical practitioners were interviewed in seven towns in northwestern and central Ethiopia. The main aim was to assess their attitudes toward the legitimacy of each other's medical system and, especially, toward the question of cooperation or integration between modern and traditional medicine. It was found that the majority of the two groups of health workers believed that cooperation between the two systems of medicine would be useful and that they themselves would be willing to participate in such

cooperative efforts. Those willing to cooperate suggested that traditional healers be (1) brought into the existing, official health-care settings, (2) given regular government wages for their services, and (3) guided and supervised by their modern counterparts.

29. Elmi, A.S., (1990), **Research into medicinal plants: The Somali Experience**. In: Proceedings of International Conference on Traditional Medicinal Plants, Mshigeni, K.E., Nkuanya, M.H.H., Fupi, V., Mahunnah, R.L.A., Mshiu, E.N. (Eds), Arusha, Tanzania, pp. 27-32.
30. Mesfin Tadesse and Berhanu Abegaz, 1990. A revision of the genus *Echinops* (Compositae – Cardueae) in Ethiopia with notes on phytogeography and chemistry. In: Ihlenfeldt, H.-D. (ed.), Mitt. Inst. Allg. Bot. Hamburg, Band 23b S: 605-629.
- 31.

**1991**

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- 32. Bishaw M. Promoting traditional medicine in Ethiopia: a brief historical review of government policy.***Soc Sci Med.* 1991;33(2):193-200.

Abstract

Past and current official policy toward Ethiopian traditional medicine is reviewed. To facilitate the objective assessment of official policy, the nature and historical origins of Ethiopian traditional medicine is examined briefly. It is noted that there is no single system of traditional medicine in Ethiopia, even though themes that are common to the many cultural groups constituting the society have been evolving. Common to most systems of Ethiopian traditional medicine are the interdigitation of 'mystical' and 'natural' explanations of ill-health and other misfortune and the holistic approach employed in dealing with illness and other personal misfortune. It is also noted that since the 1974 change of government in Ethiopia, official attitude toward the promotion and development of traditional medicine appears to have become more positive, especially, after the adoption of the Primary Health Care strategy in 1978. While this is true as far as official statements are concerned, in actual practice there continues to be considerable uncertainty about the interpretation and implementation of Government policy. It is suggested that misconceptions regarding the nature and role of traditional medicine in Ethiopian society will have to be corrected if appropriate plans and strategies are to be formulated.

- 33. Abebe, D. & E. Hagos. 1991. Plants as a primary source of drugs in traditional health practices of Ethiopia. Pp. 101-113 in Plant Genetic Resources of Ethiopia.** Edited by J.M.M. Engels J. G. Hawkes & M. Worede. Cambridge University Press, Cambridge.

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- 36.** Abebe D, Hagos E (1991): Plants as a primary source of drugs in the traditional health practices of Ethiopia. In: Plant Genetic resources of Ethiopia. Eds: Engles J, Hawkes J, Worede M. Cambridge: Cambridge University Press, 101-113.
- 37.** Hymete, A. and Kidane, A. (1991) Screening for Anthelmintic Activity in Two *Echinops* spp. *Ethiop. The Pharmaceutical Journal*, 9, 67-71.
- 38.** Berhanu M. Abegaz, Mesfin Tadesse and Majinda, R., 1991. Distribution of sesquiterpene lactones and polyacetylenic thiophenes in *Echinops* (Compositae). *Biochemical Systematics and Ecology*, 19(4): 323 - 328.
- 39.** Jacobsson L, Merdasa F. Traditional perceptions and treatment of mental disorders in western Ethiopia before the 1974 revolution. *Acta Psychiatr Scand* 1991;84(5):475-81.
- 40.**

**1992**

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- 41.** Asres, K., Murthy, P.N., Djote, M. (1992), **Antimicrobial Screening of Calotropis Procera, Calpurnia aures and Melia azedarach growing in Ethiopia**, *Ethiop.Pharm J.*, 10(1): 43-49
- 42.** Tadesse, M. & S. Demissew. 1992. Medicinal Ethiopian plants: Inventory, identification and classification. *Botany 2000: East and Central Africa NAPRECA Monograph 5*:1- 19.
- 43.** Asres, K., Murthy, P.N., Djote, M. (1992), **Antimicrobial Screening of Calotropis Procera, Calpurnia aures and Melia azedarach growing in Ethiopia**, *Ethiop.Pharm J.*, 10(1): 43-49
- 44.** Anokbongo WW. The role of African traditional medicine in health-care delivery alongside modern medicine. In: Edwards S and Asfaw Z. eds. *Plants used in African traditional medicine as practiced in Ethiopia and Uganda*. *Botany 2000: East and Central Africa. NAPRECA Monograph Series No. 5*. Addis Ababa: NAPRECA & Addis Ababa University, 1992;25-35.
- 45.** Mesfin Tadesse and Sebsebe Demissew, 1992. *Medicinal Ethiopian Plants:Inventory, Identification and Classification*. In: Sue Edwards & Zemedede Asfaw, (eds.). *Plants Used in African Traditional Medicine as Practiced in Ethiopia and Uganda*. *Botany 2000: East and Central Africa. NAPRECA Monograph Series No. 5*: 1-24.
- 46.**

1993

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47. Tadesse A, Gebre-Hiwot A, Asres K, Djote M, Frommel D. **The *in-vitro* activity of *Vernonia amygdalina* on *Leishmania aethiopica*.** *Ethiop Med J.* 1993 Jul;31(3):183-9.

Abstract

Anti-leishmanial activity of chloroform and methanol extracts of *Vernonia amygdalina*, a plant widely used in Ethiopia for the treatment of parasitic infections, has been assessed *in vitro* on *Leishmania aethiopica*. Amastigotes were more sensitive to *V. amygdalina* than promastigotes. The chloroform extract had a stronger parasiticidal activity, with median effective doses (ED50) of 18.5 micrograms/ml and 13.3 micrograms/ml for promastigotes and amastigotes, than the methanol extract with ED50 of 74.4 micrograms/ml and 45.8 micrograms/ml respectively. Cytotoxicity caused by *V. amygdalina* to host cells, the human leukaemia monocyte THP-1 cell line, as determined by the methyl tetrazolium assay, resulted in a median lethal dose (LD50) of 19.6 micrograms/ml for the chloroform extract and 243.4 micrograms/ml for the methanol extract. In comparison, the ED50 and LD50 of pentamidine, a standard anti-leishmanial drug, were 0.5 micrograms/ml and 1.4 micrograms/ml respectively. These results indicate that *V. amygdalina* displays potent anti-leishmanial activities and warrants further investigation.

48. Desta B. **Ethiopian traditional herbal drugs. Part II: Antimicrobial activity of 63 medicinal plants.** *J Ethnopharmacol.* 1993 Jun;39(2):129-39.

Abstract

A total of 315 extracts/fractions from 63 traditionally used Ethiopian plants were subjected to antimicrobial screening using known strains of *Staphylococcus aureus*, *Salmonella gallinarum*, *Escherichia coli*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* and *Candida albicans*. The agar plate well-diffusion method was used at a sample concentration of 1000 micrograms/ml; it was found that all of the plants showed activity against one or more of the microorganism(s). Direct aqueous extracts from six plants were found to be active against all of

the test organisms. These findings confirm traditional therapeutic claims for aqueous dosage forms of these herbs. The relative susceptibility of the test organisms to the five types of extracts/fractions indicated a decreasing rank order of: *S. aureus*, *P. aeruginosa*, *C. albicans*, *S. gallinarum*, *E. coli*, *K. pneumoniae* and *P. vulgaris*.

- 49.** Abebe, D. & A. Ayehu. 1993. **Medicinal Plants and Enigmatic Health Practices in Northern Ethiopia**. World Health Organization, Ethiopian Ministry of Health Project No. AF/ ETH/TRM/001RB and the United Nations Development Programme.

Abstract: No

- 50.** Tadesse, M. & S. Demissew. 1992. **Medicinal Ethiopian plants: Inventory, identification and classification. Botany 2000: East and Central Africa NAPRECA Monograph 5:1- 19.**

Abstract: No

- 51.** Petros, B., Sorsa, S., Balcha, F. and Bogale, M. (1993), An in vitro screening of some Ethiopian traditional medicinal plants against Plasmodium falciparum, In: Fifth NAPRECA symposium on Natural products, Antananarivo, Madagascar.

- 52.** Abebe D, Ayehu A: Medicinal Plants and Enigmatic Health Practices of Northern Ethiopia. Addis Ababa: BSPP; 1993.

- 53.** Gebre-Mariam A, Lemma F and Alemu Y. Utilization of traditional medicine among inpatients in Jimma hospital. Ethiop J Health Dev. 1993;7(2):119

- 54.** Dejene A, Cherinet H, H/Meskel F, Gudunfa A and Mekonnen A. Knowledge, attitude and practice (KAP) towards harmful traditional practices among high school students in Addis Ababa. Ethiop J Health Dev. 1993;7(2):119-120.

**55.** Mirgassa K. (1993) Indigenous Medical Beliefs and Practices Among the Oromo of Illubabaor, Addis Ababa University, (Unpublished M.A Thesis in Addis Ababa University).

**56.**

**1994**

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- 57.** Mesfin T, Obsa T. **Ethiopian traditional veterinary practices and their possible contribution to animal production and management.** *Rev Sci Tech.* 1994 Jun;13(2):417-24.

Abstract

The wide variety of traditional veterinary practices maintained within different ethnic groups provides an indication of the potential usefulness of this neglected knowledge for the Ethiopian livestock husbandry. In Ethiopia, as in other countries, traditional veterinary medicine involves the work of bone-setters, midwives, religious healers and people who claim the ability to communicate with devils. The knowledge of pastoralists in the areas of tick control, recognition of toxic plants, traditional surgery and traditional vaccination methods is described. Efforts by a Chinese veterinary team to promote traditional Ethiopian veterinary practices have been encouraging. Further evaluation of traditional veterinary practices is recommended as a condition for the integration of these practices with those of modern veterinary medicine. It is also suggested that this evaluation be coordinated and encouraged by the Veterinary Service of the Ministry of Agriculture in Ethiopia.

- 58.** Stadler M, Dagne E, Anke H. **Nematicidal activities of two phytoalexins from *Taverniera abyssinica*.** *Planta Med.* 1994 Dec;60(6):550-2.

Abstract

The traditional analgesic and antipyretic Ethiopian drug "Dingetegna" is made of dried root material of *Taverniera abyssinica* A. Rich (Leguminosae). In a screening for nematicidal natural products, "Dingetegna" extracts showed strong nematicidal activities towards *C. elegans*. In the following, medicarpin and 4-hydroxymedicarpin were isolated as nematicidal constituents from the extracts. In a microwell plate assay for nematicidal activity, both compounds exhibited an LD50 of 25 micrograms/ml towards *C. elegans*. Beside these nematicidal effects, weak cytotoxic and antimicrobial activities were observed. In addition, both compounds inhibited oxygen consumption of axenically grown *C. elegans*, L 1210 cells, and filamentous fungi. Respiration in

sensitive bacteria was not affected. In L 1210 cells, the incorporation of precursors into macromolecules was affected in the presence of glucose, indicating that inhibition of respiration is not the only target site of the compounds.

- 59.** Bitew, A., Abate, D. (1994), Preliminary screening of Basidiomycetes for Antimicrobial activity, *Ethiop.Pharm J.*, 12:28-37.
- 60.** Mesfin Tadesse, 1994. Traditional Use of Some Medicinal Plants in Ethiopia. In: Seyani J.H. & Chikuni, A.C. (ed.) *Proc. XIIIth Plenary Meeting of AETFAT, Malawi*, 1: 273-293

**1995**

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- 61.** Desta B. **Ethiopian traditional herbal drugs. Part I: Studies on the toxicity and therapeutic activity of local taenicial medications.** *J Ethnopharmacol.* 1995 Jan;45(1):27-33.

Abstract

The quantitative toxicities of 33 taenicial herbal drugs are presented, expressed as their intraperitoneal LD50 values in mice and their respective median effective oral dose and worm expulsion time in humans. Rank orders of toxicity, taenicial potency and worm expulsion time of the herbal medications are indicated along with a discussion of their respective therapeutic merits and untoward effects. On the basis of considerations of lower toxicity, higher potency and shorter worm expulsion time, the taenicial herbal medications are arranged in decreasing rank order of preference. Other therapeutic uses of the herbs are also presented and discussed.

- 62.** Aklilu lema (1995) A preliminary report on these molluscidal properties of Endod (Phtolacca dodecandra). *Ethiopian medicinal journal* 3: 187-190.

- 63.** Aklilu lema (1995) A preliminary report on these molluscidal properties of Endod (Phtolacca dodecandra). *Ethiopian medicinal journal* 3: 187-190.

**64.**

**1996**

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**65. Hodes RM, Teferedegne B. Traditional beliefs and disease practices of Ethiopian Jews.**

*Isr J Med Sci.* 1996 Jul;32(7):561-7.

Abstract

In an attempt to assess concepts of disease, we questioned 33 Ethiopian Jews (Falashas) in Ethiopia about 13 diseases: 8 western and 5 cultural syndromes (in the Amharic language): birrd (cold), wugat (stabbing chest pain), moygnbagegn (neurologic disorder), mitch (sunstroke), and attent hono kere (retained fetus becoming bone). Disease causation was often attributed to spirits and the sun. None of the interviewees understood the cause of: a) epilepsy, most attributing it to spirits and recommending smelling match smoke as treatment, b) prolonged labor, attributed by most to the evil kole spirit and is managed by traditional birth attendants; and c) abortion, believed to be caused by exposure to sun or cold. Less than 20% linked malaria to mosquitoes. Most correlated splenomegaly with malaria. Hepatitis was believed to be caused by a bird or bat flying around the affected person. Multiple factors were linked to diarrhea, including a journey in the sun. Moygnbagegn is the only condition treated by venisection from brachial veins; wugat is treated by "cupping". Modern medicine was recommended by < 30% of those questioned for epilepsy, splenomegaly, hepatitis, and Ethiopian cultural diseases. It was recommended most for malaria (52%), sexually transmitted diseases (55%), and diarrhea (69%).

**66. Agro-Bio Ethiopia. 1996. Six-hundred Ethiopian plants have medicinal value.**

[www.wam.umd.edu/~tes/agrobioeth.htm](http://www.wam.umd.edu/~tes/agrobioeth.htm)

**67. Asres, K. and Nigussie, T. (1996), Antibacterial activity of Commphora tennisvollese, Ethiop.Pharm J., 14:22-27.**

**68. Kassa, M., Mohana, R., and Hunde, A. (1996), Antimalarial activity of Bersama abyssinica against Plasmodium falciparum, Ethiop.Pharm J., 14:16-21.**

- 69.** Bogale, M., Petros, B. (1996), Evaluation of the antimalarial activity of some Ethiopian traditional medicinal plants against *Plasmodium falciparum* in vitro, *SINET: Ethiop. J. Sci*, 19(2): 2333-243.
- 70.** Desta, Y., Debell, A. and Assefa, G. (1996), Traditional Medicine: Global and National perspectives. In: Proceedings of the workshop on Development and utilization of Herbal Remedies in Ethiopia, Dawit Abebe (Ed), Ethiopian Health and Nutrition Research Institute, Addis Ababa, pp. 1-19.
- 71.** Messeret shiferaw (1996), The role of health professionals in the development of traditional medicine in Ethiopia. In: Proceedings of the workshop on Development and utilization of Herbal Remedies in Ethiopia, Dawit Abebe (Ed), Ethiopian Health and Nutrition Research Institute, Addis Ababa, pp. 15-18.
- 72.** Kassaye M. Integration of traditional medicine with modern care services. In: Abebe D. ed. Proceedings of the workshop on development and utilization of herbal remedies in Ethiopia. 1996 June 4-6; Addis Ababa: EHNRI, 1996:10-14.
- 73.** Gebre-Mariam T, Gebre T and Hunde A. Standardization and dosage form development of herbal remedies: Part II. In: Abebe D. ed. Proceedings of the workshop on development and utilization of herbal remedies in Ethiopia. 1996 June 4-6; Addis Ababa: EHNRI, 1996:69-78.
- 74.** Hymete, A. and Afifi, M.S. (1997) Investigation of the Fixed Oil Isolated from the Roots of *Echinops kebericho* Mesfin. Mansoura. *Journal of Pharmacological Sciences*, 13, 59-69.
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76. Birrie H, Balcha F, Erko B, Bezuneh A, Gemedra N. **Investigation into the cercariacidal and miracidiacidal properties of Endod (*Phytolacca dodecandra*) berries (type 44).** *East Afr Med J.* 1998 May;75(5):311-4.

Abstract

Aqueous extract of ground Endod (*Phytolacca dodecandra*) berries (Type 44) was investigated for its cercariacidal and miracidiacidal properties. Aqueous extract of the berries prevented snails from being infected by miracidia at a concentration of 4 ppm. Assessment of cercariacidal activity of Endod berries indicated that mortality of cercariae exposed to aqueous extract of Endod berries increased with increase in concentration of the test material and exposure time. Viability assessment test showed that pre-treatment of the cercariae with 12 ppm of the extract completely inhibited infection of mice by cercariae and significantly reduced tissue egg deposition and worm establishment in the mice (ANOVA,  $P < 0.05$ ) The potential use of (*Phytolacca dodecandra*) berries against schistosome larval stages in fresh water in a schistosomiasis control program is discussed.

77. Asres K, Tei A, Moges G, Sporer F, Wink M. **Terpenoid composition of the wound-induced bark exudate of *Commiphora tenuis* from Ethiopia.** *Planta Med.* 1998 Jun;64(5):473-5.

Abstract

The bark of *Commiphora tenuis* Vollensen exudes a translucent, free-flowing odoriferous liquid upon wounding which was analysed by capillary GLC and GLC-MS. 42 mono- and sesquiterpenes were detected and 37 identified. The main components of the monoterpenoid fraction were alpha-pinene (60.8%), beta-pinene (8.8%), sabinene (6.3%), alpha-thujene (8.9%), limonene (5.5%), 3-carene (3.7%), beta-myrcene (1.8%), and beta-elemene (1.1%) constituting 97% of the oil. Identified sesquiterpenoid components constituted approximately 1.6% of the oil. Oleanolic acid

acetate was isolated and identified as the main triterpene from the resin by <sup>1</sup>H- and <sup>13</sup>C-NMR. Three other triterpenes of the olean-12-ene group were also detected using GC-MS. The essential oil exhibited antibacterial activities against *Staphylococcus aureus*, *Proteus mirabilis* and *E. coli* with MIC between 0.5 and 1%.

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- 79.** Gebremariam T, Asres K. Applied Research in Medicinal Plants. Addis Ababa: Biodiversity Institute; 1998. (Programme and Abstract of National Workshop on “Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia”, April 28–May 1).
- 80.** Abrararw Tesfaye (1998) Traditional Medicine in Urban Centers: Beliefs and Practices; The Case of Dessie Town. (Unpublished M.A Thesis in Addis Ababa University)
- 81.** National Committee on Traditional Practices of Ethiopia, Project Report; Baseline Survey on Harmful Traditional Practice in Ethiopia. Addis Ababa, Ethiopia; Feb, 1998.
- 82.** Endale, A., Kassa, M. and Gebre-Mariam, T. (1998), In vitro anthelmintic activity of the extracts of the seeds of *G. lotoids* in albino mice infected with *Hymenolopisnana* worms, *Ethiop.Pharm J.*, 16:34-41.
- 83.** Kassa, M., Mshana, R., Regassa, A., and Assefa, G. (1998), in vitro test of five Ethiopian medicinal plants for antimalarial activity against *Plasmodium falciparum*, *SINET: Ethiop. J. Sci.*, 21: 81.
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- 85. Mekonnen Y. Effects of ethanol extract of *Moringa stenopetala* leaves on guinea-pig and mouse smooth muscle. *Phytother Res.* 1999 Aug;13(5):442-4.**

Abstract

The fresh leaf ethanol (LE) extract of *Moringa stenopetala* was tested in guinea-pig ileum and mouse duodenum and in uterus strips. There were significant dose and time dependent reductions of the acetylcholine (AC) response with initial stimulatory effects in both the guinea-pig ileum and the mouse duodenum preparations. Spontaneous rhythmic contractions were greatly reduced, suggesting an antispasmodic property of the crude LE extract. The LE extract showed some oxytocic activity on uterus strips of guinea-pigs and mice. The results are indicative of the traditional use of the leaves of *Moringa stenopetala* for stomach pain and to expel retained placentae by women.

- 86. Mekonnen Y, Yardley V, Rock P, Croft S. In vitro antitrypanosomal activity of *Moringa stenopetala* leaves and roots. *Phytother Res.* 1999 Sep;13(6):538-9.**

Abstract

The leaves and the root extracts of *Moringa stenopetala* were tested in vitro against trypomastigotes of *Trypanosoma brucei*, *Trypanosoma cruzi* and *L. donovani amastigotes*. The fresh root wood ethanol extract and the dried leaves acetone extract were found to be active against *T. brucei* with an ED(50) value of 9.2 microg/mL and 10.0 microg/mL respectively. All the other extracts were inactive against all the tested parasite form

- 87. Kassu A, Dagne E, Abate D, Castro A, Van Wyk BE. Ethnomedical aspects of the commonly used toothbrush sticks in Ethiopia. *East Afr Med J.* 1999 Nov;76(11):651-3.**

Abstract

**OBJECTIVE:** To determine the botanical identity, cytotoxicity, and antibacterial property of the commonly used toothbrush sticks in Ethiopia.

**SETTING:** Research laboratories of the departments of Biology and Chemistry, Addis Ababa University between December 1993 and May 1995.

**METHODS:** The study was performed by purchasing the commonly used toothbrush sticks from street markets in various towns of Ethiopia. Voucher specimens were collected and their botanical identity was determined following floral keys. The toothbrush sticks were ground in a mill and soaked in absolute methanol for 24 hours and filtered. The filtrates were dried in a rotary evaporator and the crude extracts were stored at 4 degrees C. The crude methanol extracts were used to test their antibacterial activity by impregnating into filter paper discs and placing on test plates of *Staphylococcus aureus* and *Bacillus cerues*. Their lethality to brine shrimp (*Artemia salina*) was performed following standard procedures.

**RESULTS:** Twenty different species of plant used as toothbrush were collected and their botanical identity determined. Crude methanol extracts of only *Agave sisalana*, Birbira and *Hypericum revolutum* test concentrations up to 500 micrograms/ml showed weak toxicity to brine shrimp. All the extracts showed antibacterial activity against *Staphylococcus aureus* and *Bacillus cereus* by agar diffusion method.

**CONCLUSION:** Toothbrush sticks can be used by the vast majority of people who cannot afford buying the commercial toothbrush and toothpaste. The toothbrush sticks may be important for the oral and dental hygiene of the users and hence may be useful in decreasing dental caries. Further studies should focus on the effect of the toothbrush sticks against other common bacteria that are associated with dental diseases.

- 88.** Alem A, Jacobsson L, Araya M, Kebede D, Kullgren G. **How are mental disorders seen and where is help sought in a rural Ethiopian community? A key informant study in Butajira, Ethiopia.** *Acta Psychiatr Scand Suppl.* 1999;397:40-7.

Abstract

One hundred key informants were interviewed about their awareness, attitudes and practices regarding mental illness using the Key Informant Questionnaire developed by WHO. Case vignettes of seven common neuropsychiatric disorders were presented to the key informants. Informants' awareness about these disorders and help-seeking practices for mental and physical symptoms or conditions were assessed. An additional question on the prototype symptoms of mental disorders was also posed. Among the presented seven conditions, epilepsy was perceived as the most common condition and major depression was regarded as the least common one. Schizophrenia was judged as the most severe problem, and mental retardation was considered the second most severe condition. Talkativeness, aggression and strange behaviour were the most frequently perceived prototype symptoms of mental illness. Traditional treatment methods were preferred more often for treating symptoms of mental disorders and modern medicine was preferred more often for treating physical diseases or symptoms. Findings of this study are similar to other studies conducted in socio-culturally different communities. Working in close connection with traditional healers would give the primary health care worker a better opportunity to gain acceptance from the community and modify certain harmful practices.

- 89.** Makonnen E, Zerihun L, Assefa G, Rostom AA. **Antifertility activity of *Ricinus communis* seed in female guinea pigs.** *East Afr Med J.* 1999 Jun;76(6):335-7.

Abstract

**OBJECTIVE:** To investigate the anti-fertility effect of *Ricinus communis* seed extract.

**DESIGN:** Laboratory-based experiment.

SETTING: Laboratory of the Department of Pharmacology, Faculty of Medicine, Addis Ababa University, Addis Ababa, Ethiopia in 1996.

RESULTS: The seed extract was found to possess anti-implantation and abortifacient effects. It was also observed that the seed extract prolonged the oestrus cycle of guinea pigs. The dioestrus phase was significantly prolonged as well. After stopping administering the extract, however, the normal dioestrus phase and oestrus cycle started to resume. The seed extract also reduced the weight of the uterus without affecting that of the ovaries significantly.

CONCLUSION: *Ricinus communis* possesses an anti-fertility effect in female guinea pigs, which might be extrapolated in human beings. These findings might support the accredited claim of its traditional use to avoid unwanted pregnancies. Further studies, however, should be pursued.

**90.** Debella A, Haslinger E, Kunert O, Michl G, Abebe D. **Steroidal saponins from *Asparagus africanus*.** *Phytochemistry*. 1999 Aug;51(8):1069-75.

Abstract

The structures of two new monodesmosidic spirostanosides and a new bisdesmosidic furostanol glycoside isolated from the roots of *Asparagus africanus* Lam. (Liliaceae) have been elucidated as (25R)-3 beta-hydroxy-5 beta-spirostan-12-one 3-O-{beta-D-glucopyranosyl-(1-->2)-[alpha-1-arabinopyranosyl-(1--> 6)]-beta- D-glucopyranoside} (1), (25R)-5 beta-spirostan-3 beta-ol 3-O-{beta-D-glucopyranosyl-(1-->2)-[alpha-L-arabinopyranosyl-(1--> 6)]-beta- D-glucopyranoside} (2) and 26-O-beta-D-glucopyranosyl]-22 alpha-methoxy-(25R)-furostan-3 beta,26-diol 3-O-{beta-D-glucopyranosyl-(1-->2)-[beta-D-glucopyranoside} (3), respectively, by the combined use of one and two dimensional NMR experiments. The complete <sup>13</sup>C and <sup>1</sup>H assignments of the peracetyl spirostanosides and the furostanol oligoside were derived. The interconversions between the methoxyl and hydroxyl group at C-22 of the furostanol glycoside was investigated and the genuine furostanol oligoside of *A. africanus* appears to be the hydroxyl type based on the comparative study of the methanol, pyridine and dioxane extracts.

**91.** Mekonnen Y, Yardley V, Rock P, Croft S. **In vitro antitrypanosomal activity of *Moringa stenopetala* leaves and roots.** *Phytother Res*. 1999 Sep;13(6):538-9.

Abstract

The leaves and the root extracts of *Moringa stenopetala* were tested in vitro against trypomastigotes of *Trypanosoma brucei*, *Trypanosoma cruzi* and *L. donovani* amastigotes. The fresh root wood ethanol extract and the dried leaves acetone extract were found to be active against *T. brucei* with an ED(50) value of 9.2 microg/mL and 10.0 microg/mL respectively. All the other extracts were inactive against all the tested parasite forms.

**92. Mekonnen Y. Effects of ethanol extract of *Moringa stenopetala* leaves on guinea-pig and mouse smooth muscle.** Phytother Res. 1999 Aug;13(5):442-4.

Abstract

The fresh leaf ethanol (LE) extract of *Moringa stenopetala* was tested in guinea-pig ileum and mouse duodenum and in uterus strips. There were significant dose and time dependent reductions of the acetylcholine (AC) response with initial stimulatory effects in both the guinea-pig ileum and the mouse duodenum preparations. Spontaneous rhythmic contractions were greatly reduced, suggesting an antispasmodic property of the crude LE extract. The LE extract showed some oxytocic activity on uterus strips of guinea-pigs and mice. The results are indicative of the traditional use of the leaves of *Moringa stenopetala* for stomach pain and to expel retained placentae by women.

**93. Mintesnot Ashebir , Mogessie Ashenafi Assessment of the antibacterial activity of Some traditional medicinal plants on some food-borne pathogens** Ethiop. J. Health Dev. 1999;13(3):211-216

Abstract:

Crude preparations of four types of traditional medicinal plants used in Ethiopia, collected from local markets, were assessed for their antimicrobial activity against some foodborne pathogens. The growth or inhibition of *Bacillus cereus*, *Staphylococcus aureus*, *Shigella boydii*, *Shigella flexneri*, *Salmonella typhimurium*, and *Escherichia coli* was determined in growth media separately containing *Artemisia afra* (5%), *Vernonia amygdalina* (7%), *Lepidium sativum* ((2%)

and *Carum copticum* (10%). None of the test organisms was affected by *Lepidium sativum* in 24 hours. *B. cereus* and *Staph. aureus* had markedly lower final counts in media containing crude preparations of *Vernonia amygdalina*, *Carum copticum*, and *Artemisia afra* when compared to control. Retarding effect was noted on *Sh. Flexineri* and *Sh. Boydii* in the initial stages by *Vernonia amygdalina* and *Artemisia afra*. Counts of *S. typhimurium* in all crude preparations were lower by about one log unit than the control until eight hours. None of the crude preparations had any effect on *E. coli*. The antimicrobial effect of some of the crude preparations may be considerably enhanced in traditional treatment if they are taken at four hour intervals.

- 94.** Asfaw Debella, Dawit Abebe and Kelbesa Urga. **Traditional Medicine in Ethiopia: Perspectives and Development Efforts.** *J. Ethiop Med. Pract.* December 1999; 1(2):114-117.

#### Abstract

Traditional medicine and surgery remain to be the best alternative health care system in Ethiopia available to more than 80% of the population. Although it was practiced for thousands of years, writings in Ethiopia date back few centuries. The effort to develop this sector is strengthened by the existing policies and the establishment of traditional medicine and drug research departments at the national level. Over 600 medicinal plants have been identified and their effects recorded. Five were recently been released to the public for mass production after extensive research proved them safe and effective. It is recommended that similar efforts be done for other favorable aspects of Ethiopian traditional medicine besides regulating unsafe practices.

- 95.** Zemedu A (1999) Ethno botany of nation nationalities and peoples in Gambella, benishangul gumuz and southern region of Ethiopia and publications office of Addis Ababa University. Addis Ababa. pp. 172.

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97. Debella A, Haslinger E, Schmid MG, Bucar F, Michl G, Abebe D, Kunert O. **Triterpenoid saponins and sapogenin lactones from *Albizia gummifera*.** *Phytochemistry*. 2000 Apr;53(8):885-92.

Abstract

The structures of two new monodesmosidic and bisdesmosidic triterpenoid saponins (1 and 2) and the known compound delta 5-stigmasterol-3-O-beta-D-glucopyranoside (3) as well as two new oleanane type triterpene lactone glycosides 4, 5 and a new sapogenin lactone 6 isolated from the stem bark of *Albizia gummifera* C.A. Smith (Mimosaceae) have been elucidated as 3-O-beta-D-glucopyranosyl(1->2)-[alpha-L-arabinopyranosyl(1->6)]-beta-D-glucopyranosyl-oleanolic acid (1), beta-D-glucopyranosyl(1->2)-beta-D-glucopyranosyl 3-O-beta-D-glucopyranosyl(1->2)-[alpha-L-arabinopyranosyl(1->6)]-beta-D-glucopyranosyl-oleanolate (2), 3 beta-O-D-glucopyranosyl-(1->2)-[O-alpha-L-arabinopyranosyl(1->6)] beta-D-glucopyranosyloxy-machaerinic acid gamma-lactone (4), 3 beta-O-beta-D-glucopyranosiduronic acid (1->2)-beta-D-glucopyranosyloxy]-machaerinic acid gamma-lactone (5), and A-homo-3a-oxa-5 beta-olean-12-en-3-one-28-oic acid (6), respectively. The complete assignment of the <sup>1</sup>H and <sup>13</sup>C resonances of 1, 2, 4 and 6 and of the peracetate of 5 were achieved by means of 2D-NMR studies.

98. Burits M, Bucar F. **Antioxidant activity of *Nigella sativa* essential oil.** *Phytother Res*. 2000 Aug;14(5):323-8.

Abstract

The essential oil of black cumin seeds, *Nigella sativa* L., was tested for a possible antioxidant activity. A rapid evaluation for antioxidants, using two TLC screening methods, showed that thymoquinone and the components carvacrol, t-anethole and 4-terpineol demonstrated respectable radical scavenging property. These four constituents and the essential oil possessed variable antioxidant activity when tested in the diphenylpicrylhydrazyl assay for non-specific hydrogen atom or electron donating activity. They were also effective OH radical scavenging agents in the assay for non-enzymatic lipid peroxidation in liposomes and the deoxyribose degradation assay.

GC-MS analysis of the essential oil obtained from six different samples of *Nigella sativa* seeds and from a commercial fixed oil showed that the qualitative composition of the volatile compounds was almost identical. Differences were mainly restricted to the quantitative composition

- 99.** Asfaw Debella, Olaf Kunert, Martin G. Schmid, Gunter Michael, Franz Bucar, Dawit Abebe and Ernst Haslinger. **A Diterpene, a Flavonol Glycoside and a phytosterol from *Securidaca longipedunculata* and *Entada abssinica*.** *Monashefre fur chemie*. 2000; 131:401-408.

Abstract

The MeOH extracts of the stem bark of *Entada abyssinica* and of the leaves and stem bark of *Securidaca longipedunculata* yielded a diterpene, a flavonol glycoside and a phytosterol glycoside. Their structures were established on basis of NMR spectroscopic analysis; the complete <sup>13</sup>C and <sup>1</sup>H assignment of the compounds was achieved by means of 2D NMR studies. Key words: *Securidaca longipedunculata*, *Entada abyssinica*, Leguminosae, Polygalaceae, Diterpene, Flavonol glycoside.

- 100.** Hirut Lemma, Cherinet Ambaye, Kelbessa Urga, Getachew Addis and Dawit Abebe. **Antifungal activity of the Essential oil of *Trachyspermum ammi* (Nech azmud).** *J Ethio Med Pract*. December 2000; 2(2):87-91.

Abstract

Objective: To study the effect of the essential oil of *Trachyspermum ammi* for its in-vitro anti-fungal activity. Methods: Fruits of *Trachyspermum ammi* were steam distilled and the essential oil was separated from the aqueous layer using a reparatory funnel and dried using anhydrous sodium sulfate (Na<sub>2</sub>SO<sub>4</sub>). Then, the antifungal effect of the oil was screened on moulds (*Aspergillus niger*, *A. flavus*), yeasts (*Cryptococcus neoformans*) and dermatophytes (*Epidermatophyton flocesum*, *Microsporum canis*, *Trichophyton rubrum* and *Trichophyton mentagraphytes*) using the dilution assay method. Results: The antifungal activity that has assayed for the essential oil from *Trachyspermum ammi* was found to inhibit the growth of all test organisms at a concentration of 0.2% and above which indicates its strong antimicrobial activity

against yeasts, moulds and dermatophytes. Conclusion: From the MIC determination, it can be concluded that the essential oil from *Trachyspermum ammi* possessed strong antifungal activity similar to some commercial antifungal agents. The efficacy of the oil at this concentration could also be taken as a good indicator of considering the oil as candidate for further study.

Key words: antifungal, Dematophytes, essential oil, molds, *Trachyspermum ammi*, yeasts

101. Getie, M., Gebre-Mariam, T., Roland, R. and Neubert, R. (2000), Distribution of Quercetin, Kaempferol and Isorhamnetin in some Ethiopian medicinal plants for the treatment of dermatological disorders, *Ethiop.Pharm J.*, 18:25-34.
102. Endale, A., Schmidt, P. C. and Gebre-Mariam, T. (2000), Quantitative determination of saponins in the extracts of the seeds of *Glinus lotoids* using colourimetric and UVspectrophotometric methods, *Ethiop.Pharm J.*, 18:1-14.
103. Teshome-Bahire W. Initiation of Healers in Ethiopia: A Case Study. *Coll Antropol.* 2000;24(2):555–563.
104. Ermias Dagne, Daniel Bisrat, Viljoen, A. and Van Wyk, B-E., 2000. Chemistry of Aloe Species. *Current Organic Chemistry*, 4: 1055-1078.
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- 106.** Alemayehu, S., Gebre-Mariam, T., Rietz, R. and Neubert, R. (2001), **In vitro release studies of *Plumbago zeylenica* roots.** *Ethiop.Pharm J.*, 19:1-18.
- 107.** Dessissa D: **A Preliminary economic valuation of medicinal plants in Ethiopia: trade, volume and price.** In Proceedings of Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia Edited by: Zewdu M, Demissie A. Addis Ababa, Ethiopia, Institute of Biodiversity Conservation and Research; 2001:176-187.
- 108.** Dawit Abebe, Kelbessa Urga, Asfaw Debella, Cherent Ambaye and Amare Dejene. **Survey of poisonous plants in Southern Ethiopia.** *Ethiop J. Health Dev.* 2001; 15(3): 209-221.

#### Abstract

Background: Though written account is wanting, many plants exist in Ethiopia that are poisonous to both humans and livestock. Some verbal reports also indicate the presence of plant species, which are employed in criminal poisoning. Objective: We conducted this study to document empirical or local knowledge on poisonous plants to help rapid identification of the source of poisoning and provision of treatment by health professionals. Design: The study was carried out in Southern Nations, Nationalities, and Peoples State of Ethiopia. A two stage stratified random sampling procedure was used in the selection of major ethnic groups (zones) and Weredas (sub-district). Using open-ended questionnaires, a focus group discussion involving community leaders was performed in each of the 12 selected Weredas. Using structured questionnaires, individual interviews were also held in up to three peasant associations of each Wereda. Results: 111 plants that are locally recognized as harmful to people and/or livestock because of their use as herbal remedies, food or fodder, and other reasons were documented. The inherent traits of the plants and the environmental factors contributing to the toxicity of the species and the conditions that favors exposure of people and livestock are discussed. A few selected species that are believed to pose the greatest hazard to people were addressed in detail. A review of the active principles that are responsible for the

toxicity of these plants is also presented. Conclusion: In view of the ever expanding and unregulated trade in herbal products, there is a danger that the public could end up in buying unsafe preparations. The need for further intensified study in the area is therefore recommended as means of minimizing the risk.

- 109.** Burits M, Asres K, Bucar F. **The antioxidant activity of the essential oils of *Artemisia afra*, *Artemisia abyssinica* and *Juniperus procera*.** *Phytother Res.* 2001 Mar;15(2):103-8.

Abstract

The essential oils of *Artemisia afra* Jacq., *Artemisia abyssinica* Schultz-Bip. and *Juniperus procera* Hochst ex Endl. were examined for their potential radical scavenging activities. First a rapid evaluation of antioxidants was made using a TLC screening method. The abilities of the volatile oils to act as nonspecific donors for hydrogen atoms or electrons were checked in the diphenylpicrylhydrazyl assay. Oils from all three species showed positive results and were examined further. The oils of *A. afra* and *J. procera* were also effective hydroxyl radical scavenging agents when assessed in the deoxyribose degradation assay, whilst oils from *A. abyssinica* exhibited a paradoxical effect. In the in vitro assay for non-enzymatic lipid peroxidation in liposomes, the oils of *A. afra* and *J. procera* also displayed antioxidant potential. It was not possible to measure the effect of *A. abyssinica* oil in this system because certain components, e.g. alk-2-enals, interfered with the assay. The compounds that contribute to the radical scavenging activities of *A. afra* and *J. procera* were identified and then assessed for their effects in the various test systems. Finally, the qualitative and quantitative compositions of the essential oils were studied by GC-MS.

- 110.** Asres K, Bucar F, Knauder E, Yardley V, Kendrick H, Croft SL. **In- vitro antiprotozoal activity of extract and compounds from the stem bark of *Combretum molle*.** *Phytother Res.* 2001 Nov;15(7):613-7.

Abstract

The antiprotozoal activity of the Ethiopian medicinal plant *Combretum molle* (R. Br. ex G. Don.) Engl & Diels (Combretaceae) was evaluated by in vitro testing against *Plasmodium falciparum*, *Trypanosoma brucei rhodesiense*, *Trypanosoma cruzi* and *Leishmania donovani*. The acetone fraction of the stem bark of this plant prepared by soxhlet extraction was inactive against the intracellular amastigotes of *L. donovani* and *T. cruzi* in murine peritoneal macrophages but showed significant activity against extracellular *T. b. rhodesiense* blood stream form trypomastigotes and trophozoites of *P. falciparum* with IC(50) values of 2.19 and 8.17 microg/mL, respectively. Phytochemical examination of the bioactive fraction resulted in the isolation of two tannins and two oleanane-type pentacyclic triterpene glycosides. One of the tannins was identified as the ellagitannin, punicalagin, whilst the structure of the other (CM-A) has not yet been fully elucidated. The saponins that were characterized as arjunglucoside (also called 4-epi-sericoside) and sericoside displayed no activity against any of the four species of protozoa tested. On the other hand, punicalagin and CM-A had IC(50) values of 1.75 and 1.50 microM, respectively, against *T. b. rhodesiense* and were relatively less toxic to KB cells (cytotoxic/antiprotozoal ratios of 70 and 48, respectively). The tannins also showed intermediate activity against *P. falciparum*, although their selectivity against these parasites was less favourable than the above. It appears that our findings are the first report of hydrolysable tannins exhibiting antitrypanosomal and antiplasmodial activities.

- 111.** Asres K, Bucar F, Kartnig T, Witvrouw M, Pannecouque C, De Clercq E. **Antiviral activity against human immunodeficiency virus type 1 (HIV-1) and type 2 (HIV-2) of ethnobotanically selected Ethiopian medicinal plants.** *Phytother Res.* 2001 Feb;15(1):62-9.

#### Abstract

Ethiopian medicinal plants used for the treatment of a variety of ailments including infectious diseases were screened for activity against human immunodeficiency virus type 1 (HIV-1) and type 2 (HIV-2). Seventy-one polar and nonpolar extracts derived from 21 plants belonging to 14 families were tested for inhibition of viral replication using HIV-1 (III(B)) and HIV-2 (ROD) strains. Selective inhibition of viral growth was assessed by the simultaneous determination of the in vitro cytotoxicity of each of the extracts against MT-4 cells. Six extracts made from the root

bark of *Bersama abyssinica* Fresen, the leaves of *Combretum paniculatum* Vent., and *Dodonaea angustifolia* L.f., and the stem bark of *Ximenia americana* L. displayed antiviral activity at concentrations that were nontoxic to MT-4 cells. The highest selective inhibition of HIV-1 replication was observed with the acetone fraction of *C. paniculatum* and the methanol fraction of *D. angustifolia* which showed selectivity indices (ratio of 50% cytotoxic concentration to 50% effective antiviral concentration) of 6.4 and 4.9, and afforded cell protection of viral induced cytopathic effect of 100% and 99%, respectively, when compared with control samples. The greatest degree of antiviral activity against HIV-2 was achieved with the acetone extract of *C. paniculatum* (EC(50): 3 microg/mL), which also showed the highest selectivity index (32). The 50% cytotoxic concentration ranged from 0.5 microg/mL for the hexane extract of *D. angustifolia* L.f., the most cytotoxic of the extracts tested, to >250 microg/mL for some extracts such as the methanol fraction of *Alcea rosea* L., the least toxic tested. Only the polar extracts that were obtained by extraction with hydroalcohol, methanol or acetone exhibited inhibition of viral growth at subtoxic concentrations. The results obtained in this study enable the selection of extracts which show some specificity of action and support the further investigation of these extracts for their potential as new lead antiretroviral compounds.

- 112.** Asres K, Bucar F, Edelsbrunner S, Kartnig T, Höger G, Thiel W. **Investigations on antimycobacterial activity of some Ethiopian medicinal plants.** *Phytother Res.* 2001 Jun;15(4):323-6.

#### Abstract

Fifteen crude extracts prepared from seven Ethiopian medicinal plants used to treat various infectious diseases were assessed for their ability to inhibit the growth of *Mycobacterium tuberculosis*. A preliminary screening of the crude extracts against *M. tuberculosis* typus humanus (ATCC 27294) was done by dilution assay using Löwenstein-Jensen medium. None of the tested extracts except the acetone fraction obtained from the stem bark of *Combretum molle* (R. Br. ex G. Don.) Engl & Diels (Combretaceae) showed significant inhibitory action against this strain. The acetone fraction of the stem bark of *C. molle* caused complete inhibition at concentrations higher than 1 mg/mL. Phytochemical analysis of the bioactive fraction led to the isolation of a major tannin and two oleanane-type pentacyclic triterpene glycosides. The tannin was identified

as the ellagitannin, punicalagin, whilst the saponins were characterized as arjunglucoside (also called 4-epi-sericoside) and sericoside. All the pure compounds were further tested against the ATCC strain. Punicalagin was found to inhibit totally growth of the ATCC and also of a patient strain, which was fully sensitive to the standard antituberculosis drugs, at concentrations higher than 600 microg/mL and 1.2 mg/mL, respectively. On the other hand, the saponins failed to show any action on the ATCC strain. It appears that our findings are the first report of tannins exhibiting antimycobacterial activity.

- 113.** *Dawit Abebe, Kelbessa Urga, Asfaw Debella, Chernet Ambaye, Amare Dejene*  
**Traditional Medicinal Uses of 'Qulqwal' Complex (Members of Euphorbiaceae Family) As Possible Risk Factor of Carcinogenesis** *J Ethiop Med Pract*, 2001;3(1): 8-15]

***Abstract***

**Background:** Several plants suspected of being poisonous to humans are thought to be widely prescribed as remedies in the indigenous health care delivery system.  
**Objective:** We conducted this study to document local knowledge about poisonous plants and to assess if these same plants are being used in ethnomedicine as well as the extent of their utilization.

**Design:** The study was carried out in Southern Nations, Nationalities, and Peoples State of Ethiopia. A two stage stratified random sampling procedure was used in the selection of major ethnic groups (zones) and weredas (sub-district). Using open-ended questionnaires, focus group discussion involving community leaders was performed in each of the 12 selected weredas. Using structured questionnaires, individual interviews were also held in up to three peasant associations of each wereda.

**Results:** 20% of the 113 species recorded in the study area as poisonous included plants with toxic acrid milky latex which belong to the family Euphorbiaceae. Secondary data also shows ironically that member species of this family to be most important source of remedy in local medicine. The role of this group of plants in tumour promotion and the mechanisms involved are highlighted.

**Conclusion:** The importance of prospective epidemiological survey of human cancer along with

investigation of initiating doses of solitary carcinogens or oncogens and co-carcinogens of the promoter type as possible risk factors of cancer associated with the utilization of Euphorbiaceae material is stressed.

Key words: Traditional medicine, Euphorbiaceae, carcinogenesis, diterpene esters, qulqwal

- 114.** Dawit Dikasso, Hirut Lemma, Kelbessa Urga, Asfaw Debella, Getachew Addis, Ashenafi Tadele, Kidist Yirsaw **Investigation on the antifungal properties of freshly pressed garlic juice on major pathogenic fungi** J Ethiop Med Pract, 2001;3(1):16-20

***Abstract***

Background : Modern science is tending to confirm many of the beliefs of ancient cultures regarding efficacy of garlic. In this paper we report the antifungal effects of freshly pressed juice of garlic on the major pathogenic fungi.

Methods: Freshly pressed juice of varying concentrations of garlic were assessed for their antifungal property on major pathogenic moulds, yeasts and dermatophytes. Fresh garlic was purchased, the cloves were peeled, washed, weighed and ground to obtain garlic paste. The paste was squeezed through fine gauze pads to obtain fresh garlic juice. The juice was filtered and anti-fungal susceptibility of the juice and the standard drug Nystatin were determined by using agar incorporation technique in Sabouraud Agar Medium. All the plates were inoculated with the test organisms and incubated at 25°C for up to three to seven days except for dermatophytes which were incubated for up to three weeks at the same temperature. Part of the juice was lyophilized, weighed and calculated to determine the extract concentration

Results: Garlic juice was found to inhibit the growth of the standard organisms of *Cryptococcus neoformans*, *Aspergillus niger*, and the clinical isolates of *A. niger* at a concentration of 25 µl/ml (10mg/ml). *A. flavus* was inhibited at 37.5 µl/ml (15mg/ml) & *T. rubrum*, *T. mentagrophyte*, *M. canis*, *E. floccosum* were inhibited at 75 µl/ml (30mg/ml).

Conclusion: It is concluded that freshly pressed juice of garlic has a strong antifungal effect on the major pathogenic moulds, yeasts and dermatophytes. Further purification and formulation of the juice would give a true antifungal activity comparable to standard antibiotics.

Key words: *Allium sativum*, antifungal, garlic, dermatophytes

- 115.** Getachew Addis, Dawit Abebe and Kelbessa Urga. **A survey of traditional Medicinal plants in Shirka District, Aris Zone, Ethiopia.** *Ethiop Pharm. J.* 2001; 19:30-47.

Abstract

The knowledge on traditional uses of medicinal plants in Ethiopia has mostly been passed on from generation to generation by word of mouth. This method of information conveyance has probably resulted in distortion or loss of indigenous knowledge. The present study is thus designed to document the indigenous knowledge on medicinal plants in Shirka, Central Ethiopia. An ethnobotanical survey was conducted in four peasant associations in February 1999. A total of 81 traditional healers were interviewed, and 58 traditionally used medicinal plants were collected. Of these plants, 37 were identified scientifically at species level, five at generic level, while 16 were only known by their vernacular names. List of the plants together with their ethnobotanical information is presented. The traditional remedies were prepared either from single or more than one plant species, and the root was predominantly used for the preparation of remedies. Almost all of these plants are included in traditional pharmacopoeia of the Northern Ethiopia, and the biomedical effects of most of them are supported by their chemical profiles as well as pharmacological and/or biological activities. The survey results suggest that extensive ethnomedical exploration in Shirka district and other parts of Ethiopia is warranted.

Key words: Medicinal plants, Shirka, Traditional healers, Traditional medicine

- 116.** Moges Kassa, Getachew Assefa, Tesfaye Mengesha and Fekade Balcha. Communication: **In vitro cytotoxicity of extracts of Anti-malarial plants against a human Leukaemia Monocyte cell line, THP-1 cells.** *Ethiop Pharm. J.* 2001; 19:57- 60.

Abstract

In vitro cytotoxic tests of the extracts of the leaves, roots and stem barks of *Bersama abyssinica* and the aerial parts of *Artemisia afra*, *Artemisia rehan* and *Ajuga remota* were carried out, in relation with the reported antimalarial activities, using the colorimetric methyl tetrazolium (CMT) assay against human leukaemia monocyte cell line, THP-1 cells. All the extracts tested at concentrations of their in vitro antimalarial activity, ( $IC_{50} = 0.23-23 \mu\text{g/ml}$ ) were not cytotoxic. The extracts of the leaves of *B.abysinica* were the most cytotoxic, and the aerial parts of *A.remota*, the least. However, their cytotoxicity to antimalarial activity ratios was 4.5 and 3.7, respectively. The root bark extracts of *B.abysinica* ( $IC_{50} = 38 \mu\text{g/ml}$ ) were about 2 times more toxic than the aerial part extracts of *A.remota* ( $IC_{50} = 84\mu\text{g/ml}$ ) but had the highest cytotoxicity to antimalarial activity ratio (19 vs. 3.7 respectively). The extract of *A.afra* ( $IC_{50} = 64 \mu\text{g/ml}$ ) was less cytotoxic than the extracts from the three parts of *B.abysinica* ( $IC_{50}$  of the leaves,  $18 \mu\text{g/ml}$ , the root bark,  $38 \mu\text{g/ml}$ , and the stem bark,  $32 \mu\text{g/ml}$ ). The cytotoxicity and antimalarial activities of the various extracts were compared and their significance as antimalarials was discussed.

- 117.** Pankhurst R (2001): **The status and availability of oral and written knowledge on traditional health care in Ethiopia.** In Proceed.National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia: 20-21 June 2001. Addis Ababa IBCR, 92-106.
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- 123.** Fullas, F. 2001. Book review: Ethiopian traditional medicine: common medicinal plants in perspective. *Journal of Black Studies*, 32:610-612.
- 124.** . Gedif, T., Hahn, H. (2001), Traditional treatment of Skin disorder in Butajira, southCentral Ethiopia, *Ethiop. Pharm. J.*, 19:48-56.
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2002

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- 130.** Gedif T, Hahn HJ. **Epidemiology of herbal drugs use in Addis Ababa, Ethiopia.***Pharmacoepidemiol Drug Saf.* 2002 Oct-Nov;11(7):587-91.

Abstract

**OBJECTIVE:** To study the utilization patterns of herbal drug use in urban Ethiopia.

**METHODS:** A cross-sectional community-based survey was conducted in Addis Ababa, capital city of Ethiopia, using a pretested semi-structured questionnaire. The questionnaire was administered to 600 heads of households, largely mothers, selected using a multi-stage systematic random sampling technique, where the final sampling units were households.

**RESULTS:** The prevalence of herbal drugs use was found to be 37%. The main reasons given for choosing herbal medicine as the first line medication option were: dissatisfaction with the services of modern health institutions due to their time consuming nature, cost considerations and perceived efficacy.

**CONCLUSION:** This study showed that in spite of the geographic accessibility of modern health institutions in urban areas, the use of traditional medicine, particularly herbal drugs, remains a major form of health care option. Hence health planners should give appropriate consideration to this sector.

- 131.** Gedif T, Hahn HJ. **Treatment of malaria in Ethiopian folk medicine.***Trop Doct.* 2002 Oct;32(4):206-9.

Abstract

Key informant interviews of herbalists were conducted to document the traditional management of malaria in Ethiopia. The perceptions of the cause and symptoms of malaria, the use of plants, their preparation and administration were recorded. Interviews were performed in rural Butajira and Addis Ababa (the main city). The result showed that 33 (75%) of the interviewed healers treat malaria using herbal drugs. Sixteen plants were reported to have been used of which eight were

used as a single remedy and the rest as composite remedies with other plants. The ethnopharmacological data generated in this study on antimalarial plants is useful for further evaluations of the traditional claims of antimalarial plants in Ethiopia.

- 132.** Teferi Gedif, Heinz-Jürgen Hahn **Herbalists in Addis Ababa and Butajira, Central Ethiopia: Mode of service delivery and traditional pharmaceutical practice** [Ethiop.J.Health Dev. 2002;16(2):191-197]

Abstract

Objective: To assess herbalist's mode of service delivery and describe their traditional pharmaceutical practices.

Methods: In-depth interviews of herbalists were conducted in Addis Ababa and Butajira, using a semi-structured questionnaire.

Results: The mean age of the healers was 53.7 and most of the healers practised traditional medicine on part-time basis. The average number of patients seen per week by the healers was 7. Most of the healers do not have fixed payment rate for their services. The analysis of traditional prescriptions revealed that the predominant dosage forms were liquid preparations and the average number of plants per prescription was 1.16.

Conclusions: Healers treat a wide range of health problems using medicinal plants in various dosage forms. In the process of evaluation and standardisation of these dosage forms, formulations tested should be made in accordance with the method used traditionally.

- 133.** Dawit Dikasso, Hirut Lemma, Kelbessa Urga, Chernet Ambaye, Ashenafi Ayele and Kidist Yersaw. **Investigation of the Antibacterial Effects of Papaya (*Carica papaya*) seeds on three Pneumonia Causing Bacteria.** Ethiop J Health Sci. 2002; 12(1):47-54.

Abstract

**BACKGROUND:** Papaya (*Carica papaya*) is one of the herbal remedies, which has recently become a subject of research focus. It is used in traditional medicine for a variety of purposes besides its common anthelmintic, carminative, diuretic, oxytoxic and ant infective effects. In this paper we report the antibacterial effects of aqueous papaya seed extracts against three pneumonia causing bacteria. **METHODS:** The study was conducted between November 2000 and June 2001. The antibacterial activity of the crude aqueous extract of papaya (*C. papaya*) seeds was investigated against specific pneumonia causing bacterial by an agar dilution technique. The growth or inhibition of the standard test microorganisms as well as clinical isolates of *Streptococcus pneumoniae*, *Staphylococcus aureus* & *Klebsiella pneumoniae* were determined in growth media. Fresh ripe papaya fruits were purchased from a local market and the seeds were collected, thoroughly cleaned with distilled water, sun dried, powdered, sieved with a mesh and macerated. The macerate was filtered through No.1, 18.5 cm what man filter, cooled immediately to -20 °C and lyophilized. The powder obtained was weighed, diluted with distilled water and the concentration determined. **RESULTS:** All the test organisms were successfully inhibited by 11.8 mg/ml of the extract except *Streptococcus pneumoniae* standard test organism which was inhibited by 18.38 mg/ml of media, indicating that *Streptococcus pneumoniae*, clinical isolate, is the least sensitive. **CONCLUSION:** Papaya (*C. papaya*) seed could be used as an effective antibacterial agent. Further purification and extraction of the active principle would give a true antibacterial activity comparable to standard antibiotics. Nevertheless, clinical trial on the effects of the seed is essential before advocating large-scale therapy. **KEY WORDS:** *Carica papaya*, antibacterial, papaya, pneumonia

- 134.** Dawit Dikasso, Hirut Lemma, Kelbessa Urga, Asfaw Debella, Getachew Addis, Ashenif Tadele and Kidist Yirsaw. **Investigation on the Antibacterial Properties of Garlic (*Allium Sativum*) on Pneumonia causing Bacteria.** *Ethiop Med J.* July 2002; 40(3):241-249.

#### Abstract

The antibacterial activity of the crude aqueous extract of garlic was investigated against some pneumonia causing bacteria by an agar dilution technique. The results revealed that *Streptococcus pneumoniae* standard test organism was completely inhibited by 7.8 mg/ml of media and the

clinical isolate of *Klebsiella pneumoniae* was completely inhibited by 24.38 mg/ml of media, indicating that *Streptococcus pneumoniae* is the most sensitive and *Klebsiella pneumoniae* the least. Garlic could be used as an effective antibacterial agent for these pathogenic microorganisms.

- 135.** Getachew Addis, Dawit Abebe, Timotewos Genebo and Kelbessa Urga. **Perceptions and practices of Modern and traditional health practitioners about traditional health practitioners about traditional Medicine in Shirka Districts, Arsi Zone**, Ethiopia. *Ethiop J. Health Dev.* 2002; 16(1):19-29.

#### Abstract

**Background:** Traditional medicine is an ancient medical practice that is still widely used in prevention and treatment of various health problems in Ethiopia. **Objective:** To evaluate perceptions and practices of modern and traditional health practitioners about traditional medicine in Shirka District of Arsi Zone, Ethiopia. **Methods:** A cross-sectional study pertaining to the perceptions and practices of modern and traditional health practitioners was carried out in February 1999 in four peasant associations of Shirka District. Two types of questionnaires (with closed and open-ended questions) were prepared to assess the respective practitioners. Fourteen modern practitioners and 80 traditional healers were interviewed. **Results:** Most of the practitioners in both systems had used traditional medicine at least once in their lifetime. The indigenous knowledge surrounding traditional medicine is mainly conveyed verbally and to some extent still employs superstitious beliefs and harmful practices. To substantially reduce the drawbacks and promote its positive elements, both types of practitioners expressed their willingness to collaborate among each other and believe in the need for government support. **Conclusion:** The knowledge surrounding traditional medicine incorporates a number of harmful practices. To make matters worse, this knowledge is mostly conveyed verbally which may result in the inevitable distortion of original information leading to the expansion of more and more harmful practices. Therefore, the need for more effort of recording the knowledge is stressed. Government support and coordinated effort among the various institutions are emphasized for promotion and development of traditional medicine.

- 136.** Hirut Lemma, Asfaw Debella, Getachew Addis, Olaf Kunert, Aberra Geyid, Ferehiwot Teka and Kidist Yersaw. **Anti-Bacterial activity of plumbago Zeylancal roots on some pneumonia causing pathogens.** SINET: Ethiop J. Sci. 2002; 25(2):285-294.

Abstract

The antibacterial activity of polar and non-polar extracts prepared from the roots of *Plumbago zeylanica* L. (Plumbaginaceae), a plant widely used in Ethiopian traditional medicine for various ailments were investigated using hole plate diffusion method against some pneumonia causing pathogens. The aqueous extract did not exhibit any activity while petroleum ether extract was found to have strong anti-bacterial effects as compared to the ethanol extract which showed a significant activity. Activity guided chromatographic purification of the petroleum ether extract led to the isolation of three compounds, of which the compound identified as 5-hydroxy-2-methyl-1, 4-naphthoquinone, plumbagin, found to be the active component on the tested microorganisms. Minimum inhibitory concentration value of this particular compound showed comparative activity resembling the commonly used broad spectrum antibiotic, tetracycline. The strong antibacterial effect of the petroleum ether extract is discussed to show that it was attributable to this compound rather than the other two that were found to have trace of activities.

Key words: anti-bacterial activity, minimum inhibitory concentration, *plumbago zeylanica*, pneumonia

- 137.** Kelbessa Urga, Asfaw Debella, Yeshe Wolde-Medih, Agata N., Abebe Bayu and Wubalem Zewdie. **Laboratory studies on the outbreak of Gangrenous ergotism associated with consumption of contaminated barley in Arsi, Ethiopia.** Ethiop J. Health Dev. 2002; 16(3):317-323.

Abstract

Background: Ergotism is caused by the fungus *Claviceps purpurea*, which parasitizes cereal grains and is ingested by man through flour milled from contaminated cereals. An outbreak of ergotism in Ethiopia in 1978 resulted from exposure to ergot alkaloids from *C. purpurea sclerotia*. Objectives: The objective of this study was to investigate consumption of cereal grains grown

locally as the most likely cause of the outbreak of gangrenous ergotism so that control measures could be applied. Methods: During June to August, 2001, there were reports of a large number of cases of gangrene in Arsi Zone, Ethiopia. A multi-disciplinary team assessed the outbreak of the disease. Non-structured in-depth interviews were conducted with heads of households of the affected, and each of the patients was also interviewed. Grain samples were then collected from the interviewed households and analyzed for ergot alkaloids. Acute toxicity studies were also conducted by feeding male, non-pregnant and pregnant Swiss albino mice with the collected grain samples. Results: Mycological cultures of grain samples yielded ergot alkaloids. All the grain samples contained ergot alkaloids, but with varying concentration. The highest concentration of ergotamine was observed in grain samples No. 4 (2.51 mg/100 g) and No. 6 (2.66 mg/100 g). Grain samples No. 2 and 7 had similar concentration of ergotamine, but more than four-fold higher than in grain sample No. 3. In contrast, the concentration of ergometrine in grain samples No. 4 (1.15mg/100 g) and No.6 (1.21mg/100 g) were two-fold lower than ergotamine. The highest death (55%) of mice was observed in those test groups fed on grain samples No. 4 and No. 6. Cases of abortion were noted after 3 days of feeding in all pregnant mice with the exception of those allocated to grain sample No. 3. Conclusion: We conclude on the basis of these results that the outbreak of gangrene in Arsi Zone, Ethiopia, is attributed to the ingestion of barley containing ergotized wild oats.

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- 146.** Dikasso, D., Lemma, H., Urga, K., Debella, A., Addis, G., Tadele, A., Yirsaw, K. (2002), Investigation on the antibacterial properties of garlic (*Allium sativum*) on Pneumonia causing bacteria, Eth. Med. J., 40 (3): 241-249.
- 147.** Bekele, T. (2002), Indigenous knowledge of medicinal plants: prospects of the Ethiopian Orthodox Church. In: Proceeding of the Workshop on "The Ethiopian Church Yesterday, Today and Tomorrow", Altaye, M., Bekele, T., Tesfaye, N. (Eds), Mahibere Kidusan, pp.133-145.

- 148.** Gedif, T., Hahn, H. J. (2002), Treatment of malaria in Ethiopian folk medicine, *Trop. Doct.*, 32(4): 206-209.
- 149.** Kindeya, G. R., Mitlohner, B. M. and Mitiku H., 2002. *Boswellia papyrifera* (Del.) Hochst.: a tropical key species in northern Ethiopia. In: *Deutscher Tropentag 2002, Conference on International Agricultural Research for Development, Witzenhausen*. 8 pages.
- 150.** Wolde B, Gebre-Mariam T: Household herbal remedies for selfcare in Addis Ababa: a preliminary assessment. *J Ethiop Pharm Assoc* 2002, 20:59-70
- 151.** Abebe D, Zewdu M, Demissie A. conservation and sustainable use of medicinal plants in Ethiopia Proceeding of the National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia. Addis Ababa: IBCR; 2002. Biodiversity conservation of medicinal plants: Problem and prospects; pp. 198–203.
- 152.** Getachew Addis, Dawit Abebe, Timotewos Genebo, Kelbessa Urga Perceptions and practices of modern and traditional health practitioners about traditional medicine in Shirka District, Arsi Zone, Ethiopia *Ethiop. J. Health Dev.* 2002;16(1):19-29

#### Abstract

Background: Traditional medicine is an ancient medical practice that is still widely used in prevention and treatment of various health problems in Ethiopia. Objective: To evaluate perceptions and practices of modern and traditional health practitioners about traditional medicine in Shirka District of Arsi Zone, Ethiopia. Methods: A cross-sectional study pertaining to the perceptions and practices of modern and traditional health practitioners was carried out in February 1999 in four peasant associations of Shirka District. Two types of questionnaires (with closed and open-ended questions) were prepared to assess the respective practitioners. Fourteen modern practitioners and 80 traditional healers were interviewed. Results: Most of the practitioners in both systems had used traditional medicine at least once in their lifetime. The indigenous knowledge surrounding traditional medicine is mainly conveyed verbally and to some extent still employs

superstitious beliefs and harmful practices. To substantially reduce the drawbacks and promote its positive elements, both types of practitioners expressed their willingness to collaborate among each other and believe in the need for government support. Conclusion: The knowledge surrounding traditional medicine incorporates a number of harmful practices. To make matters worse, this knowledge is mostly conveyed verbally which may result in the inevitable distortion of original information leading to the expansion of more and more harmful practices. Therefore, the need for more effort of recording the knowledge is stressed. Government support and coordinated effort among the various institutions are emphasized for promotion and development of traditional medicine.

**153.** Teferi G, Heinz-Jürgen H. Herbalist in Addis Ababa and Boutajira, central Ethiopia mode of service delivery and traditional pharmaceutical practice. *Ethiopian J Health Dev.* 2002;16:191–7.

**154.** Gebre-mariam T, Wolde B. Household herbal remedies for self-care in Addis Ababa preliminary assessment. *J Ethiopian Pharm Assoc.* 2002;20:59–70.

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- 155.** Gedif T, Hahn HJ. **The use of medicinal plants in self-care in rural central Ethiopia.** *J Ethnopharmacol.* 2003 Aug;87(2-3):155-61.

Abstract

Medicinal plants are an important element of Ethiopian traditional medicine. This questionnaire survey examined the extent and type of medicinal plants used in self-care by rural Ethiopian community. Six hundred mothers were interviewed using a semi-structured questionnaire. The prevalence of the use of herbal drugs in self-care was found to be 12.5%. Twenty-five plant species belonging to 21 families were reported, each with local names, methods of preparation and parts used. This study showed that self-care using medicinal plants is a major part of health care options in Butajira community.

- 156.** Hadis M, Lulu M, Mekonnen Y, Asfaw T. **Field trials on the repellent activity of four plant products against mainly *Mansonia* population in western Ethiopia.** *Phytother Res.* 2003 Mar;17(3):202-5.

Abstract

The repellent activity of essential oils of lemon eucalyptus (*Eucalyptus maculata citrodion*), rue (*Ruta chalepensis*), oleoresin of pyrethrum (*Chrysanthemum cinerariaefolium*) and neem (*Azadiracta indica*) have been field tested as 40%, 50% and 75% solutions in coconut oil against populations of mosquitoes consisting mainly of *Mansonia* in Gambella, western Ethiopia. A latin square design was used to randomize the test subjects for possible individual differences for mosquito attraction. Repellency was evaluated as the percentage protection. Deet was included in the study for comparison. All the plant products manifested repellency. At 50% concentration at which the highest repellency was recorded the protection was 91.6%, 87.0%, 96.0%, 97.9% for rue, neem, pyrethrum and deet, respectively. The essential oil of lemon eucalyptus was not tried at this concentration. At a 40% concentration deet, lemon eucalyptus and pyrethrum were

significantly ( $p < 0.05$ ) more effective than rue and neem. At a 50% concentration, deet and pyrethrum were significantly better ( $p < 0.05$ ) than rue and neem. At a 75% concentration concentration, deet and lemon eucalyptus performed significantly better ( $p < 0.05$ ) than pyrethrum and neem. The difference between pyrethrum and neem was also significant ( $p < 0.01$ ).

- 157.** Mekonnen Y, Dräger B. **Glucosinolates in *Moringa stenopetala*. *Planta Med.* 2003 Apr;69(4):380-2.**

#### Abstract

Bio-guided fractionation of seed extracts from *Moringa stenopetala* resulted in a myrosinase hydrolysis product, 5,5-dimethyloxazolidine-2-thione. It is formed from the glucosinolate glucoconringiin, which was identified together with O-(rhamnopyranosyloxy)benzyl glucosinolate from *M. stenopetala* for the first time. The glucosinolates in seeds, leaves and roots of *M. stenopetala* were quantified as des-sulphoglucosinolate by HPLC. The seeds without testa contained the highest concentration of glucoconringiin and of O-(rhamnopyranosyloxy)benzyl glucosinolate within the plant, 3 % and 19 % of dry mass, respectively. Abbreviations. GLS:glucosinolate GC:glucoconringiin RB-GLS: O-(rhamnopyranosyloxy)benzyl glucosinolate

- 158.** Giday M, Asfaw Z, Elmqvist T, Woldu Z. **An ethnobotanical study of medicinal plants used by the Zay people in Ethiopia.***J Ethnopharmacol.* 2003 Mar;85(1):43-52.

An ethnobotanical survey was carried out to collect information on the use of medicinal plants by the Zay people who live on islands as well as shore areas of Lake Ziway in the Ethiopian Rift Valley. A total of 33 medicinal plants were reported as being used locally for the treatment and/or control of human and livestock ailments. Results of the survey showed that leaf materials form the major component of plant parts harvested. The majority of the remedies are prepared in the form of juice from freshly collected plant parts. Most of the remedies are prepared from a single species, and are mainly taken orally. Most of the medicinal plants are collected from the wild. Of the total claimed medicinal plants, 10 were reported scarce locally. Environmental degradation and intense deforestation have been reported as the main causes for the depletion of medicinal plants in the

area. As the Zay people are still partly dependent on medicinal plants, loss of these plants will, to a certain extent, hamper the existing health care system in the area. Measures for conservation of medicinal plants of the Zay people are urgently needed.

- 159.** Adera TD. **Beliefs and traditional treatment of malaria in Kische settlement area, southwest Ethiopia.** *Ethiop Med J.* 2003 Jan;41(1):25-34.

#### Abstract

Kische settlement area southwest Ethiopia, is endemic for malaria, and malaria-related morbidity and mortality are important public health problems. Malaria beliefs and practices are often related to culture, and can influence the effectiveness of control strategies. This study assessed attitude and practices relative to causation, treatment, prevention and control of malaria, and documented traditional malaria treatment practices and remedies, in order to provide baseline data for control program planning and further investigation. A cross-sectional study was conducted in December 1997 by interviewing 254 randomly selected study subjects 85 indigenous and 169 settlers. Eighty three percent of 254 respondents attributed the cause of malaria infection to dirt and rubbish. Ranking of vector control measures was poor, with 77% prioritizing cleaning dirt and rubbish, while only 36% mentioned drainage of swampy areas. Ninety eight percent accepted Dichlorodiphenyltrichloroethane (DDT) house spraying. The prevalence of clinical malaria attacks was 77% and communities had good knowledge about malaria morbidity and mortality. Forty three percent had used traditional medicine for malaria, for reasons including greater accessibility (82%), low cost (48%), lack of awareness about modern medicine (25%) and belief that traditional medicine is better (7%). Most are well informed about malaria morbidity and mortality, understood about the use of DDT spraying and have good treatment seeking behavior but practice of prevention and concept about causation prevention, and control of malaria is poor. It is wise to put emphasis on health education particularly on preventive aspects. Malaria control technicians and environmental health technicians, who closely interact with the community, could be used for this purpose. The common traditional treatments for malaria could be further investigated for their effects on malaria parasites and/or symptomatic relief of clinical illness.

- 160.** Esser KB, Semagn K, Wolde-Yohannes L. **Medicinal use and social status of the soap berry endod (*Phytolacca dodecandra*) in Ethiopia.***J Ethnopharmacol.*2003 Apr;85(2-3):269-77.

Abstract

Berries from *Phytolacca dodecandra* L'Herit. (endod in Amharic) offer a readily available molluscicide to control schistosomiasis. Parts of the endod plant have been used as a detergent and as traditional medicine for centuries in Ethiopia. An interview survey was performed in the highlands of Ethiopia to provide information on the distribution of the plant, people's traditional use of it, their perception of the plant, and the potential for increased production and use of endod as a soap for indirect control of schistosomiasis. People of all ages report that they are familiar with the plant and its detergent and medicinal uses. The plant is largely disappearing from unprotected areas due to land clearing. Younger people appear to use endod as a soap whenever it is available. Older women prefer commercial soap and consider endod to be associated with poor people. Common medicinal uses include treatment of skin itching (ringworm), abortion, gonorrhoea, leeches, intestinal worms, anthrax and rabies. Two thirds of the people express interest in cultivating endod for personal use if supplied with rooted cuttings. Increased cultivation of endod and use of berries for washing might be possible if information about schistosomiasis and its control is disseminated among people. Preference for commercial soap and lack of land for cultivation are major obstacles for increasing the availability and use of endod.

- 161.** Makonnen E, Debella A, Zerihun L, Abebe D, Teka F. **Antipyretic properties of the aqueous and ethanol extracts of the leaves of *Ocimum suave* and *Ocimum lamiifolium* in mice.***J Ethnopharmacol.*2003 Sep;88(1):85-91.

Abstract

Numerous plant species are used to treat ailments associated with pyrexia in the indigenous health care delivery system of Ethiopia. Notable among these are *Ocimum suave* and *Ocimum lamiifolium*. The objective of the present study was thus to evaluate the antipyretic effects of the aqueous and ethanol extracts of the leaves of *Ocimum suave* and *Ocimum lamiifolium* in mice. Rectal temperatures were recorded before and after inducing pyrexia as well as after administration

of the respective extracts every half an hour for 3h. Parallel experiments were run with a standard antipyretic (acetylsalicylic acid) and the vehicle (distilled water). All the plant extracts showed antipyretic property with reasonable onset and duration of action. Both ethanol and aqueous extracts of *Ocimum suave* were observed to be more potent than those of *Ocimum lamiifolium*. Aqueous extract of *Ocimum suave* and ethanol extract of *Ocimum lamiifolium* were more potent than their other counterpart extracts. Time dependent antipyretic effect was also observed with some extracts; reduced with time with aqueous extract of *Ocimum suave* and increased with time with both extracts of *Ocimum lamiifolium*.

- 162.** Debella A, Makonnen E, Abebe D, Teka F, Kidanemariam AT. **Pain management in mice using the aqueous and ethanol extracts of four medicinal plants.** *East Afr Med J.* 2003 Aug;80(8):435-9.

Abstract

**BACKGROUND:** There are many traditionally used analgesic plants in Ethiopia. They, however, have not been subject to scientific investigation for their efficacy and safety.

**OBJECTIVE:** To evaluate both prophylactic and relieving effects of aqueous and ethanol extracts of four traditionally used medicinal plants in Ethiopia.

**DESIGN:** An experimental design in which five group of albino mice weighing 30-35 grams representing positive and negative control, and extract treated groups respectively. The extracts, standard drugs and normal saline were administered into GIT by gavage to evaluate the analgesic effect.

**SETTING:** Department of Drug Research at Ethiopian Health and Nutrition Research Institute and Department of Pharmacology at Faculty of Medicine, Addis Ababa university.

**METHODS:** Analgesic effects of water and ethanol extracts of four plants were evaluated against distilled water and standard analgesics (morphine and acetylsalicylic acid) with acetic acid induced writhing tests in mice. The four plants used for this screening were *Ocimum suave*, *Ocimum lamiifolium*, *Lippia adoensis* and *Ajuga remota*.

RESULTS: All extracts of the four plant materials were observed to possess both inhibiting and treatment activities against acetic acid induced pain. Dose related analgesic effect was also observed with all extracts of all plants with different potencies. Ethanol extracts of all the four plant materials were more potent than their water extracts at all dose levels except *O. sauve*, and *L. adoensis* whose water extracts seem to be a bit more potent at low dose. The analgesic potencies of both extracts of all the four plants were shown to be less than those of the standard analgesics. Of all the extracts, the ethanol extract of *O. lamiifolium* was found to be the most potent, while its water extract was the least. Acetic acid induced writhing was relieved with medium dose of both extracts in most cases and with low dose in few. Hundred percent relief was achieved with both standard analgesics at a very low dose.

CONCLUSION: The present study show that all the extracts of all the plant materials have got both inhibiting and relieving effects of pain.

- 163.** Getie M, Gebre-Mariam T, Rietz R, Höhne C, Huschka C, Schmidtke M, Abate A, Neubert RHEvaluation of the anti-microbial and anti-inflammatory activities of the medicinal plants *Dodonaea viscosa*, *Rumex nervosus* and *Rumex abyssinicus*. *Fitoterapia*. 2003 Feb;74(1-2):139-43.

#### Abstract

The crude extracts of the leaves of *Dodonaea viscosa* and *Rumex nervosus* as well as of the root of *Rumex abyssinicus* were tested for anti-microbial and anti-inflammatory activities. It was observed that the three plants possess antibacterial activity against *Streptococcus pyogenes* and *Staphylococcus aureus* and strong activity against Coxsackie virus B3 and influenza A virus. In contrast, none of them exhibited anti-fungal activity. The anti-inflammatory activity test results verified that only *R. abyssinicus* inhibited the synthesis of prostaglandin (PG) E(2).

- 164.** Makonnen E, Debella A, Abebe D, Teka F. Analgesic properties of some Ethiopian medicinal plants in different models of nociception in mice. *Phytother Res*. 2003 Nov;17(9):1108-12.

Abstract

Many people use analgesic plants to relieve pain and inflammation though most of them have not yet been proved to possess such properties. The objective of the present study was to screen the aqueous and ethanol extracts of four Ethiopian traditionally used medicinal plants for analgesic properties. Aqueous and ethanol extracts of the plant materials were screened for their analgesic properties in mice using tail-flick, hot-plate and tail-pinch tests at three dose levels. Normal saline and standard analgesics were employed as negative and positive controls, respectively. The plants subject for the present screening were *Ocimum suave*, *Ocimum lamiifolium*, *Lippia adoensis*, and *Ajuga remota*. All extracts were observed to possess analgesic properties with varying potencies in tail-flick and hot-plate tests. Analgesic activity, however was not observed with tail-pinch test. The analgesic potencies also varied with concentrations and time after administration. From the present findings, it can be concluded that the extracts of all the plant materials have got analgesic properties with fast onset of action whose mechanisms need to be investigated further.

- 165.** Abuye C, Urga K, Knapp H, Selmar D, Omwega AM, Imungi JK, Winterhalter P. **A compositional study of *Moringa stenopetala* leaves.** *East Afr Med J.* 2003 May;80(5):247-52.

Abstract

**OBJECTIVE:** To investigate nutrient composition in moringa leaves and compare with those of kale (*Brassica carinata*) and Swiss chard (*Beta vulgaris*).

**DESIGN:** Laboratory based study, nutrient composition of fresh and cooked leaves of *M. stenopetala* were analyzed.

**SETTING:** Gama-Gofa, south-western Ethiopia.

**RESULTS:** Raw *M. stenopetala* leaves contain 9% dry matter as crude protein, about 3-fold lower than in kale and swiss chard. *M. stenopetala* leaves contain higher percentage of carbohydrate, crude fiber and calcium compared to both raw and cooked kale and swiss chard. Vitamins are present at nutritionally significant levels averaging 28 mg/100g of vitamin C and 160 microg/100g

of beta-carotene. Minerals such as potassium, iron, zinc, phosphorus and calcium also exist in significant concentrations with the average values of 3.08 mg/100g iron and 792.8 mg/100g calcium.

**CONCLUSION:** Although the nutrient composition of *M. stenopetala* leaves in most cases is lower compared to kale and swiss chard they can be a good source of nutrients in dry season potentially when other vegetables are scarce. However, the presence of small amount of cyanogenic glucosides in *M. stenopetala* leaves may have a health risk in areas of high incidence of endemic goitre as an exacerbating factor if consumed more for a long period of time.

- 166.** Getachew Addis. **Treatments promoting germination of *Taverniera abyssinica*** A. Rich. Seeds. Seed Sci. & Technol. 2003; 31:579-586.

Abstract

*Taverniera abyssinica* A. rich is an endemic and threatened medical plant species in Ethiopia. However, there is no any attempt to investigate the germination behavior of the seed for sustainable utilization and conservation of the specious. This investigation was therefore designed to study the factors affecting germination of the seeds. Effects of storage durations (2, 8, 14, or 20 months), storage conditions (room temperature or refrigeration), pod developmental staged (green, brownish-green or brown) and treatment methods: mechanical hot water under 30°C-90°C temperature regime, and acid (sulphuric, nitric and hydrochloric acids) on percentage germination of *T. abyssinica* seeds were investigated. The findings indicated that seeds from brownish-green and brown pods germinated successfully (98%-100%) and could be stored for at least 20 months in dry condition under 2°C-20°C without loss of viability. However, the seeds of *T.abyssinica* required pre-germination treatment. Mechanical or 98% sulphuric acid treatment for 10-40 minutes improved germination from 8% (control) to over 98%. Hot water (70°C) treatment for one hour also improved germination to 54%. Mechanical see scarification is the most promising approach to overcome seed coat dormancy provided that cheap, safe, efficient and easily applicable devices are developed.

- 167.** Mamuye Hadis, Mesfin Lulu, Yared Mekonnen and Tefera Asfaw. **Field Trials on the repellent activity of four plant products against *Mansonia* population in Western Ethiopia.** *Phytotherapy Research*. 2003; 17:2002-2005.

Abstract

The repellent activity of essential oils of lemon eucalyptus (*Eucalyptus maculata citrodion*), rue (*Ruta chalepensis*), oleoresin of pyrethrum (*Chrysanthemum cineraria folium*) and neem (*Azadiracta indica*) have been field tested as 40%, 50% and 75% solutions in coconut oil against populations of mosquitoes consisting mainly of *Mansonia* in Gambella, western Ethiopia. A latin square design was used to randomize the test subjects for possible individual differences for mosquito attraction. Repellency was evaluated as the percentage protection. Deet was included in the study for comparison. All the plant products manifested repellency. At 50% concentration at which the highest repellency was recorded the protection was 91.6%, 87.0%, 96.0%, 97.9% for rue, neem, pyrethrum and deet, respectively. The essential oil of lemon eucalyptus was not tried at this concentration. At a 40% concentration deet, lemon eucalyptus and pyrethrum were significantly ( $p < 0.05$ ) more effective than rue and neem. At a 50% concentration, deet and pyrethrum were significantly better ( $p < 0.05$ ) than rue and neem. At a 75% concentration, deet and lemon eucalyptus performed significantly better ( $p < 0.05$ ) than pyrethrum and neem. The difference between pyrethrum and neem was also significant ( $p < 0.01$ ).

- 168.** Fassil H: **Ethiopia: a qualitative understanding of local traditional knowledge and medicinal plant use.** *IK Notes* 2003, 52:1-4.

- 169.** Abebe, D., Debella, A & Urga, K. 2003. Medicinal plants and other useful plants of Ethiopia. EHNRI, Addis Ababa, Ethiopia, pp.5.

- 170.** Paulos, A., Gezu, B. (2003), Assessment of the Afar's Ethnoveterinary Knowledge, Abstracts: First National workshop on Traditional Medicine, Addis Ababa.

- 171. Fullas, F. (2003). Spice plants in Ethiopia: their culinary and medicinal applications. Iowa, USA: Library Congress Cataloging.**
- 172.** Jeppson A, Tesfu M (2003) Traditional Surgical practices in Ethiopia. *Ethio J Health Dev* 17: 30-40.
- 173.** Urga K, Asefa A, Gudina M (2003) TM in Ethiopia. Proceeding of a national workshop held in Addis Ababa. During June 30- July 2, 2003. EHNRI, Addis Ababa, Ethiopia.
- 174.** Gedif T, Hahn HJ. The use of medicinal plants in self-care in rural central Ethiopia. *Journal of Ethnopharmacology*. 2003;87:155–161. doi: 10.1016/S0378-8741(03)00109-0. [[PubMed](#)] [[Cross Ref](#)]
- 175.** Tesema, T., Mirutse, G., Negussu, A. and Teshome, H. (2003) Medicinal Plants Biodiversity. National Biodiversity Strategy and Action Plan (NBSAP) Project, IBCR, Addis Ababa
- 176.** Hareya, F. (2003) Local Health Knowledge and Home-Based Medicinal Plant Use in Ethiopia. International Development Centre. Ph.D. Dissertation, Oxford University, Oxford.
- 177.** K. Gebrehiwot, Muys, B., M. Haile, and Mitloehner, R., 2003. Introducing *Boswellia papyrifera* (Del.) Hochst and its non-timber forest product, frankincense. *International Forestry Review*, 5(4): 348-353
- 178.** Sebsebe Demissew, Nordal, I. and Stabbetorp, O.E., 2003. Flowers of Ethiopia and Eritrea: Aloes and other lilies. Shama Books, Addis Ababa, Ethiopia.
- 179.** Fassil H. "We do what we know". Local health knowledge and home-based medicinal plant use in Ethiopia. Doctoral dissertation, International Development Center, Oxford University, 2003.

**180.**

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182. Nedi T, Mekonnen N, Urga K. **Diuretic effect of the crude extracts of *Carissa edulis* in rats.***J Ethnopharmacol.* 2004 Nov;95(1):57-61.

Abstract

*Carissa edulis* (forssk) vahl (Apocynaceae) is used traditionally for the treatment of headache, chest complaints, rheumatism, gonorrhoea, syphilis, rabies and as a diuretic. In the present study, the diuretic activity of different extracts of *Carissa edulis* was investigated. The diuretic activity of the different extracts of *Carissa edulis* in a dose range of 50-1000 mg/kg was assessed orally in rats using hydrochlorothiazide as a standard drug. The root bark maceration extract showed no effect on the urine output up to a dose of 1000 mg/kg, while the root bark soxhlet extract produced a significant increase ( $P < 0.05$ ) in urine output at a dose of 1000 mg/kg. The root wood maceration and root wood soxhlet extracts produced a significant increase in urine output at a dose of 50 mg/kg, with a P-value of  $<0.05$ . Urinary electrolyte excretion was also affected by the extracts: the root bark soxhlet extract increased urinary excretion of sodium, potassium and chloride ions; root wood maceration extract increased excretion of sodium and potassium, while root wood soxhlet extract increased excretion of potassium ion. These findings support the traditional use of *Carissa edulis* as a diuretic agent.

183. Endale A, Schmidt PC, Gebre-Mariam T. **Standardisation and physicochemical characterisation of the extracts of seeds of *Glinus lotoides*.***Pharmazie.* 2004 Jan;59(1):34-8.

Abstract

Extraction methods were standardised for saponin-containing extracts from the seeds of *Glinus lotoides* and the effects of some extraction process variables, such as the extracting solvent (various concentrations of methanol in water) and method of extract drying (freeze-drying and vacuum oven-drying), on the physical properties of the extracts were investigated. Physicochemical properties, namely particle size and size distribution, morphology, water uptake profiles and sorption isotherms, densities, flow properties and compaction profiles, of the crude dry extracts of

60% methanol (extract A), 70% methanol (extract B) and 80% methanol (extract C) were investigated. The average particle sizes (X50) of extracts A, B and C were found to be 68.4, 92.1 and 68.5 microm, respectively. Scanning electron micrographs of freeze-dried and vacuum oven-dried extract A showed that the particles are irregular in shape and are compact masses with sharp edges. The percent water uptake by the crude extracts was found to increase with an increase in relative humidities, while the hygroscopicity increased with decreasing methanol ratio of the extracting solvent. The bulk and the true densities of the three extracts (A, B and C) ranged from 0.66 to 0.67 and 1.49 to 1.50 g/ml, respectively. The tapped density (0.94 g/ml) and hence the porosity (56.0%), Carr's index (29.8%) and Hausner ratio (1.42) of extract A were greater than those of extracts B and C. Measurements of angle of repose indicated that all of the extracts exhibit poor flow properties. Compaction studies revealed that extract C has higher compactibility than extracts A and B.

- 184.** Bruck Messele, Hirut Lemma, Mohammed G Abdel-Mohsen, Tsige Gebre-Mariam ***In vitro* evaluation of the antimicrobial activities of selected medicinal plants** *Ethiopian Pharmaceutical Journal*, vol. 22 (2004): 1-14

***Abstract***

The 80% methanol extracts of the dried, ground plant materials of *Inula confertiflora*, *Clematis simensis*, *Zehneria scabra* and *Pycnostachys abyssinica* were tested for antimicrobial activity against common bacterial and fungal pathogens by the agar well diffusion method. The minimum inhibitory concentration (MIC) determination and evaluation of topical antimicrobial formulations were also carried out on the 80% methanol extract of *I. confertiflora*. The results indicated that all of the plant extracts exhibited antimicrobial activities against one of the most common bacterial pathogens, namely *Staphylococcus aureus*. In addition, a good antifungal activity against *Trichophyton mentagrophytes* was exhibited by the extract of *I. confertiflora*, which lends some credibility to the traditional uses of the plants. Evaluation of topical formulations of the 80% methanol extract of *I. confertiflora* demonstrated that the hydrophilic formulations exhibit higher antimicrobial activities (as compared to their hydrophobic counterparts) that were comparable (in case of their activity against *T. mentagrophytes*) to the commercially available antifungal products.

**Keywords:** medicinal plants, antimicrobial activities, agar well diffusion method, minimum inhibitory concentration, topical formulations

- 185.** Hailu Tadeg, Endris Mohammed, Kaleab Asres, Tsige Gebre-Mariam  
**Performance evaluation of topical formulations of the crude extracts of *L. adoensis* and *O. rochetiana*** *Ethiopian Pharmaceutical Journal*, vol. 22 (2004): 15-26

**Abstract**

*Lippia adoensis* and *Olinia rochetiana* are traditionally used in the form of topical applications for the treatment of various skin disorders in Ethiopia. In view of their traditional uses and proven antimicrobial activities, the crude extracts of the two botanicals were incorporated into various formulation bases having different degrees of hydrophilicity and/or lipophilicity. The performances of the resulting topical formulations were then evaluated using agar well diffusion technique. The results indicated that water miscible (hydrophilic) formulations are superior in performance to water immiscible (hydrophobic) ones. The most lipophilic ointment (petrolatum ointment) showed virtually no activity indicating that the active compound(s) of the herbal drugs could not be released from this formulation. Some formulations of the herbal drugs showed relatively comparable activities with different topical antiseptic products locally available in the market. *L. adoensis* in sodium laurate monostearin cream base showed a zone of inhibition of  $25 \pm 0.9$  against *S. aureus*, which is even better than that of gentamycin ( $21 \pm 1.0$ ) against the same organism. Similarly, *O. rochetiana*, in the same base, showed a zone of inhibition of  $65 \pm 2.5$  against *T. menthagrophytes*, which is by far better than any of the topical antifungal agents tested. From among the marketed topical antifungal agents clotrimazole gave the maximum zone of inhibition ( $47 \pm 2.5$ ). The traditional claims attributed to these herbal drugs by the local people for the treatment of topical skin disorders is partly justified by the different degrees of antimicrobial activities exhibited by topical formulations of these botanicals against the selected strains of bacteria and fungi which are known to be common causative agents for different types of skin infections.

**Keywords:** *Lippia adoensis*, *Olinia rochetiana*, topical formulations, performance evaluation, antimicrobial activity

- 186.** Hunde D, Asfaw Z, Kelbessa E: **Use and management of ethnoveterinary medicinal plants by indigenous people in 'Boosat', Welenchiti area.** Ethiopian journal of Biological Sciences 2004, 3:113-132.
- 187.** Balemie K, Kelbessa E, Asfaw Z: **Indigenous medicinal plant utilization, management and threats in Fentalle area, Eastern Shewa, Ethiopia.** Ethiopian Journal of Biological Sciences 2004, 3:37-58
- 188.** Mesfin Tadesse, 2004. Asteraceae (Compositae). Flora of Ethiopia and Eritrea, vol. 4(2), (eds.) Inga Hedberg, Ib Friis and Sue Edwards. The National Herbarium, Addis Ababa University, Ethiopia, and Uppsala University, Sweden.
- 189.** Teshale S, Merga B, Girma A, Ensermu K. Medicinal plants in the ethnoveterinary practice of Borana pastoralists, southern Ethiopia. International Journal of Applied Research and Veterinary Medicine.2004;2:220–225.
- 190.** EHNRI (Ethiopian Health Nutrition Research Institute) (2004) Traditional medicine in Ethiopia: Proceeding of a national workshop held in Addis Ababa, Ethiopia. June 30-July 2, 2003.
- 191.**

2005

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192. Hareya Fassil Beyond Plants, Professionals & Parchments: The role of home-based medicinal plant use and traditional health knowledge in primary health care in Ethiopia  
*Ethnobotany Research & Applications* 3:037-049 (2005)

Abstract

This paper is concerned with the use of medicinal plants and the related lay traditional health knowledge and practices among rural communities in the **Bahir Dar Zuria Wereda (district)** of Gojam located in the northwestern highlands of Ethiopia. Much of the research on Ethiopian traditional medicine and medicinal plants to date has been carried out in a compartmentalized manner, with researchers from various disciplines pursuing their interests in the subject in relative isolation. Most studies have been driven by a specific interest in the properties of particular medicinal plants, focusing on two main sources of information, i.e., the knowledge of professional traditional health practitioners and the ancient medico-religious herbal manuscripts with which, the religious traditional health practitioners or debterra, in particular, are closely associated. Focus on the professional realm of traditional health has detracted attention from others in the community who may also be knowledgeable about plant-derived treatments and cultural health practices. Due to the resulting overall ‘plantfocus’, relatively little attention has been paid to the local socio-cultural context in which many medicinal plants continue to be used by ordinary local people and knowledge about them developed and passed on over generations. The preliminary findings of a study seeking to address this research gap by focusing on lay community members are presented here. Qualitative and quantitative analysis of the data gathered through the main phase of the field research (carried out over the period August-December, 2000) is still underway. Nevertheless, this presentation offers an opportunity to discuss some of the general trends and preliminary findings of the household surveys and interviews held with members of five rural farming communities in Bahir Dar Zuria and to revisit the central hypothesis and objectives of the research in light of these findings

- 193.** K. Asres, S. Gibbons, E. Hana, F. Bucar **Anti-inflammatory activity of extracts and a saponin isolated from *Melilotus elegans*** *Pharmazie* 60: 310–312 (2005)

The crude methanol extract of *Melilotus elegans* Ser. (Fabaceae), a plant widely used in Ethiopian traditional medicine for the treatment of asthma, haemorrhoid and lacerated wounds showed a significant anti-inflammatory activity against carrageenin-induced rat paw oedema. At a dose corresponding to 333.3 mg per kg body weight of dry plant material, the methanol extract displayed a strong inhibitory effect that was comparable to the inhibitory effect of 1 mg/kg of indomethacin in the same test system. Bioassay guided fractionation of the alcoholic extract led to the isolation of an oleanene-type triterpene saponin identified as azukisaponin V (1) ((3-O-[ $\alpha$ -l-rhamnopyranosyl-(1 $\rightarrow$ 2)- $\beta$ -d-glucopyranosyl(1 $\rightarrow$ 2)- $\beta$ -D-glucuronopyranosyl]-soyasapogenol B). The structure of the compound was identified by using MS and extensive one- and two-dimensional NMR experiments ( $^1\text{H}$ ,  $^{13}\text{C}$ , COSY, HMQC, HMBC and NOESY). One hour after injection of carrageenin, inhibition of oedema exerted by 1 was approximately ten times higher than that of indomethacin on a molar basis.

- 194.** Wondwosen Teshome-Bahiru **Impacts of Urbanisation on the Traditional Medicine of Ethiopia** *Anthropologist*, 8(1): 43-52 (2005)

#### ABSTRACT

The aim of this article is to assess how urbanisation affected the traditional medicine of Ethiopia. The data were collected in Addis Ababa, Ethiopia from June 1998 to January 1999 by employing anthropological techniques of data collection, namely, participant observation and interview. It is found out that the urbanisation process of the country has both positive and negative impacts on the traditional medicine of Ethiopia.

**KEYWORDS** Urbanisation. Ethiopia. Traditional Medicine. Addis Ababa. Healer

- 195.** Tchoumboungang F, Zollo PH, Dagne E, Mekonnen Y. **In vivo antimalarial activity of essential oils from *Cymbopogon citratus* and *Ocimum gratissimum* on mice infected with *Plasmodium berghei*.** *Planta Med.* 2005 Jan;71(1):20-3.

Abstract

The essential oils obtained by hydrodistillation from fresh leaves of *Cymbopogon citratus* and *Ocimum gratissimum* growing in Cameroon were analyzed by GC and GC/MS. The main constituents of the oil of *Ocimum gratissimum* were gamma-terpinene (21.9 %), beta-phellandrene (21.1 %), limonene (11.4 %) and thymol (11.2 %), while the oil of *Cymbopogon citratus* contained geranial (32.8 %), neral (29.0 %), myrcene (16.2 %) and beta-pinene (10.5 %). The effects of these oils on the growth of *Plasmodium berghei* were investigated. Both oils showed significant antimalarial activities in the four-day suppressive in vivo test in mice. At concentrations of 200, 300 and 500 mg/kg of mouse per day, the essential oil of *C. citratus* produced the highest activity with the respective percentages of suppression of parasitaemia: 62.1 %, 81.7 % and 86.6 %. The corresponding values for the oil of *O. gratissimum* at the same concentrations were 55.0 %, 75.2 % and 77.8 %, respectively. Chloroquine (10 mg/kg of mouse, positive control) had a suppressive activity of 100 %.

- 196.** Endale A, Kammerer B, Gebre-Mariam T, Schmidt PC. **Quantitative determination of the group of flavonoids and saponins from the extracts of the seeds of *Glinus lotoides* and tablet formulation thereof by high-performance liquid chromatography.** *J Chromatogr A.* 2005 Aug 12;1083(1-2):32-41.

Abstract

The total flavonoids and saponins of the seeds of *Glinus lotoides* in the crude extracts and tablet formulation thereof were quantified by reversed-phase high-performance liquid chromatographic (RP-HPLC) methods with UV detection. The saponins were analyzed after acid hydrolysis in 3 M HCl at 100 degrees C for 1 h. Vicenin-2 and mollugogenol B were isolated and used as reference substances for the quantification of total flavonoids and saponins, respectively. The identity and

purity (> 97%) of the standards were confirmed by spectroscopic (UV, MS, and NMR) and chromatographic (HPLC) methods. The flavonoids and saponins of the crude extract of the seeds and tablet formulation were separated by RP-HPLC (Nucleosil RP-18 column, 250 mm x 4.6 mm) using linear gradient elution systems of acetonitrile-water-0.1 M H<sub>3</sub>PO<sub>4</sub> for flavonoids and methanol-water for saponins. Satisfactory separation of the compounds was obtained in less than 30 and 25 min, for the flavonoids and saponins, respectively. The methods were validated for linearity, repeatability, limits of detection (LOD) and limits of quantification (LOQ). Repeatability (inter- and intra-day, n = 6 and 9, respectively) showed less than 2% relative standard deviation (RSD). The LOD and LOQ were found to be 0.075 and 0.225 mg/mL, respectively, for vicenin-2 and 0.027 and 0.082 mg/100 mL, respectively, for mollugogenol B. The content of flavonoids and saponins of six single tablets was between 95 and 103% for flavonoids and 94-98% for saponins. The validated HPLC methods were employed to standardize a fingerprint of a laboratory produced purified extract, which could be used as a secondary standard for the routine quality control. Accordingly, the purified extract was found to contain 21.3% flavonoids (vicenin-2, 10%) and 25.4% saponins (glinuside G, 14.2%).

- 197.** Wube AA, Streit B, Gibbons S, Asres K, Bucar F. **In vitro 12(S)-HETE inhibitory activities of naphthoquinones isolated from the root bark of *Euclea racemosa* ssp. *schimperi*.** *J Ethnopharmacol.* 2005 Nov 14;102(2):191-6. Epub 2005 Jul 12.

#### Abstract

Platelet 12-lipoxygenase is believed to play a role in cancer and other pathological conditions, such as psoriasis, atherosclerosis and arthritis. The inhibition of 12-LOX is a potential therapeutic approach in the treatment of tumor metastasis. The extracts of *Euclea racemosa* Murr.ssp.schimperi (A. DC.) F. White (Ebenaceae) obtained by maceration and naphthoquinones isolated from the dichloromethane extract have been investigated for their 12(S)-HETE inhibitory activity using human platelets. At 100 microg/ml, the dichloromethane extract inhibited the formation of 12(S)-HETE by 88.7% and compounds 7-methyljuglone (2), isodiospyrin (3), neodiospyrin (4) and mamegakinone (5), isolated from this extract, exhibited significant activities

with IC(50) values ranging from 4 to 58 microg/ml (22.2-155.7 microM). Of these the most abundant compound, 7-methyljuglone displayed a potent inhibitory activity with an IC(50) value of 4.18 microg/ml (22.2 microM), which was comparable to the positive control baicalein with an IC(50) value of 5 microg/ml (18.5 microM). In contrast, 4(S)-shinanolone (1), the reduced form of compound 2, did not show any significant inhibitory activity even at a concentration of 60 microg/ml.

- 198.** Wube AA, Bucar F, Gibbons S, Asres K. **Sesquiterpenes from Warburgia ugandensis and their antimycobacterial activity.***Phytochemistry.* 2005 Oct;66(19):2309-15.

Abstract

The dichloromethane extract of the stem bark of Warburgia ugandensis afforded three new coloratane sesquiterpenes, namely: 6alpha,9alpha-dihydroxy-4(13),7-coloratadien-11,12-dial (1), 4(13),7-coloratadien-12,11-olide (2), and 7beta-hydroxy-4(13),8-coloratadien-11,12-olide (3), together with nine known sesquiterpenes, i.e., cinnamolide-3beta-acetate (4), muzigadial (5), muzigadiolide (6), 11alpha-hydroxymuzigadiolide (7), cinnamolide (8), 7alpha-hydroxy-8-drimen-11,12-olide (9), ugandensolide (10), mukaadial (11), ugandensidial (12), and linoleic acid (13). Their structures were assigned on the basis of 1D and 2D-NMR spectroscopic and GC-MS analysis. The compounds were examined for their antimycobacterial activity against Mycobacterium aurum, M. fortuitum, M. phlei and M. smegmatis; and the active constituents showed MIC values ranged from 4 to 128 microg/ml compared to the antibiotic drugs ethambutol (MIC ranged from 0.5 to 8 microg/ml) and isoniazid (MIC ranged from 1 to 4 microg/ml).

- 199.** Asres K, Gibbons S, Hana E, Bucar F. **Anti-inflammatory activity of extracts and a saponin isolated from Melilotus elegans.***Pharmazie.* 2005 Apr;60(4):310-2.

Abstract

The crude methanol extract of *Melilotus elegans* Ser. (Fabaceae), a plant widely used in Ethiopian traditional medicine for the treatment of asthma, haemorrhoid and lacerated wounds showed a significant anti-inflammatory activity against carrageenin-induced rat paw oedema. At a dose corresponding to 333.3 mg per kg body weight of dry plant material, the methanol extract displayed a strong inhibitory effect that was comparable to the inhibitory effect of 1 mg/kg of indomethacin in the same test system. Bioassay guided fractionation of the alcoholic extract led to the isolation of an oleanene-type triterpene saponin identified as azukisaponin V (1) ((3-O-[alpha-L-rhamnopyranosyl-(1 → 2)-beta-D-glucopyranosyl(1 → 2)-beta-D-glucuronopyranosyl]-soyasapogenol B). The structure of the compound was identified by using MS and extensive one- and two-dimensional NMR experiments (<sup>1</sup>H, <sup>13</sup>C, COSY, HMQC, HMBC and NOESY). One hour after injection of carrageenin, inhibition of oedema exerted by 1 was approximately ten times higher than that of indomethacin on a molar basis.

- 200.** Hymete A, Iversen TH, Rohloff J, Erko B. **Screening of *Echinops ellenbeckii* and *Echinops longisetus* for biological activities and chemical constituents.***Phytomedicine.* 2005 Sep;12(9):675-9.

#### Abstract

Members of the genus *Echinops* in the family of Asteraceae are widely used in Ethiopian herbal medicine for the treatment of various diseases and illness such as migraine, diarrhea, heart pain, different forms of infections, intestinal worm infestation and hemorrhoid. Hydroalcoholic extracts of the root, flower head, leaf and stem of *Echinops ellenbeckii* O. Hoffm. and *Echinops longisetus* A. Rich were investigated for their chemical constituents and biological activities. The presence of alkaloids, saponins, phytosterols, polyphenols and carotenoids in the different parts of the plants was observed whilst anthraquinones were not detected. The leaf extracts of both plants and stem extract of *E. longisetus* showed strong inhibitory activity against cultures of *Staphylococcus aureus*. None of the extracts were found to be active against Gram-positive organisms. The flower extract of *E. ellenbeckii* showed strong inhibitory activity against *Candida albicans*. Root and flower extracts of the plants investigated showed lethal activity against earthworms. Moreover, the

extracts of the roots of both plants showed molluscicidal activity against schistosome-transmitting snail hosts. The biological activities observed were dose dependent.

- 201.** Geyid A, Abebe D, Debella A, Makonnen Z, Aberra F, Teka F, Kebede T, Urga K, Yersaw K, Biza T, Mariam BH, Guta M. **Screening of some medicinal plants of Ethiopia for their anti-microbial properties and chemical profiles.** *J Ethnopharmacol.* 2005 Mar 21;97(3):421-7.

#### Abstract

In the indigenous health care delivery system of Ethiopia, numerous plant species are used to treat diseases of infectious origin. Regardless of the number of species, if any of such claims could be verified scientifically, the potential significance for the improvement of the health care services would be substantial. The objective of this study was, therefore, to determine the presence of anti-microbial activity in the crude extracts of some of the commonly used medicinal plants as well as to identify the class of compounds in the plants that were subjected to such screening. Thus, the crude methanol, petroleum ether and aqueous extracts of 67 plant species were subjected to preliminary screening against 10 strains of bacterial species and 6 fungal strains using the agar dilution method. A sample concentration of 250-2000 microg/ml and 500-4000 microg/ml were used for the bacterial and fungal pathogens, respectively. The results indicated that 44 different plant species exhibited activity against one or more of the bacteria while one species, viz., *Albizia gummifera* showed activity against all the 10 bacteria at different gradient of dilution. Twenty three species inhibited or retarded growth of one or more organisms at dilution as low as 250 microg/ml. Extracts of same plants species were also tested against six different fungal pathogenic agents of which eight species showed growth inhibition against one or more of the organisms. *Trichila emetica* and *Dovyalis abyssinica*, which inhibited growth of four and five fungal strains at 100 microg/ml concentration, respectively, were the most promising plants. Chemical screening conducted on the extracts of all the plants showed the presence of several secondary metabolites, mainly, polyphenols, alkaloids, tannins sterols/terpenes, saponins and glycosides. The plants

containing more of these metabolites demonstrated stronger anti-microbial properties stressing the need for further investigations using fractionated extracts and purified chemical components.

- 202.** Gebrie E, Makonnen E, Zerihun L, Debella A. **The possible mechanisms for the antifertility action of methanolic root extract of *Rumex steudelii*.** *Afr Health Sci.* 2005 Jun;5(2):119-25.

#### Abstract

**BACKGROUND:** The practice of traditional medicine for the control of fertility in most parts of Ethiopia is based on the uses of plant medicines for many years. *Rumex steudelii* Hochst (Polygonaceae), locally known as "Tult" or "Yeberemelas" is one of the traditionally used antifertility plants in Ethiopia. In our previous study, the methanolic extract of *R. steudelii* root was found to show antifertility activity in female rats.

**OBJECTIVES:** The present study focused further on the possible mechanisms of the antifertility effect of the methanolic extract of *R. steudelii*.

**METHODS:** The effect of the extract on implantation, the uterus weight of immature ovariectomized rats and serum estrogen-progesterone ratio was evaluated. Its effect on isolated guinea pig uterus in the presence and absence of uterine muscle contractions inhibitors was also assessed. Test for in vivo abortifacient effect was also carried out.

**RESULTS:** It was found that the extract decreased the number of implantation sites significantly. At a contraceptive dose, it was also observed to have no estrogenic activity in immature rat bioassay. The extract did not affect the serum estrogen-progesterone ratio. It produced concentration dependent increase in uterine muscle contractions similar to those of the standard drug, oxytocin. Incubation of the tissue with three uterine muscle contractions inhibitors revealed that the extract produced uterine contractions perhaps by activating muscarinic and/or histaminic receptors. The in vivo abortifacient effect was not seen upon administration of both lower and higher doses of the extract in pregnant rats.

CONCLUSION: All these observations suggest that the extract produced antifertility effect mainly by inhibiting implantation though antiestrogen, progesteron and uterotonic effects could as well be possible mechanisms.

- 203.** Asres K, Seyoum A, Veeresham C, Bucar F, Gibbons S. **Naturally derived anti-HIV agents.** *Phytother Res.* 2005 Jul;19(7):557-81.

#### Abstract

The urgent need for new anti-HIV/AIDS drugs is a global concern. In addition to obvious economical and commercial hurdles, HIV/AIDS patients are faced with multifarious difficulties associated with the currently approved anti-HIV drugs. Adverse effects, the emergence of drug resistance and the narrow spectrum of activity have limited the therapeutic usefulness of the various reverse transcriptase and protease inhibitors that are currently available on the market. This has driven many scientists to look for new anti-retrovirals with better efficacy, safety and affordability. As has always been the case in the search for cures, natural sources offer great promise. Several natural products, mostly of plant origin have been shown to possess promising activities that could assist in the prevention and/or amelioration of the disease. Many of these anti-HIV agents have other medicinal values as well, which afford them further prospective as novel leads for the development of new drugs that can deal with both the virus and the various disorders that characterize HIV/AIDS. The aim of this review is to report new discoveries and updates pertaining to anti-HIV natural products. In the review anti-HIV agents have been classified according to their chemical classes rather than their target in the HIV replicative cycle, which is the most frequently encountered approach. Perusal of the literature revealed that most of these promising naturally derived anti-HIV compounds are flavonoids, coumarins, terpenoids, alkaloids, polyphenols, polysaccharides or proteins. It is our strong conviction that the results and experiences with many of the anti-HIV natural products will inspire and motivate even more researchers to look for new leads from plants and other natural sources.

- 204.** Asres K, Bucar F. **Anti-HIV activity against immunodeficiency virus type 1 (HIV-I) and type II (HIV-II) of compounds isolated from the stem bark of *Combretum molle*.** *Ethiop Med J.* 2005 Jan;43(1):15-20.

Abstract

In vitro anti-HIV activity of various extracts prepared from the stem bark of *Combretum molle* (R. Br. Ex. G. Don.) Engl & Diels (Combretaceae), a plant widely used in Ethiopian traditional medicine for the treatment of liver diseases, malaria and tuberculosis has been assessed against human immunodeficiency virus type 1 (HIV-1) and type 2 (HIV-2). The total extract was prepared by percolation with 80% methanol whilst the petroleum ether, chloroform, acetone and 100% methanol fractions were obtained by successive hot extraction using Soxhlet apparatus. Selective inhibition of viral growth was assessed by the simultaneous determination of the in vitro cytotoxicity of each of the extracts against MT-4 cells. Results obtained in this study indicate that the acetone fraction possessed the highest selective inhibition of HIV-1 replication. Phytochemical investigation of the acetone fraction resulted in the isolation of two tannins and two oleanane-type pentacyclic triterpene glycosides. One of the tannins was identified as punicalgin (an ellagitannin), whilst the structure of the other (CM-A) has not yet been fully elucidated. The saponins that were characterized as arjunglucoside (also called 4-epi-sericoside) and sericoside did not inhibit replication of either HIV-1 or HIV-2. On the other hand, both punicalgin and CM-A displayed selective inhibition of HIV-1 replication with selectivity indices (ratio of 50% cytotoxic concentration to 50% effective antiviral concentration) of 16 and 25, respectively and afforded cell protection of viral induced cytopathic effect of 100% when compared with control samples. Neither of the tannins exhibited a selective inhibition to HIV-2 replication at nontoxic doses.

- 205.** Tadege H, Mohammed E, Asres K, Gebre-Mariam T. **Antimicrobial activities of some selected traditional Ethiopian medicinal plants used in the treatment of skin disorders.** *J Ethnopharmacol.* 2005 Aug 22;100(1-2):168-75. Epub 2005 Apr 20.

Abstract

Hydroalcoholic extracts of eight species of medicinal plants, namely, *Acokanthera schimperi* (Apocynaceae), *Calpurnia aurea* (Leguminosae), *Kalanchoe petitiata* (Crassulaceae), *Lippia adoensis* (Verbenaceae), *Malva parviflora* (Malvaceae), *Olinia rochetiana* (Oliniaceae), *Phytolacca dodecandra* (Phytolaccaceae) and *Verbascum sinaiticum* (Scrophulariaceae), traditionally used in the treatment of various skin disorders were screened for antimicrobial activity

against different strains of bacteria and fungi which are known to cause different types of skin infections. The tests were carried out using agar well diffusion method at three concentration levels (100, 50 and 25mg/ml) of the crude extracts. The MICs of the crude extracts of *Lippia adoensis* and *Olinia rochetiana* were determined by agar dilution method. Furthermore, the powdered leaves of *Lippia adoensis* and *Olinia rochetiana* were fractionated into different solvents of wide ranging polarity and the resulting fractions were screened for antimicrobial activity against the same organisms. Of all the plants tested, *Lippia adoensis* and *Olinia rochetiana* were found to be the most active species against bacterial and fungal strains, respectively. In addition, almost all species of plants were found to have activity on at least one microbial strain. The antimicrobial activity profile also showed that *Staphylococcus aureus* and *Trichophyton mentagrophytes* were the most susceptible bacterial and fungal strains, respectively. The results indicate the potential of these herbal drugs in treating microbial infections of the skin, thus, justifying their claimed uses in the treatment of various skin disorders, the majority of which are of infectious origin.

- 206.** Wube AA, Bucar F, Asres K, Gibbons S, Rattray L, Croft SL. **Antimalarial compounds from *Kniphofia foliosa* roots.** *Phytother Res.* 2005 Jun;19(6):472-6.

#### Abstract

During the course of screening Ethiopian medicinal plants for their antimalarial properties, it was found that the dichloromethane extract of the roots of *Kniphofia foliosa* Hochst. (Asphodelaceae), which have long been used in the traditional medicine of Ethiopia for the treatment of abdominal cramps and wound healing, displayed strong in vitro antiplasmodial activity against the chloroquine-sensitive 3D7 strain of *Plasmodium falciparum* with an ED50 value of 3.8 microg/mL and weak cytotoxic activity against KB cells with an ED50 value of 35.2 microg/mL. Five compounds were isolated from the roots and evaluated for their in vitro antimalarial activity. Among the compounds tested, 10-(chrysophanol-7'-yl)-10-(xi)-hydroxychrysophanol-9-anthrone and chryslandicin, showed a high inhibition of the growth of the malaria parasite, *P. falciparum* with ED50 values of 0.260 and 0.537 microg/mL, respectively, while the naphthalene derivative, 2-acetyl-1-hydroxy-8-methoxy-3-methylnaphthalene, exhibited a less significant antimalarial activity with an ED50 value of 15.4 microg/mL. To compare the effect on the parasite with toxicity to mammalian cells, the cytotoxic activities of the isolated compounds against the KB cell line

were evaluated and 10-(chrysophanol-7'-yl)-10-(xi)-hydroxychrysopan-9-anthrone and chryslandin displayed very low toxicity with ED<sub>50</sub> values of 104 and 90 microg/mL, respectively. This is the first report of the inhibition of the growth of *P. falciparum* by anthraquinone-anthrone dimers and establishes them as a new class of potential antimalarial compounds with very little host cell toxicity.

- 207.** Gebre-Mariam T, Asres K, Getie M, Endale A, Neubert R, Schmidt PC. **In vitro availability of kaempferol glycosides from cream formulations of methanolic extract of the leaves of *Melilotus elegans*.** *Eur J Pharm Biopharm.* 2005 May;60(1):31-8.

#### Abstract

In Ethiopian traditional medicine, *Melilotus elegans* Salzm.ex Ser. (Leguminosae) is used for the treatment of haemorrhoids and lacerated wounds. In view of its wide spread use and proven anti-inflammatory activity, 80% methanolic extract of the leaves was formulated into creams. HPLC/UV and MS studies revealed the presence of flavonoids, of which kaempferol was the major aglycone. Quantitative estimation of kaempferol in the hydrolyzed extract as determined by HPLC/UV was found to be 16.3±0.93 microg/mg (n=6, range) of extract. The in vitro release profiles of kaempferol glycosides (quantified as kaempferol equivalent) from the cream formulations in a multilayer membrane system indicated that a lipophilic cream of the extract provides higher release of kaempferol glycosides than hydrophilic and amphiphilic ones. Over a study period of 4h, the lipophilic cream released 66±5.70% of kaempferol glycosides, while the hydrophilic and amphiphilic creams resulted in 55±2.77 and 38±2.30% release, respectively.

- 208.** Demelash Biffa **In vitro antimicrobial activities of bark and leaf extracts of *Moringa stenopetala* against mastitis causing bacterial pathogens** *Ethiopian Pharmaceutical Journal* Vol. 23 2005: 15-22

**Abstract**

Antimicrobial activities of methanolic and aqueous extracts of the bark and leaf of *Moringa stenopetala* (Moringaceae) were studied in vitro against major mastitis causing bacterial pathogens; *Staphylococcus aureus*, *Streptococcus agalactiae* and *Streptococcus dysagalactiae*. The test involved the use of agar well diffusion inhibition (AWDI) test and antimicrobial activity was determined by absence or presence of growth inhibition and measurement of inhibition zone diameter (mm) expressed as mean zone of inhibition  $\pm$  standard error (MZI SE). Extract solutions were prepared at four concentrations (0.3, 0.7, 1.2 and 2.0 g/ml) using Tris buffer saline. Penicillin G (1.2 g/ml) was used as a standard drug for comparison with the test materials. The study showed significant response variation between the organisms to various concentrations of the test extracts. Growth inhibition of *S. aureus* was much pronounced at 0.3 g/ml of methanolic extract of the bark (MZI  $\pm$  SE = 58.4  $\pm$  2.4). Conversely, *S. agalactiae* and *S. dysagalactiae* exhibited significantly ( $p < 0.0005$ ) higher degree of sensitivity to methanolic bark extract at 2.0 g/ml (54.0  $\pm$  2.1 and 50.3  $\pm$  0.7, respectively). Similarly, methanolic leaf extract showed a more significant ( $p < 0.0005$ ) growth inhibition effect on *S. aureus* than on *S. agalactiae* and *S. dysagalactiae*. For aqueous extracts of bark and leaf, however, the variation in growth inhibition between test organisms was observed only at 2.0 g/ml. Bark and leaf extracts of *M. stenopetala* were demonstrated to have a potent microbial growth inhibition effects when tested in vitro against the major bacteria causing udder infection. Further in vitro studies, determination of optimal dose and identification of active ingredients were recommended.

**Keywords:** antimicrobial activity, mastitis, *Moringa stenopetala*, moringaceae, bark and leaf extracts

- 209.** Riot Sishu, Mariamawit Yonathan, Ameha Seyoum, Kaleab Asres **Radical scavenging activity of volatile oils of herbs traditionally used to spice cooking butter in Ethiopia** *Ethiopian Pharmaceutical Journal* Vol. 23 2005: 7-14

**Abstract**

Since time immemorial food preservation has been a common practice. Most of these preservatives come from natural sources such as herbs and spices. Currently, synthetic antioxidants are

extensively incorporated in foods and cosmetics for the prevention of lipid peroxidation. Some of these synthetic antioxidants, however, have been shown to be carcinogenic and since quite recently, efforts are underway to develop effective and safer natural antioxidants targeting mainly herbs and spices. In Ethiopia, the aerial parts of *Lippia adoensis* var. koseret and *Ocimum basilicum* var. purpurascens, rhizomes of *Zingiber officinalis*, and seeds of *Aframomum corrorima* are used to spice cooking butter and also to preserve its freshness for a long time. The volatile oils of these plants, obtained by hydrodistillation, and the methanolic extract of spiced butter were tested for their radical scavenging activity using TLC and 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay. The antioxidant principles of the examined volatile oils were detected in the methanolic extract of the cooking butter spiced with the four plants. Quantitative studies showed that the volatile oils were able to reduce the stable radical, DPPH to the yellow coloured 2,2-diphenylpicrayl-1-hydrazine in a dosedependent manner. The strongest effect was exhibited by the essential oil of the aerial parts of *O. basilicum* var. purpurascens ( $IC_{50} = 0.04 \mu\text{l/ml}$ ) whereas the weakest effect was shown by that of the seeds *A. corrorima* ( $IC_{50} = 34.9 \mu\text{l/ml}$ ). The antioxidant potentials of the oil obtained from the aerial parts of *L. adoensis* var. koseret and the rhizomes of *Z. officinalis* were somewhat intermediate ( $IC_{50} = 6.13$  and  $9.66 \mu\text{l/ml}$ , respectively). The results of this study may provide a rational explanation for the traditional use of these plants to prevent rancidity and preserve the freshness of cooking butter, which could be attributed to their radical scavenging activity.

**Keywords:** spiced butter, volatile oils, TLC analysis, antioxidant activity, DPPH assay

210. Andargachew Mulu, Afework Kassu, Belay Tessema **Antibacterial activity of honey produced by honeybees (*Apis mellifera*) on bacterial species isolated from infected wound** *Ethiopian Pharmaceutical Journal* Vol. 23 2005: 1-6

### **Abstract**

Honey is considered to be important in traditional treatment of wound infections in many countries of the world, including Ethiopia. However, information on in vitro antibacterial activity of honey

produced by honeybees on bacterial pathogens is lacking in Ethiopia. The objective of this study was to determine the antibacterial effect of honey against bacterial species isolated from wound discharges. Wound swabs and discharges were collected as part of routine clinical management of patients both from in-patient and out-patient departments of the University of Gondar Teaching Hospital. Specimens were collected and processed following standard microbiological procedures. Minimum inhibitory concentrations (MIC) and minimum bactericidal concentrations (MBC) of honey sample on bacterial isolates were investigated by an agar dilution technique. *Staphylococcus aureus* was the predominant species isolated from various types of wound discharges (63%), followed by *Klebsiella pneumoniae* (9%), and *Escherichia coli* (9%). Growth retardation and complete inhibition were observed at lower concentration of 2.5% and 6% (v/v), respectively. The average MIC and MBC of honey for all tested organisms was 6.2% and 8% (v/v) of honey, respectively. Honey showed bacteriostatic and bactericidal activity on tested Gram-positive and Gram-negative isolates of bacteria from wound discharges *in vitro*. However, a more detailed comparative study should be made to evaluate the antibactericidal activity of honey and other antimicrobial agents currently in use.

**Keywords:** honey, antibacterial activity, minimum inhibitory concentrations, minimum bactericidal concentrations, infected wound

211. Asfaw Debella, Eyasu Mekonnen, Legesse Zerihun, Dawit Abebe and Frehiwot Teka. **In-vitro antipyretic studies of the aqueous & ethanol extracts of the leaves of AJUGA REMOTA & LIPPIA ADOENSIS.** *Ethiop Med J.* 2005; 43(2):111-118.

#### Abstract

**Background:** There are quite large numbers of traditionally used plants that are used to treat ailments associated with fever in the ethnomedical system of Ethiopia. Most of them, however, have not been subjected to scientific investigation for their efficacy and safety. **Objective:** To evaluate the antipyretic effects of the aqueous and ethanol extracts of the leaves of *Ajuga remota* and *Lippia adoensis*. **Design:** An experimental design, in which five groups of in-house bred albino mice weighing 30-35 g representing positive and negative control, and three dose levels extract treated groups, respectively was employed. The extracts, standard drugs and distilled water

were administered into GIT by gavages to evaluate the antipyretic effect after inducing pyrexia in mice. Results: All extracts of both plants that were administered orally at doses of 50, 100 and 200 mg per kg showed antipyretic property. The antipyretic effects were observed to be dose dependent. In both plants, the aqueous extract was found to have more potent antipyretic effect than the ethanol extract. No mouse manifested toxic effects at any dose levels of all the extracts for the observed period of two weeks. Conclusion: The present study show that both extracts of the investigated plants have got antipyretic effects and the extracts are effective and safe at the doses tested. This supports the traditional claim or use of these plants.

Key words: *Ajuga remota*, *Lippia adeonensis*, Yeast, Extracts, Antipyretic activity, Rectal temperature.

- 212.** Dawit Abebe, Asfaw Debella, Amare Dejene, Ambaye Degefa, Almaz Abebe, Kelbessa Urga, Lemma Ketema. **Khat chewing habit as a possible risk behavior for HIV infection: a case-control study.** *Ethiop J. Health Dev.* 2005; 19(3): 174-181.

#### Abstract

Background: The use/abuse of psychoactive drugs such as khat leaves (*Catha edulis*) are believed to alter one's moods or emotional state either through the sustained release or inhibition of neurotransmitters, thereby enhancing or dampening the response of the individual. Most people whose thinking is wrapped by continued drug use may not be able to see the harm resulting from their actions. Thus, there has been a strong linkage between drug use and casual or unsafe sexual practice despite serious concern about HIV infection. Objective: Khat chewing is known to be a widespread habit in Ethiopia. This study is, thus, aimed at investigating whether or not the use of this psycho stimulant alone or in conjunction with other behaviors associated with its use constitutes a risk behavior that accelerates the spread of HIV infection. Methods: A case-control study involving 850 human subjects, i.e. 425 HIV positives (cases) and 425 HIV negatives (control) was conducted using rapid test algorithm and/or western blot method for determination of HIV status. Both groups were interviewed about their probable khat chewing habits, alcohol intake, multiple sexual practice, and the like, using a structured questionnaire. The data were

analyzed using SPSS/PC + statistical software. Results: Risk behaviors for HIV infection such as khat chewing in conjunction with alcohol intake and casual sex were observed more in people with HIV than in the control group. Khat chewing was significantly associated with multiple sexual practice (OR = 4.03, 95% CI = 3.02, 5.39), which in turn was strongly linked with HIV cases (OR = 3.52, 95% CI = 2.64, 4.69). thus, more than the nonchewers, khat chewers constituted significantly higher number of HIV cases (OR = 2.32, 95% CI = 1.75, 3.07). Conclusion: Khat chewing is a risk behavior for the spread of HIV infection. Mainstreaming of khat control into national development planning initiatives is recommended.

**213.** Gujji T: Ethnopharmacy of Medicinal Plants in Wombera District, Metekel Zone, Western Ethiopia MSc. Thesis, School of Pharmacy, Addis Ababa University; 2005.

**214.** Getachew Addis, Kelbessa Urga, and Dawit Dikasso. **Ethnobotanical Study of Edible Wild Plants in Some Selected Districts of Ethiopia.** Human Ecology. February 2005; 33(1): 83-118.

#### Abstract

The ethnobotanical study on edible wild plants was carried out from May to December, 2001, in four districts of Ethiopia. The study areas included the rural and semiurban settings of Alamata, Cheha, Goma, and Yilmana Denssa districts of Tigray, Southern Peoples, Oromiya, and Amhara regional states, respectively. Voucher plant specimens were collected along with ethnobotanical information, and scientific names were determined. One hundred and fifty two plant parts from 130 species were recognized and consumed in these districts. Children consumed more wild plants during seasons of food availability (sufficient crop stock) than adults. There was marked increase in quantity and number of wild plant species consumed during food shortage and famine. A few of the reportedly edible species caused health problems that sometimes lead to fatality. Research into the safety and nutritional composition of edible wild plants and fungi is warranted. Selected edible wild plant species should be promoted as supplements to dietary variety and/or bridging the hungry periods of food shortage. **KEYWORDS:** drought; edible wild plants; Ethiopia; food shortage; poisoning.

- 215.** Ariaya Hymete, Rohloff, J., Kjoson H. and Iversen, T-H., 2005. Acetylenic thiophenes from the roots of *Echinops ellenbeckii* from Ethiopia. *Natural Products Research*, 19(8): 755-761.
- 216.** Hymete A, Iversen TH, Rohloff J, Erko B. Screening of *Echinops ellenbeckii* and *Echinops longisetus* for biological activities and chemical constituents. *Phytomedicine*. 2005 Sep;12(9):675-9.

### **Abstract**

Members of the genus *Echinops* in the family of Asteraceae are widely used in Ethiopian herbal medicine for the treatment of various diseases and illness such as migraine, diarrhea, heart pain, different forms of infections, intestinal worm infestation and hemorrhoid. Hydroalcoholic extracts of the root, flower head, leaf and stem of *Echinops ellenbeckii* O. Hoffm. and *Echinops longisetus* A. Rich were investigated for their chemical constituents and biological activities. The presence of alkaloids, saponins, phytosterols, polyphenols and carotenoids in the different parts of the plants was observed whilst anthraquinones were not detected. The leaf extracts of both plants and stem extract of *E. longisetus* showed strong inhibitory activity against cultures of *Staphylococcus aureus*. None of the extracts were found to be active against Gram-positive organisms. The flower extract of *E. ellenbeckii* showed strong inhibitory activity against *Candida albicans*. Root and flower extracts of the plants investigated showed lethal activity against earthworms. Moreover, the extracts of the roots of both plants showed molluscicidal activity against schistosoma-transmitting snail hosts. The biological activities observed were dose dependent.

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218. Mander M, Emanu B, Asfaw Z, Busa B: **Marketing of Medicinal Plants in Ethiopia: A Survey of the Trade in Medicinal Plants**: A research report prepared by Sustainable Use of medicinal Plants Project Addis Ababa, Ethiopia: Institute of Biodiversity Conservation; 2006.
219. Alemayehu Amberbir, Binyam Getachew, Kebede Deribe et al (2006) A historical overview of traditional medicine practices and policy in Ethiopia. *Ethiopian Journal of Health Development* 2006; 20(2):127-134]
220. Miriam G, Nevbert TG, Schimat R, Wutzlers PC, Schmidtke P (2006) Antiviral activities of some Ethiopia medicinal plants used for the treatment of dermatological disorder. *Journal of Ethopharmacology* 104: 182-187.
221. Mussema Y. A historical overview of traditional medicine practices and policy in Ethiopia. *Ethiop J Health Dev.* 2006;20(2):127–134.
222. Abebe Dawit, Asfaw Debella, Amare Dejene, Almaz Abebe, Yared Mekonnen, Ambaye Degefa and Lemma Ketema. **Is khat-chewing associated with HIV risk behaviour? A community-based study from Ethiopia.** *African J. of AIDS Research.* 2006; 5(1):61-69.

#### Abstract

This study examines the possible association between the stimulant khat and risky sexual behavior that might aggravate the spread of HIV. A community-based cross-sectional survey and focus group discussions were conducted in the Southern People's and Oromia regional States of Ethiopia in 2004 involving 4,000 individuals to assess the attitudes and perceptions of an Ethiopian population towards the habit of khat-chewing and its possible association with risky sexual behavior. All participants in the focus group discussions and 38 percent of the survey respondents were of the opinion that behaviors associated with the mild narcotic effects of khat are conducive to casual sex, and hence constitute an increased risk for contracting and spreading HIV. A

significant shift towards casual sex practices was observed in response to the effects induced by the substance, and a strong association was observed between khat-chewing, indulgence in alcohol and recourse to risky sexual behavior. There was no significant difference in the use or non-use of condoms among those male chewers who admitted resorting to casual sex after khat-chewing. The authors suggest that HIV/AIDS programmes in certain regions should address the habitual use of khat and other substances of potential abuse as part of their intervention efforts to curb the AIDS epidemic. Key words: Alcohol, Amphetamine, Cathinone, Drug use, Khat, Psychotropic drugs.

- 223.** Dawit Dikasso, Eyasu Mekonnen, Asfaw Debella, Dawit Abebe, Kelbessa Urga, Walelign Mekonnen, Daniel Melaku, Ashenafi Assefa and Yared Mekonnen. **In vivo anti-malarial activity of hydroalcoholic extracts from asparagus africanus Lam. in mice infected with plasmodium berghei.** *Ethiop J. Health Dev.* 2006; 20(2); 112-118.

#### Abstract

Background: Malaria is a major public health problem in the world in general and developing countries in particular, causing an estimated 1-2 million deaths per year, an annual incidence of 300-500 million clinical cases and more than 2 billion people are at risk of infection from it. But it is also becoming more difficult to treat malaria due to the increasing drug resistance. Therefore, the need for alternative drugs is acute. Objective: This study aims at investigating the in vivo antiplasmodial activity of extracts of the roots and area parts from traditionally used medicinal plant, named *Asparagus africanus* (Liliaceae). Methods: A rodent malaria parasite, *Plasmodium berghei*, which was maintained at the Ethiopian Health and Nutrition Research Institute (EHNRI) laboratory, was inoculated into Swiss albino mice. The mice were infected with  $1 \times 10^7$  parasites intraperitoneally. The extracts were administered by an intra gastric tube daily for four days starting from the day of parasite inoculation. The control groups received the same amount of solvent (vehicle) used to suspend each dose of the herbal drug. Chloroquine was used as a standard drug, and was administered through the same route. Results: Extracts from the roots and aerial parts of *A.africanus* were observed to inhibit *Plasmodium berghei* parasitaemia in the Swiss albino mice by 46.1% and 40.7% respectively. Conclusion: The study could partly confirm the claim in Ethiopian traditional medicine that the plant has therapeutic values in human malaria. There is, thus, the need to initiate further in-depth investigation by using different experimental models.

- 224.** Wube AA, Bucar F, Asres K, Gibbons S, Adams M, Streit B, Bodensieck A, Bauer R. **Knipholone, a selective inhibitor of leukotriene metabolism.** *Phytomedicine*. 2006 Jun;13(6):452-6. Epub 2005 Sep 19.

Abstract

Inhibition of leukotriene formation is one of the approaches to the treatment of asthma and other inflammatory diseases. We have investigated knipholone, isolated from the roots of *Kniphofia foliosa*, Hochst (Asphodelaceae), for inhibition of leukotriene biosynthesis in an ex vivo bioassay using activated human neutrophil granulocytes. Moreover, activities on 12-lipoxygenase from human platelets and cyclooxygenase (COX)-1 and -2 from sheep cotyledons and seminal vesicles, respectively, have been evaluated. Knipholone was found to be a selective inhibitor of leukotriene metabolism in a human blood assay with an IC<sub>50</sub> value of 4.2 μM. However, at a concentration of 10 μg/ml, the compound showed weak inhibition of 12(S)-HETE production in human platelets and at a concentration of 50 μM it produced no inhibition of COX-1 and -2. In our attempt to explain the mechanism of inhibition, we examined the antioxidant activity of knipholone using various in vitro assay systems including free radical scavenging, non-enzymatic lipid peroxidation, and metal chelation. Knipholone was found to be a weak dose-independent free radical scavenger and lipid peroxidation inhibitor, but not a metal chelator. Therefore, the leukotriene biosynthesis inhibitory effect of knipholone was evident by its ability either to inhibit the 5-lipoxygenase activating protein (FLAP) or as a competitive (non-redox) inhibitor of the enzyme. Cytotoxicity results also provided evidence that knipholone exhibits less toxicity for a mammalian host cell.

- 225.** Yonathan M, Asres K, Assefa A, Bucar F. **In vivo anti-inflammatory and anti-nociceptive activities of *Cheilanthes farinosa*.** *J Ethnopharmacol*. 2006 Dec 6;108(3):462-70. Epub 2006 Jun 27.

Abstract

In Ethiopia inflammatory skin diseases are among the most common health problems treated with traditional remedies which mainly comprise medicinal plants. In the present work, the anti-inflammatory and anti-nociceptive activities of *Cheilanthes farinosa* (Forsk.) Kaulf (Adiantaceae), a fern used in many parts of Ethiopia to treat inflammatory skin disorders, were studied using in vivo models of inflammation and pain. The results of the study showed that the fronds *Cheilanthes farinosa* possess strong anti-inflammatory and anti-nociceptive properties. It was further demonstrated that the active ingredients of the fern reside mainly in the methanol fraction from which three compounds viz. the flavonol glycoside rutin, and the natural cinnamic acids, caffeic acid and its quinic acid derivative chlorogenic acid have been isolated. The methanol extract was also shown to potentiate the anti-inflammatory activity of acetyl salicylic acid. At the tested concentrations, the methanol extract displayed a better anti-nociceptive activity than that of ASA in both the early and late phases of formalin induced nociception in mice. However, the activity of the extract was more pronounced in the late phase, which is commonly associated with inflammatory pain. Evaluation of the pharmacological properties of the compounds isolated from the active fractions pointed out that chlorogenic acid possesses strong anti-inflammatory and anti-nociceptive activities while caffeic acid and rutin were inactive. Moreover, on molar basis chlorogenic acid was proved to be superior in its anti-inflammatory action to acetyl salicylic acid. It was therefore concluded that chlorogenic acid contributes, in full or in part, to the anti-inflammatory and anti-nociceptive activities of *Cheilanthes farinosa*. Both the methanolic extract and pure chlorogenic acid failed to display anti-nociceptive activity when tested by the tail-flick test indicating that the plant is not a centrally acting analgesic but instead exerts its analgesic activity by way of its antinflammatory action.

- 226.** Dikasso D, Makonnen E, Debella A, Abebe D, Urga K, Makonnen W, Melaku D, Kassa M, Guta M. **Anti-malarial activity of *Withania somnifera* L. Dunal extracts in mice.** *Ethiop Med J.* 2006 Jul;44(3):279-85.

Abstract

**OBJECTIVE:** This study aims at investigating the in vivo antiplasmodial activity of a traditionally used medicinal plant, *Withania somnifera*, L. Dunal, (Solanaceae).

**METHODS:** Rodent malaria parasite, *Plasmodium berghei*, 0.2 ml of  $10^7$  parasites, was inoculated into Swiss albino mice intraperitoneally. Extracts were administered by intra gastric tube daily for four days starting from the day of parasite inoculation. Negative controls received the same amount of solvent used to suspend the extracts and the positive controls were given chloroquine by the same route. Parasite suppressive effect and effects on body weight, packed cell volume (PCV) and body temperature were determined.

**RESULTS:** Parasitemia percent inhibition of *W. somnifera* roots and root barks were 50.43% and 29.13% respectively, with 600 mg/kg dose. Inhibition was statistically significant at all dose levels, compared to the negative controls ( $p < 0.05$ ), and maximum inhibition was seen at 600 mg/kg.

**CONCLUSION:** Extracts of the leaves and root barks of *W. somnifera* showed parasite suppressive effect and a protective effect on PCV drop (at higher doses), both in dose-related fashions. However, the effects on body weight and body temperature falls are inconclusive.

**227.** Shibeshi W, Makonnen E, Zerihun L, Debella A. **Effect of *Achyranthes aspera* L. on fetal abortion, uterine and pituitary weights, serum lipids and hormones.** *Afr Health Sci.* 2006 Jun;6(2):108-12.

Abstract

**BACKGROUND:** The practice of traditional medicine for the control of fertility in rural Ethiopia is based on folk use of numerous antifertility herbs and *Achyranthes aspera* is one of these used for this purpose. Many plants are known to possess anti-fertility effect through their action on hypothalamo-pituitary-gonadal axis or direct hormonal effects on reproductive organs resulting in inhibition of ovarian steroidogenesis.

**OBJECTIVES:** The present study focused to investigate the effect of methanolic leaves extract of *Achyranthes aspera* L. on some indicators for anti-fertility activities such as abortifacient,

estrogenesis, pituitary weight, and ovarian hormone level and lipids profile in female rats, in attempt to validate the traditional claim.

**METHODS:** The abortifacient effect of the methanolic extract of the leaves of *Achyranthes aspera* was determined by counting the dead fetuses in vivo. Effect on estrogenesis was assessed by taking the ratio of the uterine weight to body weight. The ratio of the pituitary weight to body weight was also calculated. The effect of the extract on the level of ovarian hormones and lipid profile was evaluated using electrochemiluminescence immunoassay.

**RESULTS:** The extract showed significant ( $p < 0.05$ ) abortifacient activity and increased pituitary and uterine wet weights in ovariectomized rats. The extract, however, did not significantly influence serum concentration of the ovarian hormones and various lipids except lowering HDL at doses tested.

**CONCLUSION:** The methanolic leaves extract of *Achyranthes aspera* possesses anti-fertility activity, which might be exploited to prevent unwanted pregnancy and control the ever-increasing population explosion.

- 228.** Seyoum A, Asres K, El-Fiky FK. **Structure-radical scavenging activity relationships of flavonoids.** *Phytochemistry*. 2006 Sep;67(18):2058-70. Epub 2006 Aug 17.

#### Abstract

The objective of this work is to establish the structural requirements of flavonoids for appreciable radical-scavenging activity (RSA) and elucidate a comprehensive mechanism that can explain their activity. To this end, the RSA of 52 flavonoids against 2,2-diphenyl-1-picrylhydrazyl was determined. The relative change in energy ( $\Delta H(f)$ ) associated with the formation of various flavonoidal and other phenolic radicals and also the spin distribution in these radicals were determined using computational programmes. By correlating experimental data with  $\Delta H(f)$ , structural features that affect activity have been identified and considered in perspective. It was shown with compelling evidences that the RSA of flavonoids could be mapped to one of their ring systems, making it possible to study their RSA by dissecting their structures and designing

representative simpler models. Consequently, hydroxytoluene units were demonstrated to successfully account for the RSA of flavonoids due to ring B and also to satisfactorily do so for activities due to ring A. Further, a comprehensive model for the radical scavenging reactions of flavonoids (and in general, phenolic compounds), which could account for hydrogen atom donation and the termination of aroxyl radicals, was proposed. Finally, prediction of structural features that could endow flavonoids with appreciable radical scavenging capability was made by considering the stability data and the ease of termination. In conclusion, the underlying molecular phenomena of the RSA of flavonoids could be explained by the ease of hydrogen atom abstraction and the ease of the termination of the flavonoidal aroxyl radicals.

- 229.** Asres K, Mazumder A, Bucar F. **Antibacterial and antifungal activities of extracts of *Combretum molle*.** *Ethiop Med J.* 2006 Jul;44(3):269-77.

#### Abstract

**OBJECTIVE:** In traditional medical practices of Ethiopia the aqueous extracts obtained from the stem bark of *Combretum molle* (R. Br. Ex. G. Don.) Engl & Diels (Combretaceae) have a longstanding reputation for the treatment of liver diseases malaria and tuberculosis. Owing to the widespread traditional uses of this plant, the study investigated the antimicrobial activity the bark extract of this plant against Gram positive and and Gram negative bacteria.

**METHODS:** Petroleum ether, dichloromethane and acetone fractions of the bark of the plant were prepared by soxhlet extraction and screened for their antimicrobial activity. The acetone fraction exhibited a powerful activity and was therefore further tested against twenty-one bacterial and six fungal strains. The minimum inhibitory concentration (MIC) of this extract was determined by checker board technique using nutrient agar medium. The zones of inhibition produced by the extract against bacteria and fungi were determined and compared by disc diffusion technique with those of pure ciprofloxacin and griseofulvin, respectively.

**RESULTS:** The highest antibacterial action of the acetone extract was against the Gram negative organisms *Escherichia coli* and *Shigella* spp with an MIC value of 50 mg/ml. The activity of the extract against these bacteria was comparable to that of ciprofloxacin when assessed by the disc diffusion technique. Among the fungal strains tested *Candida albicans* showed high susceptibility

to the extract and growth was completely inhibited at a concentration of 400 microg/ml. At the same concentration, the acetone extract and the standard antifungal drug griseofulvin produced comparable zones of inhibition on *C. albicans*. Studies on the mode of action of the extract indicated that it was bactericidal and fungicidal. The antimicrobial activity of the extract was attributed to the high amount of hydrolysable tannins present in the bark of the plant.

**CONCLUSION:** The acetone extract of the stem bark of *C. molle* has the potential for use as a natural antimicrobial agent. Further in vivo antimicrobial, phytochemical and toxicological studies are required to evaluate the chemotherapeutic effect of the plant.

**230.** Y Tesfa, K Asres, T Gebre-Mariam **Formulation and Optimization of the Seed Extracts of *Glinus lotoides* L. Tablets Using Surface Response Method** *Ethiopian Pharmaceutical Journal* Vol. 24 (2) 2006: pp. 75-83

**Abstract**

Tablets of the seed extracts of *Glinus lotoides* L. were prepared by direct compression using microcrystalline cellulose (MCC). A two-factor-two-level factorial was designed to investigate the combined effects on formulation variable (amount of MCC) and processing variable [compression force (CF)] on tablet properties; crushing strength (H), friability (Fr), and disintegration time (DT). From the results of multiple linear regression analysis, surface responses and contour plots were generated that demonstrated the effects of the independent variables on H, Fr and DT. The optimum combinations of the amount of MCC and CF were obtained by superimposing the contour diagram of tablet's H, Fr and DT. The resulting tablets were evaluated for hardness, Fr and DT. The optimum formulation of the tablets composed of the active crude extracts (348 mg), MCC (174 mg), Ac-Di-Sol® (26 mg), and talc (26 mg) were compressed approximately at 12 KN. H, Fr, and DT of the tablets consisting of the optimum formulation were  $162 + 6.023N$ , 0.123% and  $13.00 + 0.45$  min, respectively.

**Keywords:** *Glinus lotoides*, optimum tablet formulation, direct compression, surface response, contour plot

- 231.** M Goji, T Gebre-Mariam, K Asres, H Lemma, N Gemed, K Yirsaw **Screening of the Antimicrobial Activities of Some Plants Used Traditionally in Ethiopia for the Treatment of Skin Disorders***Ethiopian Pharmaceutical Journal* Vol. 24 (2) 2006: pp. 130-135

**Abstract**

The antimicrobial activities of the extracts of the leaves of *Jasminum abyssinicum* (Oleaceae), and *Solanecio gigas* (Asteraceae); the leaves, seeds and fruit-flesh of *Lagenaria siceraria* (Cucurbitaceae), plants widely used in Ethiopian traditional medicine for the treatment of skin disorders, have been assessed in vitro on selected species of bacteria and fungi. The total extract was prepared by maceration with 80% methanol and agar-well diffusion method was used for antimicrobial activity tests. The results of this study revealed that all the extracts have activity against *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Streptococcus pyogenes* with the exception of the fruit-flesh of *L. siceraria* which showed no activity against clinical isolate *S. aureus*. The fractions of *J. abyssinicum* demonstrate less activity as compared to its crude whole extract. All the extracts failed to show any activity against *Escherchia coli*. Similarly following the method used in this study, the extracts were shown to be devoid of activity against *Aspergillus flavus*, *A. niger*, *Trichophyton mentagrophyte* and the clinical isolate of *Candida albicans*.

**Keywords:** antibacterial activity, antifungal activity, *Jasminum abyssinicum*, *Lagenaria siceraria*, *Solanecio gigas*

- 232.** Tesfaye Seifu, Kaleab Asres, Tsige Gebre-Mariam **Ethnobotanical and ethnopharmaceutical studies on medicinal plants of Chifra District, Afar Region, North Eastern Ethiopia***Ethiopian Pharmaceutical Journal* Vol. 24, 2006: 41-58

**Abstract**

Medicinal plants have neither been seriously studied nor documented in Afar Region, North Eastern Ethiopia and most of the available information is still in the hands of the traditional healers.

A study was carried out during Nov. 2002 - May 2003 to explore ethnobotanical information on the use of medicinal plants by the Afar people in 13 rural communities of Chifra District, Afar Region. Based on the information obtained from ethnic leaders, 29 traditional medicine practitioners were interviewed by using a pre-tested semi-structured questionnaire, and a total of 70 plant species were reported to have medicinal values. Of these, 33 were fully identified by their botanical names, 10 only at generic level and 27 could not be identified taxonomically and were recorded only by their vernacular names. 15% of the identified species belong to the family Fabaceae. Among 144 ethnoformulations reported, the majority were liquid preparations followed by unprocessed herbs and powders. Next to the oral route, nasal administration is the most common route of drug application. The medicinal uses of the plants were grouped into 9 therapeutic categories to have the factor of informant's consensus (Fic) for each group. Accordingly, snakebite had the highest value (0.53) suggesting the dependence of the practitioners on certain plants for the indication.

**Keywords:** medicinal plants, traditional medicine, ethnobotany, ethnopharmacy, Afar region

- 233.** Kaleab Asres, Simons Gibbons, Franz Bucar **Radical scavenging compounds from Ethiopian medicinal plants***Ethiopian Pharmaceutical Journal* Vol. 24, 2006: 23-30

***Abstract***

Various solvent fractions prepared from plants used in Ethiopian traditional medicine were examined for their potential radical scavenging activity using rapid TLC screening method. The preliminary results indicated that the methanol fractions of the leaves of *Bersama abyssinica* and the fronds of *Cheilanthes farinose*, and the acetone fraction of the leaves of *Euclea racemosa* ssp. *schimperi* possess significant free radical scavenging capacity. The abilities of these extracts to act as nonspecific donors of hydrogen atom or electrons were evaluated using the 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay. It was found out that they all showed positive results with the methanol extract of *B. abyssinica* (7.5 ug/ml) displaying the highest activity. Phytochemical

investigation of the methanol fraction of *B. abyssinica* leaves resulted in the isolation of five flavonol glycosides and the xanthone, magniferin. Four flavonol glycosides together with the plant acids caffeic acid and chlorogenic acid were obtained from the methanol extract of the fronds of *Cheilanthes farinose*. Similarly, the acetone fraction of the browse plant, *E. racemosa* ssp. *schimperi* afforded four flavonol glycosides. All the secondary metabolites isolated from these active fractions were found to exhibit significant antioxidant activity, as judged by scavenging stable DPPH free radicals. However, the flavonol glycoside rutin figured as the most active radical scavenger with an IC50 value of 9.5 mM.

- 234.** Million Adane, Abebe Endale, Geremew Bultosa, Mohammed Gamal Abdel-Mohsen, Tsige Gebre-Mariam **Isolation and physicochemical characterization of godare (*Colocasia esculenta*) starch from Ethiopia** *Ethiopian Pharmaceutical Journal* Vol. 24, 2006: 13-22

***Abstract***

Physicochemical properties of starch isolated from tuber of *Godare* [*Colocasia esculenta* (Araceae)] have been characterised. Amylose content was found to be 24.3%. The starch granules are polygonal to spherical in shape with indentations in some granules. The granules exist as single entities. The starch has normal granule size distribution with mean particle size of 13µm. The true density was found to be 1.347 g/ml. The moisture sorption pattern and swelling power of *Godare* starch were similar to that of potato starch. The Xray diffraction pattern of *Godare* starch is typically B-type with distinctive maximum peak at around 17° 2θ. Barbender viscosity (6% on dry basis) showed much lower peak viscosity (157 BU) and breakdown viscosity (6 BU) than potato starch. *Godare* starch exhibited a DSC gelatinisation temperature of T-onset (63°C), T-peak (68°C) and T-end (75°C) with enthalpy of gelatinisation (ΔH, 11.5 mJ/mg). Keywords: *Colocasia esculenta* starch, granule size, X-ray diffraction, amylograph, DSC-gelatinisation

- 235.** Ashenafi Assefa, Kelbesa Urga, Mulugeta Guta, Daniel Melaku, Walelegn Mekonen, Martha Melesse, Asnakech Senbeta and Tsegaye Kidane-Mariam. **Spasmolytic activity of the aqueous root extract of solanum incanum, solanaceae.** Ethiop J. Biological Society. 2006; 5(2):137-146.

Abstract

*Solanum incanum* L. (Solanaceae) is an annual herb that is used in the traditional medicine of Ethiopia for treating stomach and intestinal disorders. The spasmolytic activity of aqueous root extract of *S. incanum* was assessed on contractions of isolated guinea-pig ileum, induced by acetyl chloride, and compared with the effect of atropine. The aqueous root extract of *S. incanum* inhibited the response to acetyl chloride in a concentration-dependent manner (EC<sub>50</sub>= 0.215 mg/ml) similar to atropine which indicates that the extract is a relaxant of guinea-pig isolated ileum. In addition to its antispasmodic activity in vitro, the extract inhibited charcoal travel in mice intestine by 36.28, 51.45, 52.93 and 38.53 percent in doses of 50, 100, 200, and 400 mg/kg body weight respectively. As the inhibition of contractile activity of the ileum is the base of the treatment of some gastrointestinal disorders such as colic, *S. incanum* may have clinical benefits for treatments of these conditions. Phytochemical screening of the root of the plant revealed the presence of alkaloids, saponins, tannins and flavonoids. The alkaloids in the plant might be responsible for the anti-cholinergic activities observed. Results of acute toxicity study showed that the mice did not show any sign of conventional toxicity when administered doses of up to 15000 mg/kg body weight orally.

Key words: Anti-spasmodic, crude extract, *solanum incanum*

- 236.** Berhan A, Asfaw Z, Kelbessa E. Ethnobotany of plants used as insecticides, repellents and antimalarial agents in Jabitehnan district, West Gojjam. Ethiop JSci. 2006; 29(1): 87 – 92p
- 237.** Gebre-Mariam T, Neubert R, Schmidt PC, Wutzler P, Schmidtke M (2006) Antiviral activities of some Ethiopian medicinal plants used for the treatment of dermatological disorders. J Ethnopharmacol 104: 182-187.

- 238.** Tiruneh G, Kebede Y, Yigzaw T (2006) Use of the plants *Artemisia* as a natural anti malarial herb in Arbaminch. *Ethiopian Journal of Health and Biomedical Sciences: University of Gondar, Ethiopia* 2: 75-76.
- 239.** Feleke, Urge (2006) Ethiopian traditional medicine revised policy. Drug Administration and Control Authority.
- 240.**

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- 241.** Teklehaymanot T, Giday M, Medhin G, Mekonnen Y. **Knowledge and use of medicinal plants by people around Debre Libanos monastery in Ethiopia.***J Ethnopharmacol.* 2007 May 4;111(2):271-83. Epub 2006 Nov 28.

Abstract

The study was conducted around Debre Libanos monastery from October 2005 to June 2006. A total of 250 villagers, 13 monks and 3 nuns were interviewed using semistructured questionnaire on the knowledge and use of medicinal plants. The informant consensus factor (ICF) and the fidelity level (FL) of the species were determined. Eighty medicinal plant species were reported. The average medicinal plant reported by a female is 1.67+/-0.33 and a male is 5.77+/-0.71 with significant difference between them ( $\alpha=0.05$ ,  $p=0.023$ ). The ICF values demonstrated that local people tend to agree more with each other in terms of the plants used to treat 'Mich' and headache (0.69) and intestinal illness and parasites (0.68) but a much more diverse group of plants are cited to treat problems related to rabies (0.14) and unidentified swelling and cancer (0.11). The FL values are also similar to ICF values. The knowledge of the villagers close to the monastery is found to be higher than those distant from the monastery and the correlation between Abichu and Telaye ( $r=0.970$ ,  $\alpha=0.05$ ,  $p=0.001$ ), and Zegamel and Doreni ( $r=0.745$ ,  $\alpha=0.05$ ,  $p=0.027$ ) is significant indicating the relationships between the number of plants reported by the informants and the distance from the monasteries to the villages. This study was not able to determine the knowledge difference between the villagers and the monastery dwellers because the monks and nuns were not willing to give information on the knowledge and use of medicinal plants. This may result in the long run in loss of local knowledge in the surrounding area and the country at large for preparation of

- 242.** Teklehaymanot T, Giday M. **Ethnobotanical study of medicinal plants used by people in Zegie Peninsula, Northwestern Ethiopia.***J Ethnobiol Ethnomed.* 2007 Mar 14;3:12.

Abstract

An ethnobotanical study was conducted from October 2005 to June 2006 to investigate the uses of medicinal plants by people in Zegie Peninsula, northwestern Ethiopia. Information was gathered from 200 people: 70 female and 130 males, using semistructured questionnaire. Of which, six were male local healers. The informants, except the healers, were selected randomly and no appointment was made prior to the visits. Informant consensus factor (ICF) for category of ailments and the fidelity level (FL) of the medicinal plants were determined. Sixty-seven medicinal plants used as a cure for 52 ailments were documented. They are distributed across 42 families and 64 genera. The most frequently utilized plant part was the underground part (root/rhizome/bulb) (42%). The largest number of remedies was used to treat gastrointestinal disorder and parasites infections (22.8%) followed by external injuries and parasites infections (22.1%). The administration routes are oral (51.4%), external (38.6%), nasal (7.9%), and ear (2.1%). The medicinal plants that were presumed to be effective in treating a certain category of disease, such as 'mich' and febrile diseases (0.80) had higher ICF values. This probably indicates a high incidence of these types of diseases in the region, possibly due to the poor socio-economic and sanitary conditions of this people. The medicinal plants that are widely used by the local people or used as a remedy for a specific ailment have higher FL values (*Carissa spinarum*, *Clausena anisata*, *Acokanthera schimperi*, *Calpurnia aurea*, *Ficus thonningii*, and *Cyphostemma junceum*) than those that are less popular or used to treat more than one type of ailments (*Plumbago zeylanicum*, *Dorstenia barnimiana*).

- 243.** Giday M, Teklehaymanot T, Animut A, Mekonnen Y. **Medicinal plants of the Shinasha, Agew-awi and Amhara peoples in northwest Ethiopia.** *J Ethnopharmacol.* 2007 Apr 4;110(3):516-25. Epub 2006 Oct 20.

#### Abstract

Study was conducted in two sub-districts in northwestern Ethiopia to compile and analyse knowledge on the use of medicinal plants for treatment or prevention of human ailments by three socio-cultural groups, namely the Amharas, Shinashas and Agew-Awis. Data were mainly collected through individual interviews conducted with selected knowledgeable farmers and professional healers of the three socio-cultural groups. A total of 76 medicinal plants belonging to

48 families were documented, of which 50 species were reported by the Amharas, 25 by the Shinashas and 20 by the Agew-Awis. Large proportions of medicinal plants were found to have been used for the treatments of gastro-intestinal complaints (26%), skin diseases (24%) and malaria (22%). Relatively, higher numbers of informants agreed on the use of *Croton macrostachyus* against malaria (21%), *Cynoglossum coeruleum* against 'mich', illness mainly characterized by fever, headache and sweating (18%) and *Zehneria scabra* against malaria (13%). The species *Croton Macrostachyus*, *Calpurnia aurea*, *Clematis hirsuta* and *Plumbago zeylanica* were found to have the highest diversity of medicinal applications. We recommend that priority for further investigation should be given to medicinal plants with higher informant consensuses, as this could indicate their better efficacy. Measures are needed to conserve plants that are reported as scarce in the study area but still are only harvested from the wild.

**244.** Mulatu A, Mekonnen Y. **Spasmolytic effects of *Artemisia Afra* and *Artemisia Rehanin* tissue preparations.** *Ethiop Med J.* 2007 Oct;45(4):371-6.

Abstract

**BACKGROUND:** The genus *Artemisia* of Family Compositae (Asteracea) is widely used in many parts of the world as herbal remedies for a variety of illnesses.

**METHODOLOGY:** Ethanol and aqueous extracts of powdered dried leaf and root of *Artemisia afra* and leaf of *Artemisia rehan* were tested on isolated mouse duodenum (MD) and guinea pig ileum (GPI). Different concentrations of each extract of the plants (ranging from 20-200 microg/ml) were tested in the presence of agonist control, acetylcholine (in MD) and histamine (in GPI) as contraction stimulators.

**RESULTS:** *Artemisia afra* leaf ethanol (ALE) and *Artemisia rehan* leaf ethanol (RLE) significantly reduced both spontaneous rhythmic and agonist-induced contractions of MD and GPI. ALE and RLE caused mean contractile response of 44.3 +/- 0.9% (at a dose of 160 microg/ml) and 35 +/- 1.8% (at a dose of 120 microg/ml) respectively in isolated MD, and a mean contractile response of 60.9 +/- 2.7% and 43.5 +/- 2.7% respectively at maximal doses of 200 microg/ml in isolated GPI.

CONCLUSION: The results in the present study indicate that the plants possess spasmolytic property and also support the traditional folk use of the aerial and root parts of the plants for stomach pains and intestinal cramps.

- 245.** Demma J, Gebre-Mariam T, Asres K, Ergetie W, Engidawork E. **Toxicological study on *Glinus lotoides*: a traditionally used taenicidal herb in Ethiopia.** *J Ethnopharmacol.* 2007 May 22;111(3):451-7. Epub 2006 Dec 20.

#### Abstract

Seeds of *Glinus lotoides* L. (Molluginaceae) are used traditionally in the treatment of tapeworm infestation in Ethiopia. Previous studies on its anthelmintic activities confirmed its traditional claims, but data on safety profile were lacking. To this effect, single and repeated dose oral toxicities of the methanolic extracts of seeds of *Glinus lotoides* were conducted in rats. Doses of 0, 1000 and 5000 mg/kg of crude extract of *Glinus lotoides* were employed in single dose toxicity studies, while doses of 0, 250, 500, and 1000 mg/kg were used in repeated toxicity studies. In the single dose toxicity test, oral administration of 5000 mg/kg of *Glinus lotoides* produced mortality in two females and one male on day 4. No significant differences in body and organ weights were observed between controls and treated surviving animals. Moreover, both gross and microscopic examinations of organs did not show detectable differences between controls and treated animals of both sexes. In repeated dose toxicity studies, no mortality was observed when varying doses of the extracts were administered per day for a period of 28 days. There were no significant differences in body weight, absolute and relative organ weights between controls and treated animals of both sexes. Hematological analysis showed no differences in most parameters examined. In the biochemistry parameter analysis, no significant change occurred. Pathologically, neither gross abnormalities nor histopathological changes were observed. These findings suggest that none of the organs appeared to be target and the data could provide satisfactory preclinical evidence of safety to launch clinical trial on standardized formulation of plant extracts.

- 246.** Eguale T, Tilahun G, Debella A, Feleke A, Makonnen E. **Haemonchus contortus: in vitro and in vivo anthelmintic activity of aqueous and hydro-alcoholic extracts of Hedera helix.** *Exp Parasitol.* 2007 Aug;116(4):340-5. Epub 2007 Feb 2.

Abstract

In vitro anthelmintic activity of crude extracts of the ripe fruits of *Hedera helix* was investigated on eggs and adult nematode parasites *Haemonchus contortus*. Aqueous extract of *H. helix* was also evaluated for in vivo anthelmintic activity at dose of 1.13 and 2.25 g/kg in sheep artificially infected with *H. contortus*. ED(50) for egg hatch inhibition was 0.12 and 0.17 mg/ml for aqueous and hydro-alcoholic extracts, respectively. There was no statistically significant difference in the activity of the two extract types ( $p>0.05$ ). Hydro-alcoholic extract showed better in vitro activity against adult parasites compared to the aqueous extract. Significant faecal egg count reduction (FECR) was detected in groups treated with both doses of *H. helix* ( $p<0.05$ ) on day 2 post-treatment. On day 7 post-treatment significant reduction was detected only for higher dose of *H. helix* ( $p<0.05$ ) while on day 14 post-treatment there was no significant FECR in both groups treated with *H. helix*. The percentage of larvae recovered from culturing faeces obtained from groups of sheep treated with lower and higher doses of *H. helix* was 47.52% and 36.07%, respectively, which was significantly lower than ( $p<0.05$ ) that recovered from the control group (60%). Significant ( $p<0.05$ ), dose dependent total worm count reduction (WCR) was observed for groups of sheep treated with *H. helix*. Increasing the dose of *H. helix* improved the efficacy against the male than the female parasites. Treatment with both doses of *H. helix* helped the animals maintain their packed cell volume (PCV) unlike the untreated control group. The overall findings of the current study indicated that *H. helix* has a potential anthelmintic benefit and further in vitro and in vivo evaluation of the different parts and fractions is needed to make use of this plant for therapeutic purposes.

- 247.** Abdulwaheb M, Makonnen E, Debella A, Abebe D. **Effect of *Catha edulis* foresh (khat) extracts on male rat sexual behavior.** *J Ethnopharmacol.* 2007 Mar 21;110(2):250-6. Epub 2006 Sep 26.

Abstract

Khat chewing is a widespread habit that has a deep-rooted socio-cultural tradition in East Africa and in the Middle East. Although a number of investigations have been carried out using cathinone, the psychoactive component of khat, these may not wholly reflect the behavioral effects observed after administering khat in a dosage similar to those used traditionally. The aim of the present study was to evaluate the effect of sub-chronically administered khat extract with or without alcohol on sexual behavior in male rats. Adult albino wistar male rats were administered either with khat extracts (100, 200, 400mg/kg), amphetamine (1mg/kg), sildenafil (1mg/kg), ethanol (2ml/kg of 2% and 10%), or a combination of khat and ethanol (2%+10%) by intragastric gavage orally for 15 days. Khat (400mg/kg) treated rats demonstrated a statistically significant increase in all sexual parameters except in mounting frequency, intercopulatory interval and copulatory efficiency. Whereas, khat (200mg/kg) treated rats showed a statistically significant increase only in ejaculation latency ( $P<0.01$ ). In marked contrast, low dose (100mg/kg) of khat extract was found to significantly reduce both mount latency ( $P<0.05$ ) and intromission latency ( $P<0.01$ ) thereby enhancing sexual motivation/arousal in male rats. Similar results were obtained when khat extract (200mg/kg) and ethanol (10%) were administered concomitantly despite the inhibitory effect observed in male sexual behavior when administered alone. From the present study it can be concluded that higher doses of the extract inhibit sexual behavior in male rats. In contrast, low dose of the extract as well as the concurrent administration of the extract followed by ethanol was found to enhance male rat sexual motivation/arousal.

- 248.** Giday M, Teklehaymanot T, Animut A, Mekonnen Y. **Medicinal plants of the Shinasha, Agew-awi and Amhara peoples in northwest Ethiopia.** *J Ethnopharmacol.* 2007 Apr 4;110(3):516-25. Epub 2006 Oct 20.

#### Abstract

Study was conducted in two sub-districts in northwestern Ethiopia to compile and analyse knowledge on the use of medicinal plants for treatment or prevention of human ailments by three socio-cultural groups, namely the Amharas, Shinashas and Agew-Awis. Data were mainly collected through individual interviews conducted with selected knowledgeable farmers and professional healers of the three socio-cultural groups. A total of 76 medicinal plants belonging to 48 families were documented, of which 50 species were reported by the Amharas, 25 by the

Shinashas and 20 by the Agew-Awis. Large proportions of medicinal plants were found to have been used for the treatments of gastro-intestinal complaints (26%), skin diseases (24%) and malaria (22%). Relatively, higher numbers of informants agreed on the use of *Croton macrostachyus* against malaria (21%), *Cynoglossum coeruleum* against 'mich', illness mainly characterized by fever, headache and sweating (18%) and *Zehneria scabra* against malaria (13%). The species *Croton Macrostachyus*, *Calpurnia aurea*, *Clematis hirsuta* and *Plumbago zeylanica* were found to have the highest diversity of medicinal applications. We recommend that priority for further investigation should be given to medicinal plants with higher informant consensuses, as this could indicate their better efficacy. Measures are needed to conserve plants that are reported as scarce in the study area but still are only harvested from the wild.

- 249.** Teklehaymanot T, Giday M, Medhin G, Mekonnen Y. **Knowledge and use of medicinal plants by people around Debre Libanos monastery in Ethiopia.** *J Ethnopharmacol.* 2007 May 4;111(2):271-83. Epub 2006 Nov 28.

#### Abstract

The study was conducted around Debre Libanos monastery from October 2005 to June 2006. A total of 250 villagers, 13 monks and 3 nuns were interviewed using semistructured questionnaire on the knowledge and use of medicinal plants. The informant consensus factor (ICF) and the fidelity level (FL) of the species were determined. Eighty medicinal plant species were reported. The average medicinal plant reported by a female is 1.67 $\pm$ 0.33 and a male is 5.77 $\pm$ 0.71 with significant difference between them ( $\alpha=0.05$ ,  $p=0.023$ ). The ICF values demonstrated that local people tend to agree more with each other in terms of the plants used to treat 'Mich' and headache (0.69) and intestinal illness and parasites (0.68) but a much more diverse group of plants are cited to treat problems related to rabies (0.14) and unidentified swelling and cancer (0.11). The FL values are also similar to ICF values. The knowledge of the villagers close to the monastery is found to be higher than those distant from the monastery and the correlation between Abichu and Telaye ( $r=0.970$ ,  $\alpha=0.05$ ,  $p=0.001$ ), and Zegamel and Doreni ( $r=0.745$ ,  $\alpha=0.05$ ,  $p=0.027$ ) is significant indicating the relationships between the number of plants reported by the informants and the distance from the monasteries to the villages. This study was not able to determine the knowledge difference between the villagers and the monastery dwellers because the monks and

nuns were not willing to give information on the knowledge and use of medicinal plants. This may result in the long run in loss of local knowledge in the surrounding area and the country at large for preparation of pharmacologically effective remedies.

- 250.** Yineger H, Kelbessa E, Bekele T, Lulekal E. **Ethnoveterinary medicinal plants at Bale Mountains National Park, Ethiopia.***J Ethnopharmacol.* 2007 May 30;112(1):55-70. Epub 2007 Feb 9.

#### Abstract

An ethnobotanical study on veterinary medicinal plants of Bale Mountains National Park and adjacent areas was conducted from July 2003 to June 2004. Semi-structured interviews and observations were used to generate ethnoveterinary data from traditional healers residing in the park and buffer zones. A total of 25 animal ailments were reported, of which blackleg, Darissaa and hepatitis were the most frequently reported ailments. Seventy four veterinary medicinal plant species that were distributed among 64 genera and 37 families were recorded. The most utilized growth forms were herbs (35 species, 47.3%) followed by shrubs (28 species, 37.84%). Roots (54 species, 41.54%) followed by leaves (47 species, 36.15%) were the most frequently used plant parts for ethnoveterinary medicine. Usually, fresh materials (53 species, 43.44%) were preferred for medicine preparations. The most frequently used route of drug administration was oral (65 species, 42.76%) followed by dermal (55 species, 36.18%). Indigenous knowledge was mostly transferred to an elect of a family member in word of mouth indicating that it was prone to fragmentation or loss

- 251.** Wondimu T, Asfaw Z, Kelbessa E. **Ethnobotanical study of medicinal plants around 'Dheeraa' town, Arsi Zone, Ethiopia.***J Ethnopharmacol.* 2007 May 30;112(1):152-61. Epub 2007 Feb 20.

#### Abstract

A study aimed at identifying plant species used and manipulated by the community for medicine was carried out around 'Dheeraa' town, Arsi Zone, Oromia Region, Southeast Ethiopia. The data were collected through a series of fieldworks conducted from October to December 2002. Random

and systematic sampling methods were employed to select the study sites as well as the informants. Ethnobotanical methods using semi-structured interviews were employed and a total of 83 species of medicinal plants were recorded. The natural environment yielded larger proportion (76 species, 92%) of the total records followed by home gardens of the area. The studied medicinal plants were those used in traditional health care of humans and livestock. However, only very few individuals of each species were found in the area and this might be attributed to the ongoing habitat modification and loss of natural vegetation. Therefore, it is important to create awareness on sustainable use of the natural vegetation. Paying special attention to the medicinal plants found in the area may help to amplify the role that these plants play in healthcare, poverty alleviation as well as environmental protection.

- 252.** Asres K, Sporer F, Wink M. **Identification and quantification of hepatotoxic pyrrolizidine alkaloids in the Ethiopian medicinal plant *Solanecio gigas* (Asteraceae).** Pharmazie. 2007 Sep;62(9):709-13.

#### Abstract

The pyrrolizidine alkaloid content of *Solanecio gigas* (Vatke) C. Jeffrey (Asteraceae), an Ethiopian medicinal plant widely used for the treatment of colic, diarrhea, gout, otitis media, typhoid fever, and noted for its wound dressing and antiabortifacient activities was studied. The flower and leaf extracts contained 0.19% and 0.14% alkaloids (dry weight), respectively. GLC-MS analysis indicated that all the alkaloids in the flowers are pyrrolizidine alkaloids (PAs), whereas the leaves contain other type of alkaloids with PAs occurring in low concentrations. Roughly, 80% and 90% of the total PAs in the flowers and the leaves, respectively, were shown to occur as N-oxides. Eighteen alkaloids were detected in the flower extract with the retronecine type twelve-membered macrocyclic diesters integerrimine, senecionine and usaramine comprising 82% of the total PA content. Analysis of the PA profile of the leaves indicated that it has a simpler pattern than the one observed for the flowers. Only five PAs were detected in the leaves with integerrimine making up about 50% of the total PAs. Quantification of the PA content by GLC showed that the flowers and leaves contain 3321.21 and 84.84 microg per 10 g of dried plant material, respectively. These

results indicate that users of this herb are at high risk of poisoning since the most toxic twelve membered macrocyclics of the retronecine type are the dominant PAs in the plant.

- 253.** A Sileshi, T Gebre-Mariam, K Asres **Antibacterial and Antifungal Activities of Extracts of Some Medicinal Plants of Ethiopia** *Ethiopian Pharmaceutical Journal* Vol. 25 (2) 2007: pp. 111-120

***Abstract***

Four Ethiopian medicinal plants, viz. *Clerodendrum myricoides* (Lamiaceae), *Ficus plamata* (Moraceae), *Grewia ferruginea* (Tiliaceae) and *Periploca linearifolia* (Asclepadiaceae) were selected based on their ethnomedicinal profiles and screened for antibacterial and antifungal activities. The antimicrobial activity of the total extracts of these plants obtained by maceration with 80% (v/v) methanol was tested by agar-well diffusion method. Further, the antimicrobial activities of petroleum ether, chloroform, acetone and methanol fractions of *C. myricoides* were also examined similarly and the minimum inhibitory concentration (MIC) of the total extract of *C. myricoides* was determined by agar dilution method. The plants were generally more active against the test bacterial strains than the fungal strains. *C. myricoides* exhibited a significant broad spectrum inhibitory effect against all the test bacteria. The total extracts of all the plants inhibited the growth of *Pseudomonas aeruginosa* at all concentration levels employed. On the other hand, only *C. myricoides* was active against *Escherichia coli*. The MICs of *C. myricoides* were 5 mg/ml against the Gram-positive bacteria, *Staphylococcus aureus* and *Streptococcus pyogenes* and 10 mg/ml against the Gramnegative bacteria *P. areuginosa* and *E. coli*. Among the test fungal strains, only *Trichophyton mentagrophytes* was sensitive to the plants studied. The strongest antifungal activity was also demonstrated by *C. myricoides*. All the solvent fractions of *C. myricoides* except the petroleum ether fraction were active against all the bacterial species tested. Conversely, the petroleum ether fraction was the most active against *T. mentagrophytes*. The results generated from this study could substantiate, at least partly, the populartraditional use of these medicinal plants for different indications including wound infections and skin diseases.

**Keywords:** *Clerodendrum myricoides*, *Ficus plamata*, *Grewia ferruginea*, *Periploca linearifolia*, antimicrobial activity

- 254.** S Tadesse, K Asres, C Veeresham **Antioxidant Activities of Three Rubus Species Growing in Ethiopia** *Ethiopian Pharmaceutical Journal* Vol. 25 (2) 2007: pp. 103-110

**Abstract**

In Ethiopian traditional medical practices some species of the genus *Rubus* (Rosaceae) are used for the treatment of diabetes mellitus, one of the disease conditions in which free radicals and oxidative stress have been implicated. In the present study extracts prepared from three members of the genus, namely *Rubus apetalus* Poir, *R. niveus* Thunb and *R. steudneri* Schweinf were investigated for their in vitro radical scavenging activities using 2,2-diphenyl-1-picrylhydrazyl (DPPH) and deoxyribose degradation assays. The 80% methanol extract, and acetone and methanol soxhlet fractions of the three plants tested showed antioxidant activity in a concentration-dependent manner. The 80% methanolic extract of *R. steudneri* showed the strongest activity in the DPPH radical scavenging assay (IC<sub>50</sub> = 6.5 mg/ml). In the deoxyribose degradation assay the 80% methanol, acetone and methanol extracts of *R. niveus* displayed potent activity with IC<sub>50</sub> values of 0.64, 0.6 and 0.61 µg/ml, respectively. Ascorbic acid (vitamin C) was used as a positive control in the DPPH assay (IC<sub>50</sub> = 4.5 µg/ml) and butylhydroxytoluene, in the deoxyribose degradation assay (IC<sub>50</sub> = 4.76 µg/ml). The results of the present study suggest that the antioxidant activity of the studied plants may contribute to their purported uses as antidiabetic agents. The work further indicated that the antioxidant active principles of the plants reside in the polar fraction of the extracts.

**Keywords:** *Rubus* spp., Rosaceae, radical scavenging activity, DPPH assay, deoxyribose degradation assay

- 255.** Z Getahun, K Asres, A Mazumder **Essential Oil Composition, Antibacterial and Antioxidant Activities of Four *Mentha* Species Growing in Ethiopia** *Ethiopian Pharmaceutical Journal* Vol. 25 (2) 2007: pp. 91-102

**Abstract**

The essential oils obtained by hydrodistillation from the leaves of *Mentha arvensis* L., *M. longifolia* L., *M. piperita* L., and *M. spicata* L., were analyzed by gas chromatography (GC-FID) and gas chromatography/ mass spectrometry (GC/MS). In addition, the antibacterial activities of the oils were evaluated against 20 bacterial strains and their radical scavenging potentials were determined in 2,2-diphenyl-1-picrylhydrazyl (DPPH) and deoxyribose degradation assays. Oxygenated monoterpenes were found to be major constituents of all the oils. The essential oil of *M. spicata* exhibited a significant wide spectrum antibacterial activity against all test strains including multiresistant strains of *Pseudomonas aeruginosa* and *Escherichia coli*. The essential oil of *M. piperita* displayed powerful in vitro radical scavenging activities in both DPPH and deoxyribose degradation assays, with IC<sub>50</sub> values of 5.96 µl/ml and 0.57 µl/ml, respectively. The other essential oils also produced concentration dependent radical scavenging activities with IC<sub>50</sub> values ranging between 5.96 and 37.01 µl/ml, and 0.57 and 3.88 µl/ml, in DPPH and deoxyribose degradation assays, respectively. The present study revealed that all the essential oils have the potential to be used as naturally occurring antibacterial and antioxidant agents.

**Keywords:** essential oils, *Mentha* spp, capillary gas chromatography-mass spectrometry, radical scavenging activity, antibacterial activity

256. M Gebrelibanos, K Asres, C Veeresham ***In Vitro Radical Scavenging Activity of the Leaf and Bark Extracts of *Senna singueana* (Del). Lock Ethiopian Pharmaceutical Journal*** Vol. 25 (2) 2007: pp. 77-84

**Abstract**

The leaves and bark of *Senna singueana* (Del). Lock (family: Fabaceae) are traditionally used in some parts of Ethiopia, for the treatment of a form of skin cancer locally called 'Minshiro Nekersa'. Total extracts and solvent fractions obtained from the leaves and bark; and fractions obtained from solid-phase extraction and TLC of the leaf extract were prepared and tested for their radical scavenging activity using DPPH (1,1-diphenyl-2-picrylhydrazyl) and deoxyribose degradation inhibition assays. The results revealed that all the samples tested possess strong DPPH

radical scavenging activity and moderate deoxyribose degradation inhibitory effect. The IC<sub>50</sub> values of the total extracts and solvent fractions ranged from 6.16 to 200.10 µg/ml in DPPH assay and 262.77 µg/ml to 1457.63 µg/ml in deoxyribose degradation inhibition assay. The TLC separated bands showed IC<sub>50</sub> values ranging from 8.89 to 53.83 µg/ml, and 72.17 to 849.18 µg/ml, respectively, in the two assays. The positive control standard compounds ascorbic acid (for the DPPH assay) and butylhydroxytoluene (for the deoxyribose degradation inhibition assay) showed IC<sub>50</sub> values of 4.46 and 4.76 µg/ml, respectively. As free radicals are known to be involved in carcinogenesis, radical scavengers can short-cut free radical mediated critical steps that lead into carcinogenesis. It was thus proposed that the observed radical scavenging activity of *S. singueana* may contribute partly to the possible scientific basis for the traditional anticancer use of the plant.

**Keywords:** *Senna singueana*, *Fabaceae*, radical scavenging activity, DPPH assay, deoxyribose degradation inhibition assay

- 257.** Asfaw Debella, Asegid Taye, Dawit Abebe, Kissi Mudi, Daniel Melaku and Girma Taye. **Screening of some Ethiopian medicinal plants for mosquito larvicidal effects and phytochemical constituents.** *Pharmacology online*. 2007; 3:231-243.

#### Abstract

Vector borne diseases are among the major causes of illness and death in many developing countries affecting substantial portion of the productive force. Medicinal plants with larvicidal properties have paramount importance for the local control of mosquito. This study was therefore focused on the phytochemical screening and laboratory investigation of the larvicidal properties of the aqueous extracts of 33 medicinal plants belonging to 27 families. The effects of aqueous extracts of 33 plants on laboratory reared *Aedes aegypti*, *Aedes africanus* and *Culex quinquefasciatus* were evaluated using the standard WHO protocol. Portions of the same extracts were used for the identification of the major classes of secondary metabolites. Determination of the LD<sub>50</sub> of the most active plants extracts was also carried out on mice. Out of the tested 33 plants extracts, five plants, viz., *Albizia gummifera* (seeds), *Balanites aegyptica* (fruits), *Hedera helix* (leaves and fruits), *Millettia ferruginea* (seeds) and *Warburgia ugandensis* (leaves) exhibited promising larvicidal activities against *Aedes aegypti*, *Aedes africanus*, and *Culex quinquefasciatus*,

respectively. Acute toxicity studies of these plants on mice showed medium lethal dose (LD50) values ranges from 150 mg/kg to 450 mg/kg when the aqueous extracts were administered intraperitoneally. Phytochemical investigation of the aqueous extracts used for the test revealed the presence of saponins, polyphenols, alkaloids and glycosides as major classes of compounds in most of the plants. The crude extracts of these plants demonstrating stronger larvicidal effect and safety on non-target organism stresses the need for extended laboratory and field evaluation, which could then be employed to play an important role in the control of the larvae of the vectors at their breeding site.

Key words: larvicidal, medicinal plants, *Aedes aegypti*, *Aedes africanus*, *Culex quinquefasciatus*

- 258.** Ashenafi Assefa, Kelbesa Urga, Mulugeta Guta, Walelign Mekonnen, Daniel Melaku, Kissi Mudi and Tsegaye Kidane-Mariam. **In vivo antimalarial activities of plants used in Ethiopian traditional medicine Delomenana, southeast Ethiopia.** Ethiopian J Health Sci. November 2007; 17(2).

#### Abstract

Background: Malaria constitutes one of the major health problems in Ethiopia. One of the reasons attributed for the upsurge was the development of resistance of *plasmodium faciparum* and the emergence of multi-resistant strains of the parasite to antimalarial drugs. A continued search for other effective, safe and cheap plantbased antimalarial agents thus becomes imperative in the face these difficulties. The objective of the present study was therefore to evaluate in vivo antimalarial activities and acute toxicity profiles of the aqueous and methanolic extracts of nine medicinal plants. Methods: Nine plants which are commonly used for the treatment of malaria in the community were identified. The nine medicinal plants species *Cissampelos mucronata*, *Clerodendrum myricoides*, *Gnidia stenophylla*, *Vernonia bipontiti*, *Euclea scimper*, *solanum incanum*, *plumbago zylanica*, *Warburiga ugandensis* and *kalanchoe petitiana* were evaluated for their antimalaria activity in vivo, in 4- day suppressive assays against *plasmodium burghei* anka strain in mice. Result: no toxic effect or mortality was observed in mice treated orally with any of the extracts as a single dose of 1000 mg/kg/day. At oral doses of 400 mg/kg/day, the lyophilized aqueous root extract of *Gnidia stenophylla*, leaf extract of *Vernonia bipontini*, root extract of

*Euclea scimperi*, *Cissampelos mucronata*, and *clerodendrum myricoides* and methanolic leaf extract of *Vernonia bipontini* presented relatively high activities, among which three extracts reduced parasitemia by > 50% when tested at an oral dose of 400 mg/kg/day indicating that the plants are promising for further investigation. Conclusion: The results justify the use of these plants as traditional medicines for the treatment of malaria. Except the leaf extract of *Cissampelos mucronata*, the methanol extract of *Clerodendrum myricoides* and aqueous extract of *Kalanchoe petitiiana* have inhibition of parasitemia above 10%. Further detailed pharmacological and toxicological studies are recommended for drug development.

Key words: malaria, medical plants, *plasmodium berghei*, traditional medicine.

- 259.** Hirut Lemma, Daniel Melaku, Mulugeta Guta, Kelbesa Urga, Kidist Yirsaw, Negero Gemeda. **Antibacterial and antifungal activities of *Psidium Guajava* Linn ('zeytuna') used in Ethiopia folk medicine.** *Ethiopian J Health Sci.* November 2007; 17(3).

#### Abstract

Background: Medicinal plants are natural resources, yielding valuable herbal products, which are often used in the treatment of various ailments. The bark of *psidium guajava* Linn is used for treatment of intestinal diseases such as diarrhoea, dysentery, stomach ache, cramps and abdominal distention as well as skin diseases. The present investigation was made to evaluate the antibacterial and antifungal activity of leaves of *psidium guajava*. Methods: Eighty percent ethanolic leaf extract of *psidium guajava* was screened for antimicrobial activity against different strain of bacteria and fungi. The microorganism that were included in the test were *staphylococcus aureus* ATCC 6538, *klebsiella pneumonia* ATCC 13883, *Esherichia coli* ATCC 25922, *Pseudomonas aeruginosa* ATCC 27855, *Trichophyton mentagraphytes* ATCC 18748, *Aspergillus flavus* ATCC 13697, *Aspergillus niger* ATCC 10535 and clinical isolates of *staphylococcus aureus*, *klebsiella pneumonia*, *esherichia coli*, *pseudomonas aeruginosa*, *streptococcus pneumonia*, *staphylococcus pyogenes*, *shigella dysenteriae*, *salmonella typhi*, *candida albicans*, *Cryptococcus neoformans*, *aspergillus flavus*, *aspergillus niger*, *trichophyton violaceum* and *microsporun canis*. The test were carried out using agar dilution method at different concentration levels of crude extract (0.25, 0.5,

0.75, 1.0, 1.5 mg/ml for antibacterial and 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0 mg/ml for antifungal) and the minimum inhibitory concentration of the crude extract of *P. guajava*. Ampicillin and letoconazol were employed as a positive control. Results: The minimum inhibitory concentration of ethanol leaf extract of *Psidium guajava* ranged from 0.5 to 1.5 mg/ml. The lowest values were observed against standard strain of *S. aureus*, *K. pneumonia* and medically important clinical isolate of *S. aureus* and *S. pyogenes*, whereas, low activity was seen against clinical isolates of *S. typhi* and *P. aeruginosa*. Its inhibitory activity against yeasts ranged from 1.5 to 2.0 mg/ml, but the inhibitory activity against other fungi was between 3.0 and 3.5 mg/ml. *Candida albicans* and *Cryptococcus neoformans* were more susceptible to the ethanol extract compared to other fungal strains. Conclusion: The results showed that *Psidium guajava* has antibacterial and antifungal effects on common bacterial and fungal species. Relatively high concentrations were required to inhibit all fungi than bacteria. Keywords: Antibacterial activity, Antifungal activity, *Psidium guajava*

**260.** Eguale T, Tilahun G, Debella A, et al. (2007). In vitro and in vivo anthelmintic activity of crude extracts of *Coriandrum sativum* against *Haemonchus contortus*. *J Ethnopharmacol* 110:428–33.

**261.** Mohammed-Birhan Abdulwaheb, Eyasu Makonnen, Asfaw Debella and Dawit Abebe. **Effect of *Catha edulis* forsk (Khat) extracts on male rat sexual behavior.** *Journal of Ethnopharmacology*. 2007; 110:250-256.

## Abstract

Khat chewing is a widespread habit that has a deep-rooted socio-cultural tradition in East Africa and in the Middle East. Although a number of investigations have been carried out using cathinone, the psychoactive component of khat, these may not wholly reflect the behavioral effects observed after administering khat in a dosage similar to those used traditionally. The aim of the present study was to evaluate the effect of sub-chronically administered khat extract with or without alcohol on sexual behavior in male rats. Adult albino wistar male rats were administered either with khat extracts (100, 200, 400mg/kg), amphetamine (1mg/kg), sildenafil (1mg/kg), ethanol (2ml/kg of 2% and 10%), or a combination of khat and ethanol (2%+10%) by intragastric gavage orally for 15 days. Khat (400mg/kg) treated rats demonstrated a statistically significant increase in

all sexual parameters except in mounting frequency, intercopulatory interval and copulatory efficiency. Whereas, khat (200mg/kg) treated rats showed a statistically significant increase only in ejaculation latency ( $P < 0.05$ ). In marked contrast, low dose (100mg/kg) of khat extract was found to significantly reduce both mount latency ( $P < 0.05$ ) thereby enhancing sexual motivation/arousal in male rats. Similar results were obtained when khat extract (200mg/kg) and ethanol (10%) were administered concomitantly despite the inhibitory effect observed in male sexual behavior when administered alone. From the present study it can be concluded that higher doses of the extract inhibit sexual behavior in male rats. In contrast, low dose of the extract as well as the concurrent administration of the extract followed by ethanol was found to enhance male rat sexual motivation/arousal.

Keywords: Khat; Sexual parameters; Sexual behavior; Ethanol extract

- 262.** Mulugeta Guta, Kelbessa Urga, Assefa, A., Hirut Lemma, Getachew Addis, Negero Gemed, Kidist Yirsaw, Kissi Mudi and Daniel Melaku. **Antibacterial activity and acute toxicity study of *Acacia nilotica***. *Ethiop. J. Biol. Sci.* 2007; 6(1):43-49.

Abstract

Methanol crude extract and chloroform, ethyl acetate, n-butanol and aqueous fractions of the methanolic extract of fruits and stem bark of *Acacia nilotica* (L.) Willd. ex Del. (Fabaceae) were screened for antibacterial activity of diarrhoeacausing bacterial species (*Escherichia coli*, *Shigella dysenteriae* and *Salmonella typhi*) in Ethiopia using standard agar dilution method. Oral acute toxicity studies were also carried out on mice with the ethyl acetate fruit fraction of *A. nilotica*. Compared with standard antibiotic (chloramphenicol and tetracycline) extracts and fractions, *A. nilotica* had low activity

- 263.** Abegaz, B., Mutanyatta-Comar, J. and Nindi, M. (2007) Naturally Occurring Homoisoflavonoids: Phytochemistry, Biological Activities and Synthesis. *Natural Product Communications*, 2, 475-498.

- 264.** Hymete, A., Rohloff, J., Iversen, T.H. and Kjösen, H. (2007) Volatile Constituents of the Roots of *Echinops kebericho* Mesfin. *Flavour and Fragrance Journal*, 22, 35-38. <http://dx.doi.org/10.1002/ffj.1746>
- 265.** Ashenafi, A., Kelbessa, U., Mulugeta, G., Walelegn, M., Daniel, M., Kisie, M & Tesgayae, K. 2007. In: vivo anti-malaria activity of plants used in Ethiopian traditional medicine, Delomenna southeast Ethiopia. *Ethiopian Journal of Health Sciences*, 17:81-89.
- 266.** Endashaw, B. 2007. Study on actual situation of medicinal plants in Ethiopia. *Japan Association for International Collaboration of Agriculture and Forestry*, 2: 1-9.
- 267.** Yineger H, Yewhalaw D. Traditional medicinal plant knowledge and use by local healers in Sekoru District, Jimma zone, southwestern Ethiopia. *J Ethnobiol Ethnomed*. 2007;3:24.
- 268.** Mulatu, A. and Mekonnen Y., 2007. Spasmolytic effects of *Artemisia afra* and *Artemisia rehan* in tissue preparations. *Ethiop. Med. J.* 45(4): 371-376.
- 269.**

**2008**

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- 270.** Shibre T, Spångéus A, Henriksson L, Negash A, Jacobsson L **Traditional treatment of mental disorders in rural Ethiopia.** *Ethiop Med J.* 2008 Jan;46(1):87-91.

Abstract

**BACKGROUND:** Mental disorders are known to be as prevalent in Ethiopia as in other countries. Only 26 psychiatrists are working in the country with close to 80 million inhabitants. To this should be added clinics run by psychiatric nurses in most of the general hospitals. This means that still most of the mentally ill in the country are treated and cared for in a traditional way.

**OBJECTIVES:** This paper presents the situation regarding traditional treatment of mental illness in a rural area in central Ethiopia, Butajira, with a population of about 350,000 persons, predominantly Muslim.

**METHODS:** All traditional healers in Butajira area were mapped by asking key informants. Twenty-four healers were so identified and interviewed about their perception of mental illness and the treatment they offer. Clients from the healers and patients from the local health centre were interviewed about their opinions on the service given.

**FINDINGS:** A majority of both clients and patients were satisfied with the consultation, but the clients of the healers were more satisfied than the patients in health centres.

**CONCLUSION:** As most persons with mental disorders are treated by traditional healers in rural Ethiopia and in most other developing countries it is important to do more comprehensive studies on the traditional treatment and to find ways of collaboration between traditional practice and modern medicine.

- 271.** Lulekal E, Kelbessa E, Bekele T, Yineger H. **An ethnobotanical study of medicinal plants in Mana Angetu district, southeastern Ethiopia.** *J Ethnobiol Ethnomed.* 2008 Apr 28;4:10. doi: 10.1186/1746-4269-4-10.

Abstract

This study documents indigenous medicinal plant utilization, management and the threats affecting them. The study was carried out in Mana Angetu district between January 2003 and December 2004. Ethnobotanical data were collected using semi structured interviews, field observations, preference and direct matrix ranking with traditional medicine practitioners. The ethnomedicinal use of 230 plant species was documented in the study area. Most of the plants (78.7%) were reportedly used to treat human diseases. The most frequently used plant part were roots (33.9%), followed by leaves (25.6%). Most of the medicinal species (90.4%) were collected from the wild. Direct matrix analysis showed that *Olea europaea* L. Subsp. *cuspidata* (Wall. ex G. Don) was the most important species followed by *Acacia tortilis* (Forssk.) Hayne (120) indicating high utility value of these species for the local community. The principal threatening factors reported were deforestation (90%), agricultural expansion (85%) and fire (53%). Documenting the eroding plants and associated indigenous knowledge can be used as a basis for developing management plans for conservation and sustainable use of medicinal plants in the area.

- 272.** Alem G, Mekonnen Y, Tiruneh M, Mulu A. **Invitro antibacterial activity of crude preparation of myrtle (*Myrtus communis*) on common human pathogens.***Ethiop Med J.* 2008 Jan;46(1):63-9.

#### Abstract

**BACKGROUND:** Myrtle "Addus" (*Myrtus communis*) has long history as a traditional medicine/or different infectious disease by many peoples of the world and in Ethiopia too.

**OBJECTIVE:** To asses the antibacterial activity of crude myrtle on some common human pathogens.

**METHODS:** This experimental study was conducted in Jimma University from February to April 2004. The antimicrobial activity/ minimum inhibitory and minimum bactericidal concentrations/ of the crude preparation of Myrtle on *E. coli*, *S. aureus*, *P. aeruginosa*, *P. vulgaris*, *P. mirabilis*, *K. aerogenes*, *S. typhi* & *S. shigie* was determined using agar dilution methods.

**RESULTS:** The Minimum Bactericidal Concentration of Myrtle for most tested microorganisms was similar to the Minimum Inhibitory Concentration. i.e. 0.5 mg/ml. for *S. aureus*, 2.5 mg/ml for *P. mirabilis* and *P. vulgaris*, 15 mg/ml for *Klebsiella* and *S. typhi*, 20 mg/ml for *P. aeruginosa*. And the MBC of Myrtle for the two relatively least sensitive species, *Shigella* and *E. coli* was 40 mg/ml and 45 mg/ml of media, respectively. The antibacterial activity of Myrtle was markedly increased by 18 times after it has been autoclaved at 121 degrees C for 15 minutes.

**CONCLUSION:** The preliminary study supports its traditional claim of effective anti-infective and could initiate further study that may ultimately facilitate to use myrtle as an antimicrobial agent. However, pharmacologically standardization and clinical evaluation on the effect of myrtle is essential, before using it as antibacterial agent in vivo.

- 273.** Teshome K, Gebre-Mariam T, Asres K, Perry F, Engidawork E. **Toxicity studies on dermal application of plant extract of *Plumbago zeylanica* used in Ethiopian traditional medicine.** *J Ethnopharmacol.* 2008 May 8;117(2):236-48. doi: 10.1016/j.jep.2008.01.036. Epub 2008 Feb 8.

#### Abstract

Plant-based therapeutic preparations are cyclically returning to complement dermatologic therapy, however, data on the toxicity profile of such plants are lacking. In the present study, *Plumbago zeylanica*, a medicinal plant commonly used in Ethiopia for skin diseases was subjected to a systematic dermatotoxicity study. To this effect, the dermatotoxicity of 80% methanol extract of the root part of *Plumbago zeylanica* was investigated in animals following standard procedures for irritation, sensitization, acute toxicity and repeated toxicity tests. Extraction of plant material with 80% methanol resulted in 9.45% of crude extract of *Plumbago zeylanica*. The skin irritation test on rabbits showed *Plumbago zeylanica* extract to be a moderate irritant, with a primary irritation index of 2.00. Sensitization test on mice by the Mouse Ear Swelling Test method revealed the extract to be non-sensitizer in a dose range of 4-10mg/ml and the percent responder was zero. Acute dermal toxicity test on rats did not produce any overt signs of toxicity, except that there was a weight gain difference between the test and control groups of female rats. This was not, however,

supported by other parameters, like the absolute and relative organ weights. Repeated dose toxicity test was associated with increased relative testis weight ( $P < 0.05$ ) as well as higher values for Blood urea nitrogen and  $K^+$  ( $P < 0.05$ ) in both sexes with the highest dose (1000 mg/kg) group, although histopathological analyses failed to lend support to these observations. Taken together, the dermatotoxicity test results from this study suggest that *Plumbago zeylanica* toxic effects might be limited to effects like moderate irritation.

- 274.** W Sewuye, K Asres **In Vivo Anti-inflammatory and Antinociceptive Activities of Extracts of *Rosa abyssinica* and *Salvia nilotica*** Ethiopian Pharmaceutical Journal, 2008; 26(2):

***Abstract***

In vivo *Rosa abyssinica* Lindley (Rosaceae) and *Salvia nilotica* Juss. Exjecr (Lamiaceae) using carrageenan-induced paw oedema and formalin test, respectively. It was observed that the 80% methanol extracts of both plants could significantly lower carrageenan-induced paw oedema at doses of 200 mg/kg, p.o. Among the solvent fractions, the acetone, chloroform and methanol fractions of *S. nilotica* exhibited anti-inflammatory activity, the strongest being that of the acetone fraction. On the other hand, only the acetone fraction of *R. abyssinica* was found to be active. The anti-inflammatory activities of the extracts and the fractions were comparable with that of the known anti-inflammatory drug, indomethacin at the tested concentrations. The results of the formalin test revealed that the acetone fractions of *R. abyssinica* and *S. nilotica* significantly inhibit formalin-induced nociception in mice particularly during the late phase. The results obtained confirmed that the extracts obtained from both *R. abyssinica* and *S. nilotica* possess genuine anti-inflammatory and antinociceptive activities, which support the folkloric use of the herbs to treat inflammatory disorders.

- 275.** A Tadele, K Urga, N Gemed, H Lemma, D Melaku, K Mudie **Antimicrobial Activity of Topical Formulations Containing *Thymus vulgaris* Essential Oil on Major Pathogens Causing Skin Diseases** Ethiopian Pharmaceutical Journal, 2008; 26(2):

**Abstract**

The in vitro antimicrobial performance of topical semisolid formulations of the essential oil from *Thymus vulgaris* L. was assessed on major pathogenic microorganisms causing skin diseases. The essential oil was obtained by hydrodistillation and formulated into five different semisolid vehicles. The inhibition zones of the active constituents released from their respective bases were determined by using agar well diffusion method. The formulations showed inhibition against the growth of microorganisms used in this study at a concentration of 1% (v/w). Bioactive compounds were released better from the hydrophilic preparations than from the hydrophobic ones. The release from macrogol blend was particularly better. The inhibition zone from macrogol blend against both the standard and clinical isolate of *Pseudomonas aeruginosa* was also found to be better than those of Fuciderm® cream (2% sodium fucidate) and tetracycline hydrochloride ointment (3% tetracycline).

- 276.** Z Getahun, K Asres, A Mazumder, F Bucar **Essential Oil Composition, Antibacterial and Antioxidant Activities of *Mentha aquatica* Growing in Ethiopia**  
*Ethiopian Pharmaceutical Journal* Vol. 26 (1) 2008: pp. 9-16

Abstract

The in vitro antibacterial and antioxidant activities of the essential oil of *Mentha aquatica* L. (Lamiaceae) growing in Ethiopia were studied. The chemical composition of the oil was also investigated by using capillary gas chromatography-mass spectrometry. A total of 34 compounds representing 99.4% of the oil have been identified. Menthofuran (70.5%) was characterized as the main component with limonene and pmenthone constituting 9.42 and 7.20% of the oil, respectively. In general, the oil showed a remarkable activity against the Gram-positive bacteria tested of which *Staphylococcus aureus* 29737, *S. aureus* ML267, *Sarcina luteus* 9341 and *Bacillus pumilus* 8241 strains were the most susceptible. The minimum inhibitory concentration (MIC) values of the oil against these organisms were found to be less than 5 µg/ml. The antioxidant activity of the oil was evaluated using 2,2-diphenyl-1-picrylhydrazyl (DPPH) and deoxyribose degradation assays and was found to possess good radical scavenging activity with IC<sub>50</sub> values of 11.2 and 3.74 µl/ml, respectively.

Keywords: antibacterial, antioxidant, *Mentha aquatica*, essential oil, capillary gas chromatography-mass spectrometry

277. H Ahfaha, K Asres, A Mazumder, F Bucar **Leaf Essential oils of *Salvia nilotica* and *Salvia schimperi*: Their Antimicrobial and Antioxidant Activities** *Ethiopian Pharmaceutical Journal* Vol. 26 (1) 2008: pp. 49-58

**Abstract**

The compositions of the essential oils of the leaves of *Salvia nilotica* and *Salvia schimperi* were analyzed by gas chromatography-mass spectrometry (GC-MS). The results of the analyses indicated that the components of the two oils are qualitatively similar with significant quantitative differences. Twenty-seven compounds comprising 84.73% of the total peak areas were identified in *S. nilotica* oil with germacrene D (28.48%), guaiol (13.99%), and trans-caryophyllene (12.96%) as major components. The essential oil of *S. schimperi* was found to contain 42 compounds accounting for 88.3% of the total peak area, the major components being linalool (44.35%), and  $\alpha$ -terpineol (9.27%). The *in vitro* antimicrobial activity of the essential oils of both plants were studied against a wide range of medically important pathogens including Grampositive and Gram-negative bacteria, as well as some fungal strains using a standard disc diffusion technique. The results revealed that the oils possessed significant activity against most of the bacterial and fungal strains used in the study. The minimum inhibitory concentration (MIC) values ranged from 25 to 100  $\mu\text{g/ml}$  against the bacteria and 1000 to 1500  $\mu\text{g/ml}$  against the fungi. At similar concentrations, the oils and the standard antibiotic ciprofloxacin exhibited similar activities against various Gram-positive and Gramnegative bacterial strains. In addition, the essential oils of both plants were demonstrated to have a strong free-radical scavenging potential in 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay. In light of the results obtained, it could be concluded that the study supports the various uses of *S. nilotica* and *S. schimperi* in traditional medical practices of Ethiopia.

**Keywords:** *Salvia nilotica*, *Salvia schimperi*, essential oils, antimicrobial activity, radical scavenging potential

- 278.** M Guta, H Lemma, G Addis, K Urga, A Assefa, E Mohammed, N Gameda, K Yirsaw, K Mudi, K Mammo **Antigonorrheal Activities of Some Traditionally Used Ethiopian Medicinal Plants** *Ethiopian Pharmaceutical Journal* Vol. 26 (1) 2008: pp. 65-68

**Abstract**

The *in vitro* antigonorrheal activity of the seeds of *Acacia nilotica* (L.) Willd. ex Del., the stem bark of *Croton macrostachyus* Del., the roots of *Cucumis pustulatus* Naud. ex Hook. f., the roots of *Foeniculum vulgare* Miller, and leaves of *Withania somnifera* (L.) Dunal were studied using the agar dilution method. Different concentrations of the 80% methanol and aqueous extracts, and the chloroform and aqueous fractions of the 80% methanol extracts were tested against clinical isolates of *Neisseria gonorrhoeae*. Significant antigonorrheal activity was exhibited by the 80% methanolic extracts of all plants whereas the aqueous extracts failed to show any activity. Furthermore, chloroform fractions of the hydroalcoholic extracts were seen to be more active as compared to their respective aqueous fractions. The findings of the study support the popular use of the plants in the Ethiopian traditional medicine for the treatment of gonorrhea.

**Keywords:** *in vitro* antigonorrheal activity, medicinal plants, hydroalcoholic extracts, agar dilution method, *Neisseria gonorrhoeae*

- 279.** B Weldegerima, T Gebre-Mariam, T Gedif **A Survey of Traditional Medicinal Plants Used by Traditional Healers in Dabat District, Northwestern Ethiopia** *Ethiopian Pharmaceutical Journal* Vol. 25 (2) 2007: pp. 131-144

**Abstract**

This study was aimed at obtaining information on the use of medicinal plants by traditional healers in Dabat district for the treatment of human disorders. A semi-structured questionnaire was used to collect data pertaining to plants commonly used to treat health problems and the way traditional healers prepare the medicaments/ remedies. The informants were traditional healers living in Dabat

district who volunteered to participate in the study. Dabat district is located in Northwestern Ethiopia, and is approximately 814 Km from Addis Ababa, the capital city of Ethiopia. Thirty-one traditional healers were interviewed and 66 traditionally used medicinal plants were reported. Fifty-one plants included in 35 families were identified taxonomically at species level, while 15 were only known by their vernacular names. Forty-four medicinal plants were used as single remedy and 13 herbal preparations were composite remedies. The medicinal plants reported are claimed to treat the prevalent diseases of the district. Herbal medicine might, therefore, play a great role in the primary health care system of the district.

**Keywords:** medicinal plants, traditional healers, semi-structured questionnaire, Dabat district, Northwestern Ethiopia

**280.**

Ashenafi Assefa, Kelbesa Urga, Daniel Melaku, Mulugeta Guta and Walelign Mekonnen. **Bronchodilator and Anti-inflammatory activities of *Adhatoda Schimperiana*.** *Ethiopian J Health Sci.* 2008; 18(2):1-9. [http://www.ejhs.ju.edu.et/admin/Volume-18-Num2/Ashenafi%20bronchodilator %20final%2012%5D%201.pdf](http://www.ejhs.ju.edu.et/admin/Volume-18-Num2/Ashenafi%20bronchodilator%20final%2012%5D%201.pdf)

**Abstract**

**BACKGROUND:** *Adhatoda schimperiana* is a plant believed to have several therapeutic effects including anti-asthmatic properties. The objective of this study was to investigate the bronchodilatory, anti-inflammatory effects and toxicity of the hydromethanolic extract of leaves of this plant. **METHODS:** The isolated guinea-pig trachea pre-contracted with histamine and acetylcholine was used to study the relaxation of hydromethanolic extract of leaves *Adhatoda schimperiana*. Salbutamol and atropine were used as standards. The effect of the hydromethanolic extract of leaves of *Adhatoda schimperiana* on carageenin-induced acute inflammation was evaluated by the rat hind paw edema method. Oral and intraperitoneal acute toxicity studies of the extract were performed on mice. **RESULTS:** The hydromethanolic extract of *Adhatoda schimperiana* inhibited contractions of guinea pig tracheal chains induced by acetylcholine and histamine with an EC<sub>50</sub> of 4.66 mg/ml and 5.92 mg/ml, respectively. Salbutamol and atropine also showed similar concentration dependent relaxation of the tracheal chains pre-contracted with both

acetylcholine and histamine. The inhibitory activity of atropine was lower than the extract and salbutamol. The extract exhibited a moderate degree of anti-inflammatory activity. The LD50 of the extract for oral acute toxicity study was found to be 1286.76 mg/kg with 95 % confidence limit of 1161.9 – 1418.0. The plant extract therefore presents a relatively low acute toxicity. **CONCLUSION:** The results of this study show anti-inflammatory activity and a relatively potent relaxant (bronchodialatory) effect of *Adhatoda schimperiana* on the tracheal chain of the guinea pig. These activities justify the traditional use of this plant in the treatment of bronchoconstrictive diseases. More detailed studies are required to investigate the mechanism of action, the toxicity and the therapeutic utility of *Adhatoda schimperiana* for further development towards a proper drug. **KEY WORDS:** *Adhatoda schimperiana*, anti-inflammatory, bronchodialator

- 281.** Asfaw Debella, Dawit Abebe, Kissi Mudi, Ashenif Tadele and Awot GebreEgziabher. **Qualitative laboratory analysis for the detection of conventional drugs in herbal preparations supplied by healers in major towns of Ethiopia.** *Ethiop J. Health Dev.* 2008; 22(1):55-62.

#### Abstract

**Background:** There has always been an air of uncertainty whether or not traditional healers, especially those in the urban areas, supplied herbal remedies adulterated with modern drugs. **Objectives:** This study aims to analyze herbal preparations prescribed by healers against malaria, gonorrhoea, tuberculosis, etc. for the presence of conventional drugs, with emphasis on anti-microbial pharmaceutical ingredients. **Methods:** Patient simulated convenience based survey method was employed to collect samples of remedies supplied by healers along with other pertinent information on quality of services provided in 60 traditional health care establishments. Presence or absence of conventional drug ingredients in the collected samples of herbal preparations was tested using a validated analytical laboratory method. **Result:** Active pharmaceutical ingredients were detected in 39 or 51% of the 76 samples of traditional remedies tested. The average price that healers charge for herbal preparations adulterated with modern drugs was higher than the full dose of conventional drugs sold in retail pharmacies. Even the unadulterated preparations were found to be more expensive than the latter. Documentation of

patient history, diagnostic techniques, dispensing practices of the remedies, etc. as observed in the traditional health service delivery outlets/clinics were generally less satisfactory. Conclusion: Supplying herbal preparations adulterated with modern drugs, particularly with anti-microbial agents entails a number of untoward effects including increased emergence of resistant pathogenic strains. Sustained effort in creating awareness among the communities by health workers and authorities is, therefore, crucial to curb the looming danger to public health. While existing legal frameworks may be sufficient to consider punitive measures against perpetrators of such inappropriate and unauthorized use of anti-microbial agents, new ones that particularly govern the activities of traditional healers need to be put in place.

- 282.** Yineger H, Yewhalaw D, Teketay D. Ethnomedicinal plant knowledge of the Oromo ethnic group in southwestern Ethiopia. *Journal of Ethnobotanical and Ethnomedicine*. 2008;4:11.

2009

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283. Getachew Addis, R. Baskaran, M. Raju, A. Ushadevi, Z. Asfaw, Z. Woldu and V. Baskaran. **Effect of blanching and drying process on carotenoids composition of underutilized Ethiopian (*Coccinia grandis* L. Voigt) and Indian (*Trigonella foenum-graecum* L.) Green leafy vegetables.** *Journal of Food Processing and Preservation.* 2009; 33:744–762.

Abstract

Processing effect on *Coccinia grandis* (ivy gourd) and *Trigonella foenum-graecum* (fenugreek) carotenoids was studied. This paper presents findings on the effect of blanching (boiling water, saline water and steam) and drying (lyophilizer, sun, shade and dryer) on retention of carotenoids. Carotenoids were extracted, identified and quantified by high performance liquid chromatography technique. Xanthophylls (neoxanthin, violaxanthin, lutein, zeaxanthin) and b-carotene were detected in both vegetables; while on the contrary, a-carotene was identified only in ivy gourd. Ivy gourd had a higher total of xanthophylls (104 mg/100 g) and hydrocarbon carotenoids (35 mg/100 g) than fenugreek with 86 mg/100 g and 31 mg/100 g, respectively (all dry weight basis). Results reveal that blanching methods did not affect carotenoids level as compared with raw. Except lyophilization, drying methods significantly reduced most carotenoids, sun drying being highly detrimental. It is recommended to use ivy gourd as source of carotenoids for health benefits. Among the processing methods tested, boiling water blanching is most preferable.

284. Mesfin F, Demissew S, Teklehaymanot T. **An ethnobotanical study of medicinal plants in Wonago Woreda, SNNPR, Ethiopia.** *J Ethnobiol Ethnomed.* 2009 Oct 12;5:28. doi: 10.1186/1746-4269-5-28.

Abstract

**BACKGROUND:** Medicinal plants are the integral part of the variety of cultures in Ethiopia and have been used over many centuries. Hence, the aim of this study is to document the medicinal plants in the natural vegetation and home gardens in Wonago Woreda, Gedeo Zone, Southern Nations, Nationalities and Peoples Regional State (SNNPR).

**MATERIALS AND METHODS:** Thirty healers were selected to collect data on management of medicinal plants using semi-structured interview, group discussion, and field observation. The distribution of plant species in the study areas was surveyed, and preference ranking, direct matrix ranking, priority ranking of factors and Informant consensus factor (ICF) were calculated.

**RESULTS:** The informants categorized the vegetation into five community types based on plant density and associated landform: 'Raqqa', 'Hakka cadanaba', 'Mancchha', 'Bullukko', and 'Wodaegido'. 155 plant species were collected from the natural vegetation and 65 plant species from the home gardens ('Gattae Oduma'). Seventy-two plant species were documented as having medicinal value: Sixty-five (71%) from natural vegetation and 27 (29%) from home gardens. Forty-five (62%) were used for humans, 15(21%) for livestock and 13(18%) for treating both human and livestock ailments: 35 (43.2%) were Shrubs, 28(34.5%) herbs, 17 (20.9%) trees and 1(1.2%) climbers. The root (35.8%) was the most commonly used plant part. The category: malaria, fever and headache had the highest 0.82 ICF. Agricultural expansion (24.4%) in the area was found to be the main threat for medicinal plants followed by fire wood collection (18.8%). Peoples' culture and spiritual beliefs somehow helped in the conservation of medicinal plants.

**CONCLUSION:** Traditional healers still depend largely on naturally growing plant species and the important medicinal plants are under threat. The documented medicinal plants can serve as a basis for further studies on the regions medicinal plants knowledge and for future phytochemical and pharmacological studies.

- 285.** Demma J, Engidawork E, Hellman B. **Potential genotoxicity of plant extracts used in Ethiopian traditional medicine.** *J Ethnopharmacol.* 2009 Feb 25;122(1):136-42. doi: 10.1016/j.jep.2008.12.013. Epub 2008 Dec 25.

#### Abstract

**AIM OF THE STUDY:** Although traditional herbal medicines are widely used in Ethiopia, no information is available on their potential genotoxicity. In the present study, hydroalcoholic extracts of *Glinus lotoides*, *Plumbago zeylanica*, *Rumex steudelii* and *Thymus schimperi* were evaluated for their DNA damaging effects using the comet assay.

**MATERIAL AND METHODS:** Mouse lymphoma L5178Y cells were exposed to different concentrations of the extracts for 3h with and without metabolic activation (S9-mix) using 4-nitroquinoline-N-oxide and benzo(a)pyrene as positive controls, and vehicles as negative controls.

**RESULTS:** In the absence of S9, all extracts were found to induce significant DNA damage without affecting the cell viability. *T. schimperi* and *R. steudelii* were the most potent DNA-damaging extracts, and *G. lotoides* and *P. zeylanica* the least potent. The addition of S9 had different effects on the DNA damage induced by the extracts: it lowered the DNA damaging effect of *P. zeylanica*, did not affect the DNA damaging effect of *T. schimperi*, and increased the DNA damaging effects of *R. steudelii* and *G. lotoides*.

**CONCLUSION:** The findings of the present study suggest that all extracts evaluated have a genotoxic potential in vitro which needs to be substantiated by further studies.

- 286.** Giday M, Asfaw Z, Woldu Z, Teklehaymanot T. **Medicinal plant knowledge of the Bench ethnic group of Ethiopia: an ethnobotanical investigation.** *J Ethnobiol Ethnomed.* 2009 Nov 13;5:34. doi: 10.1186/1746-4269-5-34.

#### Abstract

**BACKGROUND:** Plants have traditionally been used as a source of medicine in Ethiopia since early times for the control of various ailments afflicting humans and their domestic animals. However, little work has been made in the past to properly document and promote the knowledge. Today medicinal plants and the associated knowledge in the country are threatened due to deforestation, environmental degradation and acculturation. Urgent ethnobotanical studies and subsequent conservation measures are, therefore, required to salvage these resources from further loss. The purpose of the present study was to record and analyse traditional medicinal plant knowledge of the Bench ethnic group in Southwest Ethiopia.

**METHODS:** Semi-structured interviews were conducted with Bench informants selected during transect walks made to houses as well as those identified as knowledgeable by local administrators and elders to gather data regarding local names of medicinal plants used, parts harvested, ailments treated, remedy preparation methods, administration routes, dosage and side effects. The same

method was also employed to gather information on marketability, habitat and abundance of the reported medicinal plants. Purposive sampling method was used in the selection of study sites within the study district. Fidelity Level (FL) value was calculated for each claimed medicinal plant to estimate its healing potential.

**RESULTS:** The study revealed 35 Bench medicinal plants: 32 used against human ailments and three to treat both human and livestock ailments. The majority of Bench medicinal plants were herbs and leaf was the most frequently used part in the preparation of remedies. Significantly higher average number of medicinal plants was claimed by men, older people and illiterate ones as compared to women, younger people and literate ones, respectively. The majority of the medicinal plants used in the study area were uncultivated ones.

**CONCLUSION:** The study revealed acculturation as the major threat to the continuation of the traditional medical practice in the study area. Awareness should, therefore, be created among the Bench community, especially the young ones, by concerned organizations and individuals regarding the usefulness of the practice.

- 287.** Tadesse D, Eguale T, Giday M, Mussa A. **Ovicidal and larvicidal activity of crude extracts of *Maesa lanceolata* and *Plectranthus punctatus* against *Haemonchus contortus*.** *J Ethnopharmacol.* 2009 Mar 18;122(2):240-4.

#### Abstract

The widespread development of anthelmintic resistance and high cost of the conventional anthelmintic drugs, has limited the control of gastrointestinal nematode parasites of sheep and goats and hence led to evaluation of medicinal plants as an alternative source of anthelmintics. In the current study, in vitro ovicidal and larvicidal activity of the leaves and fruits of the aqueous and hydro-alcoholic extracts of *Maesa lanceolata* and aerial parts of *Plectranthus punctatus* were evaluated on the egg and larvae of *Haemonchus contortus* using egg hatch assay and larval development test. All extracts of plants tested have shown complete inhibition of egg hatching at or below 1 mg/ml. ED50 for egg hatch inhibition ranged from 0.11 to 0.29 mg/ml, for both the aqueous and hydro-alcoholic extracts of *Plectranthus punctatus* and *Maesa lanceolata*. All extracts have shown dose dependent inhibition of larval development with variable results. The complete

inhibition (100%) at the maximum concentration tested (50 mg/ml) was obtained only for hydro-alcoholic extract of the fruits of *Maesa lanceolata* and the lowest inhibition (50.33%) was recorded for the hydro-alcoholic extract of the leaves of the same plant. The overall findings of the present study has shown that *Plectranthus punctatus* and *Maesa lanceolata* contain possible anthelmintic compounds and further evaluation of different extracts and fractions of these plants should be carried out.

- 288.** Karunamoorthi K, Ilango K, Endale A. **Ethnobotanical survey of knowledge and usage custom of traditional insect/mosquito repellent plants among the Ethiopian Oromo ethnic group.** *J Ethnopharmacol.* 2009 Sep 7;125(2):224-9. doi: 10.1016/j.jep.2009.07.008. Epub 2009 Jul 14.

#### Abstract

**AIM OF THE STUDY:** Repellent plants usage is an integral part of Ethiopian tradition and has been practiced over many centuries. Hence, the aim of this study was to assess the knowledge and usage custom of traditional insect/mosquito repellent plants among the Oromo ethnic group in Ethiopia.

**MATERIALS AND METHODS:** The ethnobotanical survey was conducted between January and March 2009. All 276 household members were interviewed on knowledge and usage custom of traditional repellent plants, using a pre-tested questionnaire in Kofe kebele, Jimma zone, Ethiopia.

**RESULTS AND CONCLUSION:** 83.6% respondents had adequate knowledge and usage custom regarding insect/mosquito repellent plants. Application of smoke by burning the repellent plant materials was the most common practice. The chi-square test result revealed that there was no statistically significant association found between the knowledge about insect repellent plants and sex (p-value=0.8912), educational status (p-value=0.7504), and age (p-value=0.1631) of the respondents. However, usage custom of repellent plants was significantly associated with sex (p-value=0.0002) and average monthly income (p-value=0.0001) although not with educational status (p-value=0.5206) of the respondents. Repellent efficacy of these plants is undetermined and

therefore the scientific validity should be evaluated by conducting further laboratory and field research. Majority of the repellent plants have been used as medicine to treat various ailments by the local community. Furthermore, they are easily available, accessible and affordable therefore usage of traditional repellent plants should be promoted among the local residents in order to reduce vector-borne disease prevalence.

- 289.** Suleman S, Ketsela A, Mekonnen Z. **Assessment of self-medication practices in Assendabo town, Jimma zone, southwestern Ethiopia.***Res Social Adm Pharm.* 2009 Mar;5(1):76-81. doi: 10.1016/j.sapharm.2008.04.002. Epub 2008 Aug 8.

Abstract

**BACKGROUND:** The actions taken for the treatment of illness or symptom of an illness vary depending on the perceptions and experiences of individuals and other factors. A significant portion of all care in illness is self-care. In many cases, self-medication is an important initial response to illness. Although some health-care providers attach negative connotations to it, the World Health Organization acknowledges the existence of a valid role of self-medication.

**OBJECTIVE:** This study was aimed at assessing the magnitude, type, and factors of self-medication in Assendabo town, Jimma, southwestern Ethiopia.

**METHODS:** A community-based cross-sectional study was conducted in Assendabo town during February and March 2006. Open-ended questionnaire was used to collect data by interviewing heads of households in the study population. The data collected were properly screened before they were analyzed.

**RESULTS:** A total of 242 households with 1257 individuals were visited, of which 143 (11.4%) reported at least 1 episode of illness and of whom 56 (39%) used self-medication using both modern pharmaceuticals and traditional medicines. Low severity of illness was a major reason for practicing self-medication; 80.6% of self-medicating individuals had no information on potential

drug adverse effect. About 55% of ill persons who treated themselves reported improvement in their condition.

**CONCLUSIONS:** There is high prevalence of self-medication in Assendabo town. Lack of drug information and accessibility to over-the-counter drugs without any health professional guide contributed to the high incidence of self-medication. Enforcement of regulations in drug distribution and provision of appropriate health education to the community at large is critical.

- 290.** Teklehaymanot T. **Ethnobotanical study of knowledge and medicinal plants use by the people in Dek Island in Ethiopia.** *J Ethnopharmacol.* 2009 Jul 6;124(1):69-78. doi: 10.1016/j.jep.2009.04.005. Epub 2009 Apr 11.

#### Abstract

**ETHNOPHARMACOLOGICAL RELEVANCE:** It reveals the trend of knowledge of medicinal plants and the documentation serves as a baseline data for future phytochemical and pharmacological studies.

**AIM OF THE STUDY:** The medicinal plants are the integral part of the variety of cultures in Ethiopia and have been used over many centuries. Hence, the aim of this study is to assess knowledge specifically with regard to gender and age, and to document medicinal plants used by the people in Dek Island.

**MATERIALS AND METHODS:** The ethnobotanical surveys and quantitative analytical methods were used to study the level of knowledge and medicinal plants use in Dek Island.

**RESULTS:** The male (mean=5.75+/-0.65; p<0.001) and informants with > or =40 years of age (mean=5.25+/-0.56; p<0.05) reported more medicinal plants. Age (p<0.05) and sex (p<0.05) have influence on knowledge of medicinal plants though sex (partial eta squared=0.496) has stronger influence than age. The medicinal plants uses showed similarity with other studies conducted in different cultural setups and locations.

CONCLUSION: The trend of knowledge loss in both age categories and sexes implicates the likely risk of loss of knowledge. The documented data could be useful for future phytochemical and pharmacological studies.

- 291.** Tadesse D, Eguale T, Giday M, Mussa A. **Ovicidal and larvicidal activity of crude extracts of *Maesa lanceolata* and *Plectranthus punctatus* against *Haemonchus contortus*.** *J Ethnopharmacol.* 2009 Mar 18;122(2):240-4.

Abstract

The widespread development of anthelmintic resistance and high cost of the conventional anthelmintic drugs, has limited the control of gastrointestinal nematode parasites of sheep and goats and hence led to evaluation of medicinal plants as an alternative source of anthelmintics. In the current study, in vitro ovicidal and larvicidal activity of the leaves and fruits of the aqueous and hydro-alcoholic extracts of *Maesa lanceolata* and aerial parts of *Plectranthus punctatus* were evaluated on the egg and larvae of *Haemonchus contortus* using egg hatch assay and larval development test. All extracts of plants tested have shown complete inhibition of egg hatching at or below 1 mg/ml. ED50 for egg hatch inhibition ranged from 0.11 to 0.29 mg/ml, for both the aqueous and hydro-alcoholic extracts of *Plectranthus punctatus* and *Maesa lanceolata*. All extracts have shown dose dependent inhibition of larval development with variable results. The complete inhibition (100%) at the maximum concentration tested (50 mg/ml) was obtained only for hydro-alcoholic extract of the fruits of *Maesa lanceolata* and the lowest inhibition (50.33%) was recorded for the hydro-alcoholic extract of the leaves of the same plant. The overall findings of the present study has shown that *Plectranthus punctatus* and *Maesa lanceolata* contain possible anthelmintic compounds and further evaluation of different extracts and fractions of these plants should be carried out.

- 292.** Dugassa S, Medhin G, Balkew M, Seyoum A, Gebre-Michael T. **Field investigation on the repellent activity of some aromatic plants by traditional means against *Anopheles arabiensis* and *An. pharoensis* (Diptera: Culicidae) around Koka,**

**central Ethiopia. *Acta Trop.* 2009 Oct;112(1):38-42. doi:  
10.1016/j.actatropica.2009.06.002. Epub 2009 Jun 17.**

#### Abstract

A study was undertaken to evaluate the impact of traditional application methods of mosquito repellent plants in the reduction of the human-vector contact of malaria vectors in central Ethiopia. The plants (*Corymbia citriodora*, *Eucalyptus camaldulensis*, *Ocimum suave* and *Ocimum basilicum*) were tested by thermal expulsion and direct burning on traditional stoves in the field against two important malaria vectors in Ethiopia (*Anopheles arabiensis* and *An. pharoensis*). A Latin-square design was applied for randomly assigning the treatment plants and control to experimental houses over different nights. The percentage repellency of each candidate plant by both application methods was estimated from the catches of mosquitoes in the treatment and control houses. On direct burning of the plants, *O. basilicum* showed the highest percentage repellency (73.11%,  $P < 0.001$ ) and *E. camaldulensis* the least repellency (65.29%,  $P < 0.001$ ) against *An. arabiensis*. By the same method of application, *C. citriodora* on the other hand gave the highest repellency (72.87%,  $P < 0.001$ ) while *E. camaldulensis* was still the least repellent plant (66.60%,  $P < 0.001$ ) against *An. pharoensis*. On thermal expulsion, *C. citriodora* exhibited the highest repellency (78.69%,  $P < 0.001$ ) while *E. camaldulensis* was the lowest repellent plant (71.91%,  $P < 0.001$ ) against *An. arabiensis*. Against *An. pharoensis*, *C. citriodora* gave the highest repellency (72.9%,  $P < 0.001$ ) while *E. camaldulensis* still gave the least repellency (72.2%,  $P < 0.001$ ) on the same method of application. All the tested plants by both methods of application gave partial but significant protection (>65%) against the house-entry and biting of two important malaria vectors in Ethiopia, and thus have a potential to be used at least as supplements to other control methods. However, feasibility and actual impact on disease transmission need to be known on these and other potentially useful plants.

**293.** Giday M, Asfaw Z, Woldu Z. **Medicinal plants of the Meinit ethnic group of Ethiopia: an ethnobotanical study.** *J Ethnopharmacol.* 2009 Jul 30;124(3):513-21. doi:  
10.1016/j.jep.2009.05.009. Epub 2009 May 18.

#### Abstract

**ETHNOPHARMACOLOGICAL RELEVANCE:** The majority of the Ethiopian people, including the Meinit ethnic group, are highly dependent on medicinal plants for their day-to-day public healthcare and veterinary needs. The existence of medicinal plants and the associated knowledge is, however, currently being threatened mainly due to deforestation, environmental degradation and acculturation. Thus, there is an urgent need to document and analyse the knowledge.

**AIM OF STUDY:** The aim of this study was to record and analyse local knowledge of the Meinit people of Ethiopia on the use of plants to treat or cure diseases of humans and domestic animals.

**MATERIALS AND METHODS:** Ethnobotanical data were gathered through series of individual interviews conducted with selected informants representing different social groups within the Meinit Community. Fidelity Level (FL) values were calculated to estimate the healing potentials of claimed medicinal plants.

**RESULTS:** The study revealed 51 medicinal plants, most of which were herbs. Root was the most frequently used part in remedy preparation. The majority of medicinal plants were not cultivated. Significantly higher numbers of medicinal plants were cited by men than women, by older people than younger ones and by illiterate people than literate ones. *Rumex nepalensis* Spreng., *Leucas deflexa* Hook.f. and *Embelia schimperi* Vatke were the medicinal plants that scored the highest FL values.

**CONCLUSIONS:** Acculturation of the young generation has been found to be the major treat to the continuation of traditional medical knowledge and practice in the study area. Efforts should, therefore, be made to incorporate traditional medicine in school curricula so that younger people could appreciate its usefulness. Priority for further Pharmaco-chemical investigation should be given to plants that scored highest FL values, as such values could indicate better efficacy.

- 294.** Nibret E, Sporer F, Asres K, Wink M. **Antitrypanosomal and cytotoxic activities of pyrrolizidine alkaloid-producing plants of Ethiopia.** *J Pharm Pharmacol.*2009 Jun;61(6):801-8. doi: 10.1211/jpp/61.06.0014.

Abstract

**OBJECTIVES:** The objective was to determine the in-vitro effect of extracts from 19 Ethiopian plant species and four pure pyrrolizidine alkaloids on bloodstream forms of *Trypanosoma brucei* and human leukaemia HL-60 cells.

**METHODS:** Crude plant extracts were prepared using methanol and dichloromethane. The alkaloidal extracts from *Solanecio angulatus* flowers were prepared with and without zinc reduction using the acid-base extraction method. Cell proliferation inhibitory activity of the extracts and compounds was assessed using Alamarblue.

**KEY FINDINGS:** The most active extract was the dichloromethane extract of *Solanecio angulatus* flowers, with an IC<sub>50</sub> value of 12.17 microg/ml. The best selectivity index (SI > 41.08) was obtained for the same extract determined with HL-60 cells. The reduced alkaloidal extract prepared from *S. angulatus* flowers and after acid-base extraction showed more antitrypanosomal activity than unreduced alkaloidal extract with an IC<sub>50</sub> value of 14.35 microg/ml and with a selectivity index of 12.23. The second most active extract was the dichloromethane extract of *Crotalaria phillipsiae* twigs with an IC<sub>50</sub> value of 12.67 microg/ml and a selectivity index of 34.35. Most of the other extracts tested showed moderate antitrypanosomal activities to variable extents. Among the four pure pyrrolizidine alkaloids tested, senecionine showed moderate antitrypanosomal activity with an IC<sub>50</sub> value of 41.78 microg/ml.

**CONCLUSIONS:** *Solanecio angulatus* (flowers) and *Crotalaria phillipsiae* (twigs) could serve as sources of novel trypanocidal compounds for the treatment of trypanosomiasis.

- 295.** Flatie T, Gedif T, Asres K, Gebre-Mariam T. **Ethnomedical survey of Berta ethnic group Assosa Zone, Benishangul-Gumuz regional state, mid-west Ethiopia.** *J Ethnobiol Ethnomed.* 2009 May 1;5:14. doi: 10.1186/1746-4269-5-14.

Abstract

Traditional medicine (TM) has been a major source of health care in Ethiopia as in most developing countries around the world. This survey examined the extent and factors determining the use of

TM and medicinal plants by Berta community. One thousand and two hundred households (HHs) and fourteen traditional healers were interviewed using semi-structured questionnaires and six focused group discussions (FGDs) were conducted. The prevalence of the use of TM in the two weeks recall period was 4.6%. The HH economic status was found to have a significant effect while the educational level and age of the patients have no effect either on the care seeking behavior or choice of care. Taking no action about a given health problem and using TM are common in females with low-income HHs. Forty plant species belonging to 23 families were reported, each with local names, methods of preparation and parts used. This study indicates that although the proportion of the population that uses TM may be small it is still an important component of the public health care in the study community as complementary and alternative medicine.

- 296.** W Tsegaye, K Urga, K Asres **Antidiabetic Activity of Samma (*Urtica simensis* Hochst. ex. A. Rich.) in Streptozotocin-Induced Diabetic Mice**, Ethiopian Pharmaceutical Journal, 2009; 27(2):

***Abstract***

Diabetes mellitus is a major public health problem in the world. According to WHO, the number of diabetics in Ethiopia, is expected to increase from about 800,000 cases in the year 2000 to 1.8 million by 2030. In the traditional health care system of Ethiopia, “Samma” (the leaves of *Urtica simensis* Hochst. ex. A. Rich., Urticaceae), are used for the treatment of diabetes mellitus and various other ailments. This study reports the antidiabetic activity of the total hydroalcoholic and aqueous extracts and the various solvent fractions of *U. simensis* in streptozotocin-induced diabetic mice. The results revealed that the total hydroalcoholic extract as well as the methanol and aqueous fractions possess significant antidiabetic activity. Blood glucose levels were reduced by 17.9% and 29.9% after oral administration of 300 mg/kg of each of the methanol and aqueous fractions, respectively. At a concentration of 40 ;g/kg, the standard antidiabetic drug glibenclamide displayed a 57.8% reduction in blood glucose level. The aqueous fraction of *U. simensis* showed antidiabetic activity in a dose dependant manner. However, the petroleum ether, chloroform and acetone fractions did not exhibit any antidiabetic activity. In light of the results obtained from the current

study, it could be concluded that the leaves of *U. simensis* have genuine antidiabetic activity, and their use in traditional medicine to control diabetes mellitus may be justified.

**Keywords:** *Urtica simensis*, Urticaceae, antidiabetic activity, hydroalcoholic extract, solvent fractions

- 297.** T Habtie, S Admassu, K Asres **Effects of Processing Methods on Some Phytochemicals Present in the Seeds of *Lupinus albus* L. Grown in Ethiopia** *Ethiopian Pharmaceutical Journal*, 2009; 27(2):

**Abstract**

The effects of extrusion cooking, roasting, aqueous and alkaline thermal process on the reduction of the levels of some phytochemicals in the seeds of white lupin (*Lupinus albus* L.) were studied. Aqueous thermal process was found to be better than the other processing methods in reducing the concentration of phytic acid. Alkaline thermal processing exhibited the most pronounced effect in reducing the toxic quinolizidine alkaloids, tannins and phytic acid of lupins. This process improves the nutritional value of lupin flour, and indicates the potential of lupin flour as an ingredient of fabricated foods.

**Keywords:** extrusion cooking, roasting, aqueous and alkaline thermal process, phytochemicals, *Lupinus albus* L.

- 298.** A Tadele, K Asres, D Melaku, W Mekonnen **In vivo anti-inflammatory and antinociceptive activities of the leaf extracts of *Clematis simensis* Fresen** *Ethiopian Pharmaceutical Journal*, 2009; 27(1):

**Abstract**

The anti-inflammatory and antinociceptive activities of the 80% methanol extract (HE), and the various solvent fractions prepared by soxhlet extraction of the leaves of *Clematis simensis* Fresen were studied using carrageenan-induced guinea pig paw edema, and tail-flick and hot-plate models in mice, respectively. Activities observed vary with concentration and time. The anti-inflammatory and the antinociceptive activities of HE at a dose of 800 mg/kg were comparable to the activities

of the standards employed in the study i.e. indomethacin (10 mg/kg) and morphine (10 mg/kg), respectively. However, the extract failed to show any activity at a dose of 200 mg/kg. HE was observed to possess anti-inflammatory activity at a dose of 400 mg/kg while it exerted antinociceptive property at a dose of 800 mg/kg. The acetone (AF) and methanol fractions (MF) exhibited anti-inflammatory activity, the latter also showed antinociceptive activity at concentrations of 100 and 200 mg/kg. Among the extracts, MF possessed greater anti-inflammatory activity than indomethacin and comparable antinociceptive activity to that of morphine in the hot plate test. The petroleum ether fraction (PEF) showed neither anti-inflammatory nor antinociceptive activity at the tested concentrations. The finding supports the traditional use and illustrated the correlation that exists between the popular perception with genuine anti-inflammatory and antinociceptive activities of the leaves of *C. simensis*.

**Key words:** *Clematis simensis*, anti-inflammatory activity, antinociceptive activity, crude extract, solvent fractions

- 299.** G Paulos, A Endale, G Bultosa, T Gebre-Mariam **Isolation and physicochemical characterization of cassava starches obtained from different regions of Ethiopia** *Ethiopian Pharmaceutical Journal*, 2009; 27(1):

***Abstract***

The chemical composition, amylose content and physicochemical properties of cassava (*Manihot esculenta* Crantz., Fam. Euphorbiaceae) starches obtained from different regions of Ethiopia were investigated. The proximate composition of the starches on dry weight basis were found to be 0.001 - 0.01% protein, 0.08 - 0.11% fat, 0.03 - 0.1% ash, and 85.7% - 87.5% starch. The amylose contents of cassava starches from Gamo Gofa, Illubabor and Wollega were estimated to be 16.1%, 21.1% and 18.9%, respectively. Scanning electron microscopy (SEM) showed spherical granules. Particle size analysis revealed granule size distribution with a mean particle size of 12.71  $\mu\text{m}$  (Gamo Gofa) 14.34  $\mu\text{m}$  (Illubabor) and 11.70  $\mu\text{m}$  (Wollega). X-ray diffraction study of the starch displayed A-type pattern with a distinctive maximum peak at around  $17.0^\circ 2\theta$ . The true average density of the starch was found to be 1.497 g/ml. Brabender viscosity of 6% starch paste showed peak viscosities of 198.5 BU (Gamo Gofa), 224.0 BU (Illubabor) and 208.0 BU (Wollega).

Differential scanning calorimeter (DSC) parameters of native starch-water mixture (1:2) exhibited an onset temperature ( $T_o$ ), a peak temperature ( $T_p$ ) and an endset temperature ( $T_e$ ) of 60.19, 65.80, 71.53 (Gamo Gofa), 55.93, 60.80, 66.61 (Illubabor), and 58.29, 64.70, 72.47 (Wollega), with a corresponding gelatinization enthalpy ( $\Delta H$ ) of 21.04, 17.05, and 22.34 mJmg<sup>-1</sup>, respectively.

**Keywords:** cassava starch, amylose content, X-ray diffraction, Brabender viscosity, gelatinization

- 300.** Balcha, A., Legesse, N. and Jochen, K. (2009) In Vitro and ex Vitro Seed-Based Propagation Methods of Echinops kebericho Mesfin: A Threatened Medicinal Plant. *Journal of Applied Horticulture*, 10, 164-168.
- 301.** Bekalo TH, Wondmatas SD, Woldemariam ZA. An ethno botanical study of medicinal plants used by local people in the low lands of Konta Special Woreda, SNNPR, Ethiopia. *J Ethnobiol Ethnomed.*2009;5:26.
- 302.** Awas T, Demissew S. In: Proceedings of the 16th International Conference of Ethiopian Studies. Svein E, Harald A, Birhanu T, Shiferaw B, editor. Trondheim, Norway: NTNU-Trykk Press; 2009. Ethnobotanical study of medicinal plants in Kafficho people, southwestern Ethiopia; pp. 711–726. 3
- 303.** Gall A, Shunkute Z. Ethiopian Traditional and Herbal Medications and their Interaction with Conventional Drugs; 2009. Available from: <http://www.ethnomed.org/clinical/pharmacy/ethiopian-herb-drug-interactions>.
- 304.**

**2010**

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- 305.** Jemal Dilebo, Tsige Gebre-Mariam and Kaleab Asres **Anti-inflammatory Activities of Extracts of Some Traditionally Used Medicinal Plants in Ethiopia on Carrageenan-Induced Mouse Paw Oedema** *Ethiop. Pharm. J.* 28, 32-38 (2010)

Hydroalcoholic extracts of some traditional medicinal plants used in Ethiopia for the treatment of skin diseases, were investigated for their anti-inflammatory activities in carrageenan-induced mouse paw oedema at doses of 300 mg/kg and 500 mg/kg body weight. The extracts were obtained from the leaves of *Bidens pilosa* L. (Asteraceae), *Malva verticillata* L. (Malvaceae), *Syzygium guineense*

DC. (Myrtaceae); and from the rhizomes of *Ferula communis* L. (Apiaceae), and from the aerial part of *Ranunculus multifidus* Forssk (Ranunculaceae). Except for the extract of *F. communis*, all the extracts showed oedema inhibition at both 300 and 500 mg/kg doses. The extract of *R. multifidus* displayed not only the greatest oedema inhibition at 300 mg/kg; it also exhibited better oedema inhibition than the reference drug indomethacin (10 mg/kg) three h after carrageenan injection. The extracts of *B. pilosa*, *M. verticillata* and *S. guineense* also demonstrated time and dose dependent inhibition of oedema. The anti-inflammatory activities of these plants may partially justify the rationale for their traditional use in the treatment of skin diseases.

Keywords : hydroalcoholic plant extracts, anti-inflammatory activity, carrageenan, mouse paw oedema inhibition, *Ranunculus multifidus*

- 306.** Teklehaymanot T, Giday M. **Quantitative ethnobotany of medicinal plants used by Kara and Kwegu semi-pastoralist people in lower Omo River Valley, Debub Omo Zone, Southern Nations, Nationalities and Peoples Regional State, Ethiopia.** *J Ethnopharmacol.* 2010 Jul 6;130(1):76-84. doi: 10.1016/j.jep.2010.04.013. Epub 2010 Apr 24.

Abstract

**AIM OF THE STUDY:** The people in Ethiopia have been using medicinal plants over centuries and the traditional knowledge is passed verbally from generation to generation. Therefore, the aim of this study was to document the medicinal plants used by Kara and Kwego semi-pastoralist people and to establish association between the species richness and diversity, habit, parts used and administration of medicinal plants reported by the two people.

**MATERIALS AND METHODS:** Semi-structured interview was used in data collection; Chi-Square test, t-test and univariate analysis were used to compare medicinal plants knowledge between Kara and Kwego people. Informant consensus factor (ICF), fidelity level (FL), and preference ranking of medicinal plants were computed.

**RESULTS:** Fifty-seven medicinal plant species were indicated that were distributed into 33 families and 52 genera. Thirty-four of them were common to both people whereas 12 were unique to Kara and 11 to Kwego. There was no significant difference ( $p>0.05$ ) between the two people in medicinal plant species richness and diversity. The growth forms, parts of medicinal plants and their conditions: fresh or dry used in the preparation of remedies and route of administration were not different ( $p>0.05$ ). Root was 55% of the plant parts used and oral was 61% of route of administration. The informant consensus factor was not significantly different ( $p>0.05$ ) between the two people. *Solanum hastifolium* Hochst.ex Dunal, *Salvadora persica* L. and *Maeura sessiliflora* Gilg were preferred more than the other medicinal plants reported to treat the prevalent diseases by both people.

**CONCLUSIONS:** The information documented on the medicinal plants of these people may be used as baseline data for future studies on semi-arid and arid pharmacologically important medicinal plants and for phytochemical investigations.

**307.** Mesfin Tadesse and Brook Mesfin **A review of selected plants used in the maintenance of health and wellness in Ethiopia** *Ee-JRIF* Vol 2, No 1 (2010) - Health Issue pp (85 - 102)

Abstract.

The therapeutic, Orthodox Christian liturgical/ceremonial, aromatic and medicinal uses of some selected members of the plant genera, Aloe, Artemisia, Boswellia, Coffea, Commiphora, Echinops, Foeniculum, Jasminum, Lawsonia, Linum, Myrtus and Olea and their products by rural and semi-urban Ethiopians is highlighted. Their uses are compared and contrasted with the uses elsewhere in the world and, in some cases, a review of the biological and chemical features is provided to highlight similarity and/or correlation of use. The need on focusing on these biological resources by researchers and entrepreneurs is highlighted. A few of the species are endemic; some are regionally distributed, while others are introduced species. An attempt is made to show the basic structures of organic molecules and the derivation of macromolecules within cells from these compounds. The central dogma of life, as revolving and evolving units of energy embodied or trapped in chemicals, is given as a cursory introduction to show relationships, in terms of energy, between the organism and the units it is made up of.

Key words: Aromatic; therapeutic; medicinal plants; primary and secondary metabolites; organic compounds; energy.

- 308.** Teklehaymanot T, Giday M. **Ethnobotanical study of wild edible plants of Kara and Kwego semi-pastoralist people in Lower Omo River Valley, Dehub Omo Zone, SNNPR, Ethiopia.** *J Ethnobiol Ethnomed.* 2010 Aug 17;6:23. doi: 10.1186/1746-4269-6-23.

#### Abstract

**BACKGROUND:** The rural populations in Ethiopia have a rich knowledge of wild edible plants and consumption of wild edible plants is still an integral part of the different cultures in the country. In the southern part of the country, wild edible plants are used as dietary supplements and a means of survival during times of food shortage. Therefore, the aim of this study is to document the wild edible plants gathered and consumed by Kara and Kwego people, and to analyze patterns of use between the two people.

**METHODS:** A cross sectional ethnobotanical study of wild edible plant species was conducted from January 2005 to March 2007. About 10% of each people: 150 Kara and 56 Kwego were randomly selected to serve as informants. Data were collected using semi-structured questionnaire

and group discussions. Analysis of variance ( $\alpha = 0.05$ ) was used to test the similarity of species richness of wild edible plants reported by Kara and Kwegu people; Pearson's Chi-square test ( $\alpha = 0.05$ ) was used to test similarity of growth forms and plant parts of wild edible plants used between the two people.

**RESULTS:** Thirty-eight wild plant species were reported as food sources that were gathered and consumed both at times of plenty and scarcity; three were unique to Kara, five to Kwegu and 14 had similar local names. The plant species were distributed among 23 families and 33 genera. The species richness: families, genera and species ( $p > 0.05$ ) were not significantly different between Kara and Kwegu. Nineteen (50%) of the reported wild edible plants were trees, 11 (29%) were shrubs, six (16%) were herbs and two (5%) were climbers. Forty plant parts were indicated as edible: 23 (58.97%) fruits, 13 (33.33%) leaves, 3 (7.69%) roots and one (2.56%) seed. There was no difference between wild edible plants growth forms reported (Pearson's Chi-square test (d.f. = 3) = 0.872) and plant parts used (Pearson's Chi-square test (d.f. = 3) = 0.994) by Kara and Kwegu people. The majority of wild edible plants were gathered and consumed from 'Duka' (March) to 'Halet' (May) and from 'Meko' (August) to 'Tejo' (November). Sixteen (41%) of the plant parts were used as a substitute for cultivated vegetables during times of scarcity. The vegetables were chopped and boiled to make 'Belesha' (sauce) or as a relish to 'Adano' (porridge). The ripe fruits were gathered and consumed fresh and some were made into juices. The seeds and underground parts were only consumed in times of famine. Thirty-seven percent of the wild edible plants were used as medicine and 23.6% were used for other functions.

**CONCLUSIONS:** The wild edible plants were used as supplements to the cultivated crops and as famine foods between harvesting seasons. But information on the nutritional values and possible toxic effects of most of the wild edible plants reported by Kara and Kwegu, and others in different part of Ethiopia is not available. Therefore, the documented information on the wild edible plants may serve as baseline data for future studies on nutritional values and possible side effects, and to identify plants that may improve nutrition and increase dietary diversity. Some of these wild edible plants may have the potential to be valuable food sources (if cultivated) and could be part of a strategy in tackling food insecurity.

- 309.** Giday M, Asfaw Z, Woldu Z. **Ethnomedicinal study of plants used by Sheko ethnic group of Ethiopia.***J Ethnopharmacol.* 2010 Oct 28;132(1):75-85. doi: 10.1016/j.jep.2010.07.046. Epub 2010 Jul 30.

Abstract

**AIM OF THE STUDY:** This study was conducted to document and evaluate knowledge on medicinal plant use by Sheko ethnic group in Southwest Ethiopia.

**MATERIALS AND METHODS:** Interviews and ranking exercises were the main methods employed to collect the ethnobotanical data. Fidelity level (FL) values were calculated for claimed Sheko medicinal plants to estimate their healing potentials.

**RESULTS:** Seventy-one Sheko medicinal plants were reported, the majority of which were used to treat skin and gastro-intestinal ailments. *Ocimum lamiifolium*, *Phytolacca dodecandra*, *Amaranthus dubius* and *Amaranthus graecizans* were the medicinal plants assigned with the highest FL values, a possible indication of their better healing potential. The majority of Sheko medicinal plants were found to be herbs, and leaf was the most preferred plant part in remedy preparations. The study indicated that men, older people and illiterate ones had better knowledge of medicinal plants use as compared to women, younger people and literate ones, respectively.

**CONCLUSIONS:** The study showed that the Sheko people have rich knowledge of medicinal plant use. This knowledge is however, currently threatened mainly due to acculturation. Awareness should thus be created among Sheko community by concerned bodies regarding the usefulness of their medical practice. The efficacy and safety of the claimed medicinal plants need to be evaluated before recommending them for a wider use with priority given to those with high fidelity level values.

- 310.** Teshome K, Gebre-Mariam T, Asres K, Engidawork E. **Toxicity studies on dermal application of plant extract of *Dodonaea viscosa* used in Ethiopian traditional medicine.***Phytother Res.* 2010 Jan;24(1):60-9. doi: 10.1002/ptr.2869.

## Abstract

Despite advances in the understanding of the medicinal properties of many herbs, the consumer today is confronted with the lack of or misinformation concerning the safety of these herbs that rivals the heyday of the patent medicine era. In the present study, *Dodonaea viscosa* (Sapindaceae), a medicinal plant commonly used for skin diseases in Ethiopia was subjected to a systematic dermatotoxicity study. To this effect, the dermatotoxicity of an 80% methanol extract of the leaf was investigated in animals following standard procedures for irritation, sensitization, acute toxicity and repeated toxicity tests. The skin irritation test in rabbits showed the extract to be a slight or negligibly slight irritant, with a primary irritation index of 0.45. A sensitization test in mice by the mouse ear swelling test method revealed the extract to be a non-sensitizer in the dose range 12-30 mg/mL. The percent responder was zero. The acute and repeated dermal toxicity tests on rats did not show any overt sign of toxicity. The findings of this study collectively indicate that dermal application of *D. viscosa* is not associated with any toxicologically relevant effects and the data could provide satisfactory preclinical evidence of safety to launch a clinical trial on a standardized formulation of the plant extracts.

- 311.** Nibret E, Wink M. **Volatile components of four Ethiopian Artemisia species extracts and their in vitro antitrypanosomal and cytotoxic activities.** *Phytomedicine*. 2010 Apr;17(5):369-74. doi: 10.1016/j.phymed.2009.07.016. Epub 2009 Aug 15.

## Abstract

*Artemisia* species are one of the many traditional medicinal plants of Ethiopia used for the treatment of infectious and non-infectious health problems. In the present study, eight extracts prepared from leaves and aerial parts of four *Artemisia* species (*Artemisia absinthium*, *A. abyssinica*, *A. afra*, and *A. annua*) growing in Ethiopia were tested in vitro against bloodstream forms of *Trypanosoma brucei brucei*. The most active extract was the dichloromethane extract from aerial parts of *A. abyssinica* with an IC(50) value of 19.13 microg/ml. A selectivity index (SI) of 8.24 was obtained with HL-60 cells treated with the same extract. Artemisinin, the best known antimalarial compound from *A. annua* showed antitrypanosomal activity with an IC(50)

value of 35.91 microg/ml and with a selectivity index of 2.44. The dichloromethane extracts of the four species were further investigated for their volatile components using GLC/MS. Camphor was detected in the four species and was found to be the principal compound (38.73%) of *A. absinthium* extract. Octa-3,5-diene-2,7-dione, 4,5-dihydroxy was detected in three species except in *A. afra* and was present as the main volatile component (54.95%) of *A. abyssinica*. Epoxylinool was detected only in *A. afra* and was the principal component (29.10%) of dichloromethane extract of the plant. Deoxyqinghaosu was only present in *A. annua* and absent in the other three *Artemisia* species. Deoxyqinghaosu was the principal volatile component (20.44%) of the dichloromethane extract of *A. annua*. In conclusion, the dichloromethane extract from aerial part of *A. abyssinica* should be considered for further study for the treatment of trypanosomiasis.

- 312.** Teshome K, Gebre-Mariam T, Asres K, Engidawork E. **Toxicity studies on dermal application of plant extract of *Dodonaea viscosa* used in Ethiopian traditional medicine.** *Phytother Res.* 2010 Jan;24(1):60-9. doi: 10.1002/ptr.2869.

#### Abstract

Despite advances in the understanding of the medicinal properties of many herbs, the consumer today is confronted with the lack of or misinformation concerning the safety of these herbs that rivals the heyday of the patent medicine era. In the present study, *Dodonaea viscosa* (Sapindaceae), a medicinal plant commonly used for skin diseases in Ethiopia was subjected to a systematic dermatotoxicity study. To this effect, the dermatotoxicity of an 80% methanol extract of the leaf was investigated in animals following standard procedures for irritation, sensitization, acute toxicity and repeated toxicity tests. The skin irritation test in rabbits showed the extract to be a slight or negligibly slight irritant, with a primary irritation index of 0.45. A sensitization test in mice by the mouse ear swelling test method revealed the extract to be a non-sensitizer in the dose range 12-30 mg/mL. The percent responder was zero. The acute and repeated dermal toxicity tests on rats did not show any overt sign of toxicity. The findings of this study collectively indicate that dermal application of *D. viscosa* is not associated with any toxicologically relevant effects and the

data could provide satisfactory preclinical evidence of safety to launch a clinical trial on a standardized formulation of the plant extracts.

- 313.** Mekonnen T, Urga K, Engidawork E. **Evaluation of the diuretic and analgesic activities of the rhizomes of *Rumex abyssinicus* Jacq in mice.** *J Ethnopharmacol.* 2010 Feb 3;127(2):433-9. doi: 10.1016/j.jep.2009.10.020. Epub 2009 Oct 23.

#### Abstract

**AIM OF THE STUDY:** *Rumex abyssinicus* Jacq (Polygonaceae) has been used traditionally for treatment of hypertension, inflammatory and painful conditions in Ethiopia. The present study aimed to evaluate the diuretic and analgesic activities of extracts of *Rumex abyssinicus* at different doses in mice.

**MATERIALS AND METHODS:** The effect on urine volume and urinary electrolyte (Na(+), K(+) and Cl(-)) was assessed for a period of 5h following oral administration of aqueous (500 mg/kg, 750 mg/kg or 1000 mg/kg) or 80% methanolic (250 mg/kg, 500 mg/kg or 750 mg/kg) extract or furosemide (10mg/kg). Acetic acid-induced writhing and hot-plate tests were employed to study the analgesic effect of 80% methanolic extracts (250 mg/kg, 500 mg/kg or 1000 mg/kg, P.O.) and compared with that of aspirin (100mg/kg, P.O.) or morphine (10mg/kg, sc).

**RESULTS:** The extracts displayed dose-dependent diuretic and analgesic effects. The highest doses of both extracts markedly and significantly increased ( $P < 0.001$ ) urine volume and urinary electrolytes, qualitatively similar to that of furosemide. 1000 mg/kg of the extract reduced the number of writhing by 67.6% ( $P < 0.001$ ) and conferred more than 70% protection against thermally induced pain stimuli after 45 min of treatment comparable to that of aspirin and morphine, respectively.

**CONCLUSION:** These findings collectively indicate that the extracts exhibited significant diuretic and analgesic activities, providing evidence, at least in part, for its folkloric use.

- 314.** Ayele Y, Urga K, Engidawork E. **Evaluation of in vivo antihypertensive and in vitro vasodepressor activities of the leaf extract of *Syzygium guineense* (Willd) D.C.***Phytother. Res.* 24: 1457–1462 (2010)doi: 10.1002/ptr.3141

Abstract

The aim of this work was to evaluate the antihypertensive activity of the hydroalcohol extract of the leaves of *Syzygium guineense* (Willd) D.C. (Myrtaceae) in a 1-kidney-1-clip rat model and its vasorelaxant effect on isolated aorta. The extract reduced blood pressure in a dose and time dependent fashion. Following 3 days of treatment, single oral daily doses of 50, 100 and 150 mg/kg caused an overall reduction ( $p < 0.05$ ) of systolic blood pressure by 6.9, 34.0 and 40.8 mmHg, respectively. The diastolic blood pressure was, however, significantly reduced ( $p < 0.05$ ) by 100 mg/kg (10.3 mmHg) and 150 mg/kg (18.4 mmHg) doses only. The mean blood pressure was reduced by 5.0, 18.3 and 25.9 mmHg by the respective doses. The extract also caused a dose-dependent relaxation of aorta precontracted with KCl at a concentration of 5-70 mg/mL, with a maximum relaxation of 56.22% achieved at 70 mg/mL concentration. The relaxation mechanism was found to be independent of the endothelium system, muscarinic receptors, histamine receptors, ATP dependent K(+) channels, cyclooxygenase enzymes and cGMP/NO pathway. The findings suggest that the extract had an antihypertensive effect most likely caused by dilation of the blood vessels, a confirmation for the folkloric use of the plant.

- 315.** Wube AA, Bucar F, Gibbons S, Asres K, Rattray L, Croft SL. **Antiprotozoal activity of drimane and coloratane sesquiterpenes towards *Trypanosoma brucei* rhodesiense and *Plasmodium falciparum* in-vitro.***Phytother Res.* 2010 Oct;24(10):1468-72. doi: 10.1002/ptr.3126.

Abstract

The extracts and 12 sesquiterpenes obtained from the East African medicinal plant *Warburgia ugandensis* Sprague (Canellaceae) were assessed for their antiplasmodial activity against the chloroquine-sensitive (3D7) and chloroquine-resistant (K1) strains of *Plasmodium falciparum* and antitrypanosomal activity against *Trypanosoma brucei* rhodesiense. The dichloromethane extract displayed strong antiplasmodial and antitrypanosomal activities with IC(50) values of 8.10 and

1.10 µg/mL against K1 strain of the malaria parasite and STIB900 strain of *T. b. rhodesiense*, respectively. Among the compounds evaluated for inhibition of trypomastigotes, both drimane and coloratane sesquiterpenes possessing aldehyde groups at positions 8 and 9 were found to show most antitrypanosomal activity with IC(50) values in the range 0.56-6.4 µM. The antiplasmodial assays also revealed that the six coloratane and six drimane sesquiterpenes isolated from this extract exhibited significant antitrypanosomal activity with IC(50) values ranged from 0.45 to 114 µM. Among the compounds tested against the malarial parasite *P. falciparum* hydroxymuzigadiolide (3) was most active with an IC(50) value of 6.40 µM.

- 316.** T Wolde, E Engidawork, K Asres, W Eregete **Evaluation of Hepatoprotective Activities of *Satureja punctata* Benth Briq and *Solanecio angulatus* Vahl Jeffrey in Ferric Nitrilotriacetate Induced Hepatotoxicity in Rats** *Ethiopian Pharmaceutical Journal*, 2010; 28(2):

**Abstract**

*Satureja punctata* Benth. Briq (Lamiaceae) and *Solanecio angulatus* Vahl Jeffrey (Asteraceae) are among the plants widely used in Ethiopian traditional medicine for the treatment of liver diseases. The study aimed at evaluating the hepatoprotective activity of the crude extracts and solvent fractions of these medicinal plants. Hepatoprotective activity was evaluated by measuring levels of alanine aminotransferase (ALT), aspartate aminotransferase (AST) and alkaline phosphatase (AP) as well as by morphologic pathology and antioxidant assay against ferric nitrilotriacetate induced hepatotoxicity in rats. Crude aqueous extract of *S. punctata* at 250 and 500 mg/kg suppressed plasma levels of AST and ALT ( $p < 0.01$ ), and AP ( $p < 0.01$  and  $p < 0.001$ ). *S. angulatus* at 400 mg/kg decreased AP ( $p < 0.05$ ), whilst 200 mg/kg reduced AST and AP ( $P < 0.01$ ), without affecting ALT. The methanol fraction of *S. punctata* (500 mg/kg) showed maximum hepatoprotective activity comparable to silymarin ( $p < 0.001$ , in all cases). Likewise, the chloroform fraction (250 mg/kg) reduced to a similar extent ( $p < 0.01$  in all cases). The aqueous fraction (250 mg/kg) showed significant reduction in AST and ALT ( $p < 0.001$ ) and AP ( $p < 0.05$ ), but 500 mg/kg failed to affect levels of AP. The methanol fraction was able to return the normal hepatic architecture of hepatocytes and scavenge free radicals in 1,1-diphenylpicrylhydrazyl (DPPH) assay. *S. punctata* is endowed with hepatoprotective activity, probably mediated via its antioxidant

activity. Thus, *S. punctata* can be taken as one candidate for development of hepatoprotective agents as it was also showed good safety profile.

**Keywords:** *Satureja punctata*, *Solanecio angulatus*, hepatoprotective, ferric nitrilotriacetate, antioxidant

- 317.** J Dilebo, T Gebre-Mariam, K Asres **Anti-inflammatory Activities of Extracts of Some Traditionally Used Medicinal Plants in Ethiopia on Carrageenan-Induced Mouse Paw Oedema** Ethiopian Pharmaceutical Journal, 2010; 28(1):

**Abstract**

Hydroalcoholic extracts of some traditional medicinal plants used in Ethiopia for the treatment of skin diseases, were investigated for their anti-inflammatory activities in carrageenan-induced mouse paw oedema at doses of 300 mg/kg and 500 mg/kg body weight. The extracts were obtained from the leaves of *Bidens pilosa* L. (Asteraceae), *Malva verticillata* L. (Malvaceae), *Syzygium guineense* DC. (Myrtaceae); and from the rhizomes of *Ferula communis* L. (Apiaceae), and from the aerial part of *Ranunculus multifidus* Forssk (Ranunculaceae). Except for the extract of *F. communis*, all the extracts showed oedema inhibition at both 300 and 500 mg/kg doses. The extract of *R. multifidus* displayed not only the greatest oedema inhibition at 300 mg/kg; it also exhibited better oedema inhibition than the reference drug indomethacin (10 mg/kg) three h after carrageenan injection. The extracts of *B. pilosa*, *M. verticillata* and *S. guineense* also demonstrated time and dose dependent inhibition of oedema. The anti-inflammatory activities of these plants may partially justify the rationale for their traditional use in the treatment of skin diseases.

**Keywords:** hydroalcoholic plant extracts, anti-inflammatory activity, carrageenan, mouse paw oedema inhibition, *Ranunculus multifidus*

- 318.** T Dinku, S Tadesse, K Asres **Antidiabetic Activity of the Leaf Extracts of *Pentascimperia* Subsp. *schimperiana* (A. Rich) Vatke on Alloxan-Induced Diabetic Mice** Ethiopian Pharmaceutical Journal, 2010;28(1):

**Abstract**

*Pentas schimperiana* (A. Rich) Vatke (Rubiaceae) is widely used for the treatment of diabetes mellitus and various other ailments in the traditional medical practices of Ethiopia. This study reports the antidiabetic and free radical scavenging activities of extracts and solvent fractions prepared from the leaves of *P. schimperiana* grown in Ethiopia on alloxan-induced diabetic mice and 2,2-diphenyl-1-picrylhydrazil (DPPH) assay, respectively. A single dose of 500 mg/kg of each of the aqueous dried leaf, hydroalcoholic fresh and dried leaf extracts of *P. schimperiana* did not show significant antidiabetic effect. However, at a dose of 1000 mg/kg, the extracts lowered blood glucose level by 26.97%, 21.90% and 26.70%, respectively. At a dose of 500 mg/kg, the aqueous and methanol fractions prepared from the dried plant material lowered blood glucose level by 23% and 27.2%, respectively, as compared with diabetic untreated mice. Treatment with a known antidiabetic drug glibenclamide (5 mg/kg of body weight) lowered blood glucose by 38%. The antidiabetic activity of the dried plant material was shown to be better than that of the fresh plant material. Both the hydroalcoholic extracts and the methanol fraction of the dried leaves of *P. schimperiana* displayed a very good DPPH scavenging activity with IC<sub>50</sub> values of 7.83 and 8.84 µg/ml, respectively. In this study ascorbic acid showed an IC<sub>50</sub> value of 4.42 µg/ml. Acute toxicity study of the aqueous and the hydroalcoholic extracts of *P. schimperiana* performed on Swiss albino mice indicated that the median lethal dose (LD<sub>50</sub>) of the extract is above 4000 mg/kg. Phytochemical screening carried out on the total leaf extracts of the plant confirmed the presence of flavonoids, saponinns, steroids and tannins. The results of the current study support the traditional use of the plant in the management of diabetes.

**Key words:** *Pentas schimperiana*, antidiabetic activity, alloxan, 2,2-diphenyl-1-picrylhydrazil, free radical scavenging activity

- 319.** Hussien J1, Hymete A, Rohloff J. **Volatile constituents and biological activities of *Pycnostachys abyssinica* and *Pycnostachys eminii* extracts.** Pharm Biol. 2010 Dec;48(12):1384-91. doi: 10.3109/13880209.2010.486406. Epub 2010 Aug 26.

Abstract

**CONTEXT:**

*Pycnostachys abyssinica* Fresen and *Pycnostachys eminii* Gürke (Lamiaceae) are used in traditional Ethiopian medicine against eye and skin infections, "Mitch disease", and dysentery.

**OBJECTIVE:**

Our study was aimed at characterizing essential oil (EO), phytochemical groups, and antimicrobial and anthelmintic activity of extracts to underscore the species' indigenous medicinal use.

**MATERIALS AND METHODS:**

Plant organs of *Pycnostachys* species were subjected to hydrodistillation, and essential oils (EO) analyzed by GC-MS. Phytochemical compounds, antimicrobial (diffusion assay) and anthelmintic activity (bioassay) of gradient solvent extracts of different polarity were studied.

**RESULTS:**

In the stem and root EO of *P. abyssinica*, 25 (99%) and 30 (99.79%) compounds were detected respectively, with estragole (70.4%) (stem) and exo-fenchyl acetate (30.6%) (root) as the most abundant compounds. In leaf, stem and root EO of *P. eminii*, 30 (90.66%), 27 (90.59%) and 27 (99.96%) compounds were detected, respectively, with high levels of  $\beta$ -caryophyllene (from 18.08% to 28.85%) and germacrene D (from 15.1% to 22.06%). Alkaloids, saponins, phytosterols, flavonoids, polyphenols, diterpenoids and carotenoids were detected in *Pycnostachys*. Petroleum ether, chloroform and methanol extracts showed distinct antimicrobial effects with generally higher potential activity of lipophilic and semi-lipophilic fractions. Leaf and root methanol extracts of both species showed lethal activity against earthworms.

**DISCUSSION:**

Identified EO constituents and phytochemical groups underscore the observed antifungal, antibacterial and anthelmintic activity of *Pycnostachys* gradient solvent extracts.

**CONCLUSION:**

EO analysis, phytochemical screening, and antimicrobial and anthelmintic assays indicate the biological potential of *Pycnostachys* species from Ethiopia, and emphasize their pharmacological and indigenous applications.

- 320.** Yitbarek Habtamu , Tadesse Eguale, Alehegne Wubete and Takele Sori **In vitro antimicrobial activity of selected Ethiopian medicinal plants against some bacteria of veterinary importance** African Journal of Microbiology Research Vol. 4 (12), pp. 1230-1234, 18 June, 2010

Due to rapid development of resistance and high cost of the new generation antibiotics, lots of efforts are being made to discover new antimicrobial agents from different sources. In the current study aqueous and hydro-alcoholic extracts of leaves of *Jasminium abyssinicum*, *Myrsine africana*, *Foeniculum vulgare* and aerial part of *Leonotis ocymifolia* were screened for antibacterial activity using agar well diffusion and broth dilution methods. Species of bacteria that cause various diseases in domestic animals namely, *Escherichia coli*, *Pasteurella gallinarum*, *Manhaemia haemolytica*, *Salmonella gallinarum*, *Salmonella typhimurium*, *Staphylococcus aureus* and *Streptococcus agalactae* were used for investigation of antibacterial activity. Except for aqueous extract of *L. ocymifolia*, all of the plant extracts demonstrated remarkable antibacterial activity on most of the bacterial species tested. The three highest zones of inhibition was exhibited by aqueous extracts of *M. africana* against *S. aureus* (19.5 mm), *J. abyssinicum* against *M. haemolytica* (19 mm) and *F. vulgare* against *P. gallinarium* (19 mm). The minimum inhibitory concentration (MIC) exhibited by the plants against test organisms varied from 10 - 1000 µg /ml. However, no plant extract has shown antibacterial effect against *E. coli* using both agar well diffusion and broth dilution methods at concentrations tested. Further detailed in vitro and in vivo evaluation of these medicinal plants should be carried out.

Key words: Medicinal plants, bacterial isolates, antibacterial activities, extract types.

- 321.** Tariku Y, Hymete A, Hailu A, Rohloff J. Constituents, antileishmanial activity and toxicity profile of volatile oil from berries of *Croton macrostachyus*. *Nat Prod Commun.* 2010 Jun;5(6):975-80.

## **Abstract**

The chemical composition of the volatile oil from berries of *Croton macrostachyus* Hochst. ex Del. was determined by GC and GC/MS. The oil was tested for its in vitro antileishmanial activity on two *Leishmania* strains, and its toxicity on the human monocytic leukemia (THP-1) cell line and erythrocytes from sheep blood. The main constituents of the oil were benzyl benzoate (51.8%), linalool (10.1%), gamma-murolene (9.3%), (E,E)-alpha-farnesene (3.2%), delta-cadinene (2.8%) and alpha-curcumene (2.7%). The oil was effective against *L. donovani* and *L. aethiopica* promastigotes (MIC = 0.08 microL/mL and 0.16 microL/mL, respectively) and axenic amastigote stages (EC50 = 20.00 nL/mL and 6.66 nL/mL, respectively). The CC50 value for the oil was 10.00 nL/mL on THP-1 cells with selectivity index values of 0.5 for *L. donovani* and 1.5 for *L. aethiopica*. The median lethal concentration (LC50) of the oil was 2.45 microL/mL. Thus the observed high efficacy and moderate toxicity of the volatile oil from *C. macrostachyus*, makes the plant a promising source of new lead compounds in the search for safe and effective antileishmanial drugs.

- 322.** Hussien J<sup>1</sup>, Hymete A, Rohloff J. Volatile constituents and biological activities of *Pycnostachys abyssinica* and *Pycnostachys eminii* extracts. *Pharm Biol.* 2010 Dec;48(12):1384-91. doi: 10.3109/13880209.2010.486406. Epub 2010 Aug 26.

## **Abstract**

### **CONTEXT:**

*Pycnostachys abyssinica* Fresen and *Pycnostachys eminii* Gürke (Lamiaceae) are used in traditional Ethiopian medicine against eye and skin infections, "Mitch disease", and dysentery.

***OBJECTIVE:***

Our study was aimed at characterizing essential oil (EO), phytochemical groups, and antimicrobial and anthelmintic activity of extracts to underscore the species' indigenous medicinal use.

***MATERIALS AND METHODS:***

Plant organs of *Pycnostachys* species were subjected to hydrodistillation, and essential oils (EO) analyzed by GC-MS. Phytochemical compounds, antimicrobial (diffusion assay) and anthelmintic activity (bioassay) of gradient solvent extracts of different polarity were studied.

***RESULTS:***

In the stem and root EO of *P. abyssinica*, 25 (99%) and 30 (99.79%) compounds were detected respectively, with estragole (70.4%) (stem) and exo-fenchyl acetate (30.6%) (root) as the most abundant compounds. In leaf, stem and root EO of *P. eminii*, 30 (90.66%), 27 (90.59%) and 27 (99.96%) compounds were detected, respectively, with high levels of  $\beta$ -caryophyllene (from 18.08% to 28.85%) and germacrene D (from 15.1% to 22.06%). Alkaloids, saponins, phytosterols, flavonoids, polyphenols, diterpenoids and carotenoids were detected in *Pycnostachys*. Petroleum ether, chloroform and methanol extracts showed distinct antimicrobial effects with generally higher potential activity of lipophilic and semi-lipophilic fractions. Leaf and root methanol extracts of both species showed lethal activity against earthworms.

***DISCUSSION:***

Identified EO constituents and phytochemical groups underscore the observed antifungal, antibacterial and anthelmintic activity of *Pycnostachys* gradient solvent extracts.

**CONCLUSION:**

EO analysis, phytochemical screening, and antimicrobial and anthelmintic assays indicate the biological potential of *Pycnostachys* species from Ethiopia, and emphasize their pharmacological and indigenous applications.

- 323.** Baye H<sup>1</sup>, Hymete A. Lead and cadmium accumulation in medicinal plants collected from environmentally different sites. *Bull Environ Contam Toxicol.* 2010 Feb;84(2):197-201. doi: 10.1007/s00128-009-9916-0. Epub 2009 Dec 4.

**Abstract**

Though use of herbal medicine is increasing dramatically worldwide, environmental pollution especially with heavy metals poses serious problem on quality of medicinal plants and their products. In Ethiopia, where more than 85% of the population relies on traditional medicine, data on heavy metals level of plants is unavailable. The purpose of this study was to assess Pb and Cd in plants grown in different parts of Ethiopia. Out of 26 samples analyzed, four for lead (15.4%; 11.56 +/- 1.07 to 98.19 +/- 1.05 mg/kg) and seventeen for cadmium (65.4%; 0.38 to 1.83 +/- 0.06 mg/kg) were found to contain concentrations above WHO limits (10 mg/kg and 0.3 mg/kg respectively).

- 324.** Tariku Y<sup>1</sup>, Hymete A, Hailu A, Rohloff J. Essential-oil composition, antileishmanial, and toxicity study of *Artemisia abyssinica* and *Satureja punctata* ssp. *punctata* from Ethiopia. *Chem Biodivers.* 2010 Apr;7(4):1009-18. doi: 10.1002/cbdv.200900375.

## Abstract

Essential oils of *Artemisia abyssinica* and *Satureja punctata* ssp. *punctata* from Ethiopia were analyzed by GC and GC/MS, and screened for leishmanicidal activity against promastigote and axenic amastigotes of *Leishmania donovani* and *L. aethiopica*, including toxicity studies on human monocytic leukemia cells (THP-1) and erythrocytes in vitro. GC/MS of *A. abyssinica* oil revealed 67 compounds (99.94%) with the major constituents yomogi alcohol (38.47%), artemisyl acetate (24.88%), and artemisia alcohol (6.70%), and oxygenated monoterpenes (84.00%) as the dominant group. The oil of *S. punctata* contained 67 compounds (99.49%) with the main constituents geranial (27.62%), neral (21.72%), alpha-bisabolol (13.62%), and (E)-nerolidol (4.82%), of which oxygenated mono- and sesquiterpenes (58.39 and 26.91%, resp.) showed highest abundance. Both oils showed effect on promastigotes (MIC 76.5 to 312.5 nl/ml) and amastigotes (EC(50) 4.06 to 131.00 nl/ml) of *L. donovani* and *L. aethiopica*, and varying toxicities on THP-1 cells (CC(50) 0.013 to 350 nl/ml with selectivity index between 0.001 and 28) and erythrocytes (with LC(50) 0.35 to 1.52 microl/ml). *S. punctata* oil exerted highest activity against both *Leishmania* sp. and toxicity. The revealed antileishmanial activities support further isolation and investigation of oil constituents for in vitro/in vivo evaluation.

- 325.** Rangunathan M, Tadesse H, Tujuba R. A cross-sectional study on the perceptions and practices of modern and traditional health practitioners about traditional medicine in Dembia district, north western Ethiopia. *Pharmacogn Mag.* 2010;6(21):19–25. doi: 10.4103/0973-1296.59962.
- 326.** Mesfin, T. and Brook, M. (2010) A Review of Selected Plants Used in the Maintenance of Health and Wellness in Ethiopia. *Ethiopian e-Journal for Research and Innovation Foresight*, 2, 85-102.
- 327.** Etana B. Ethnobotanical study of traditional medicinal plants of Goma Woreda, Jimma zone of Oromia region. Ethiopia: MSc Thesis, Addis Ababa University; 2010.
- 328.** Assefa B, Glatzel G, Buchmann C. Ethnomedicinal uses of *Hagenia abyssinica* (Bruce) J.F. Gmel among rural communities of Ethiopia. *J Ethnobiol Ethnomed.* 2010;6:20

- 329.** Yirga G. Ethnobotanical study of medicinal plants in and around Alamata, southern Tigray, North Ethiopia. *Curr Res J Biol Sci.* 2010;2:338–344.
- 330.** F. Fullas, “Ethiopian medicinal plants in veterinary health care: a mini-review,” *Ethiopian e-Journal for Research and Innovation Foresight*, vol. 2, no. 1, pp. 48–58, 2010.
- 331.** Yigzaw Kebede (2010) How far have we gone in understanding TM in Ethiopia? University of Gonder. *Ethiop. J Health Biomed Sci* 2: 73-74.
- 332.**

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- 334.** Zewdineh Thomas, Mamuye Hadis, Asegid Taye, Yared Mekonnen, and Beyene Petros. **Larvicidal effects of *Jatropha curcas* L. against *Anopheles arabiensis* (Diptera: Culicidae).** Momona Ethiopian Journal of Science. 2011; 3:52-64.

Abstract

Crude and column chromatographic fractions of methanol leaf extract of *Jatropha curcas* were tested for their larvicidal activities against laboratory reared late third instar larvae of *Anopheles Arabiensis*. Crude methanol leaf extract of *J. curcas* had similar larvicidal activity to 0.5 ppm Temephos (positive control) at test concentrations ranging from 125 -1000 ppm while column chromatographic fractions (F1 and F2 ) of the crude methanol leaf extract of *J. curcas* showed similar larvicidal activities to 0.5 ppm Temephos at 62.5 and 125 ppm test concentrations. Column chromatographic fraction three (F3) showed similar larvicidal activity to 0.5 ppm Temephos at 125 ppm test concentration. The LC50 and LC90 values of crude methanol leaf extract of *J. curcas* were found to be 92.09 and 241.09 ppm, respectively. Toxic activities of column chromatographic fraction one (F1) (LC50=28.65 ppm; LC90 = 49.20 ppm) were nearly equal to that of column chromatographic fraction two [F2] (LC50= 30.40 ppm; LC90 = 49.80 ppm). Least toxicity on the test larvae was observed by column chromatographic fraction three [F3] (LC50 = 80.70 ppm; LC90 = 123.70 ppm). Thus, the larvicidal activity of crude methanol leaf extract was not due to the synergistic effects of its fractions. Further studies are recommended to identify larvicidal active ingredients from the active column chromatographic fractions of crude methanol leaf extract of *J. curcas*. Key words: Malaria vector control, *Anopheles arabiensis*, Botanical larvicides *J. curcas*

- 335.** Demissew S. **How has government policy post-Global Strategy for Plant Conservation impacted on science? The Ethiopian perspective.** *Bot J Linn Soc.* 2011; 166(3):310-25.

Abstract

In this paper, existing relevant Ethiopian government biodiversity-related policies and strategies, and mandates of various institutions prior to GSPC targets, are reviewed. Response to whether or

not institutions responded to GSPC targets as the result of new policies or rebranded their work to fit within the context of existing policies and adjust their outcomes to fit into the GSPC targets is provided. The Ethiopian national report of 2009 submitted to the Convention of Biological Diversity Secretariat is reviewed and gaps analysed. The policies of the Federal government (and implementing institutions) post-GSPC so far have had only a limited impact on science, but research institutions have aligned their outputs to fit with the GSPC targets. Suggestions, conclusions and recommendations are made in order to work effectively towards the realization of the GSPC targets beyond 2010 in Ethiopia.

- 336.** Eguale T, Tadesse D, Giday M. ***In-vitro* anthelmintic activity of crude extracts of five medicinal plants against egg-hatching and larval development of *Haemonchus contortus*.** *J Ethnopharmacol.* 2011 Sep 1;137(1):108-13. doi: 10.1016/j.jep.2011.04.063. Epub 2011 May 6.

#### Abstract

**ETHNOPHARMACOLOGICAL RELEVANCE:** *Senna occidentalis*, *Leonotis ocymifolia*, *Leucas martinicensis*, *Rumex abyssinicus*, and *Albizia schimperiana* are traditionally used for treatment of various ailments including helminth infection in Ethiopia.

**MATERIALS AND METHODS:** In vitro egg hatch assay and larval development tests were conducted to determine the possible anthelmintic effects of crude aqueous and hydro-alcoholic extracts of the leaves of *Senna occidentalis*, aerial parts of *Leonotis ocymifolia*, *Leucas martinicensis*, *Rumex abyssinicus*, and stem bark of *Albizia schimperiana* on eggs and larvae of *Haemonchus contortus*.

**RESULTS:** Both aqueous and hydro-alcoholic extracts of *Leucas martinicensis*, *Leonotis ocymifolia* and aqueous extract of *Senna occidentalis* and *Albizia schimperiana* induced complete inhibition of egg hatching at concentration less than or equal to 1mg/ml. Aqueous and hydro-alcoholic extracts of all tested medicinal plants have shown statistically significant and dose dependent egg hatching inhibition. Based on ED(50), the most potent extracts were aqueous and hydro-alcoholic extracts of *Leucas martinicensis* (0.09 mg/ml), aqueous extracts of *Rumex abyssinicus* (0.11 mg/ml) and *Albizia schimperiana* (0.11 mg/ml). Most of the tested plant extracts

have shown remarkable larval development inhibition. Aqueous extracts of *Leonotis ocymifolia*, *Leucas martinicensis*, *Albizia schimperiana* and *Senna occidentalis* induced 100, 99.85, 99.31, and 96.36% inhibition of larval development, respectively; while hydro-alcoholic extracts of *Albizia schimperiana* induced 99.09 inhibition at the highest concentration tested (50mg/ml). Poor inhibition was recorded for hydro-alcoholic extracts of *Senna occidentalis* (9%) and *Leonotis ocymifolia* (37%) at 50mg/ml.

**CONCLUSIONS:** The overall findings of the current study indicated that the evaluated medicinal plants have potential anthelmintic effect and further in vitro and in vivo evaluation is indispensable to make use of these plants.

- 337.** Birhan W, Giday M, Teklehaymanot T. **The contribution of traditional healers' clinics to public health care system in Addis Ababa, Ethiopia: a cross-sectional study.** *J Ethnobiol Ethnomed.* 2011 Dec 2;7:39. doi: 10.1186/1746-4269-7-39.

#### Abstract

**BACKGROUND:** Ethiopian people have been using traditional medicine since time immemorial with 80% of its population dependent on traditional medicines. However, the documentation of traditional healers' clinics contribution to modern public health system in cosmopolitan cities is scanty. Studies conducted so far are limited and focused on the perceptions and practices of modern and traditional health practitioners about traditional medicine. Thus, a cross sectional study was conducted from February to May 2010 to assess the contribution of traditional healers' clinics to public health care system in Addis Ababa.

**MATERIALS AND METHODS:** Ten traditional healers who were willing to participate in the study and 306 patients who were visiting these traditional healers' clinics were interviewed using two types of semi-structured questionnaires. Data were summarized using percentages, tables and bar chart.

**RESULTS:** The diseases mostly treated by traditional healers were wound, inflammation, herpes zoster, hemorrhoids, fracture, paralysis, back-pain, liver diseases, cancer and eczema. This study showed that traditional healers' clinics considerably contribute to public health care in Addis Ababa. Fifty two percent of patients reported that traditional healers' clinics were their first choice when they faced health problems. The reasons for visiting these clinics were 175 (57.2%) efficacy, 109 (35.6%) dissatisfaction with modern medicine, 10 (3.3%) dissatisfaction with modern medicine and efficacy, 6 (2.0%) cost and 6 (2.0%) dissatisfaction and cost. Females (55.2%), young age (20-40 years, 65.0%), never married (56.9%), orthodox (73.9%), Amhara (52.3%), educational status above grade 12 (34.6%) and government employees (29.4%) were frequent visitors. Healers reported that there was no form of cooperation with modern health professionals. The reasons were lack of motivation to collaborate and communicate with modern health service workers. Family based apprenticeship was the sources of knowledge for majority of the healers.

**CONCLUSIONS:** The study conducted showed that for the majority of patients interviewed traditional healers' clinics were one of the options to solve their health problems that indicated the considerable contribution of these clinics to the public health care system in Addis Ababa. Nevertheless, in this study the contribution of traditional healers' clinics to the public health system would have been better shown if individuals who are not users of the traditional healers' clinics were included in the interview. However, the study might be useful as a base line data for future evaluation of the significance of traditional healers' clinics for public health system and the services rendered in these clinics.

- 338.** Taye B, Giday M, Anmut A, Seid J. **Antibacterial activities of selected medicinal plants in traditional treatment of human wounds in Ethiopia.** *Asian Pac J Trop Biomed.* 2011 Oct;1(5):370-5. doi: 10.1016/S2221-1691(11)60082-8.

#### Abstract

**OBJECTIVE:** To evaluate the activity of selected Ethiopian medicinal plants traditionally used for wound treatment against wound-causing bacteria.

**METHODS:** Samples of medicinal plants (*Achyranthes aspera*, *Brucea antidysenterica*, *Datura stramonium*, *Croton macrostachyus*, *Acokanthera schimperi*, *Phytolacca dodecandra*, *Millettia*

*ferruginea*, and *Solanum incanum*) were extracted using absolute methanol and water and tested for their antimicrobial activities against clinical isolates and standard strains of wound-causing bacteria using agar well diffusion and micro titer plate methods.

**RESULTS:** Most of the plant extracts had antibacterial activities, among which *Acokanthera schimperi* and *Brucea antidysenterica* inhibited growth of 100% and 35% of the test organisms, respectively. Methanolic extracts had higher activities compared with their corresponding aqueous extracts. The most susceptible organism to the extracts was *Streptococcus pyogenes* while the most resistant were *Escherichia coli* and *Proteus vulgaris*.

**CONCLUSIONS:** This finding justifies the use of the plants in wound healing and their potential activity against wound-causing bacteria. Their toxicity level and antimicrobial activity with different extraction solvents should further be studied to use them as sources and templates for the synthesis of drugs to control wound and other disease-causing bacteria.

**KEYWORDS:**

Agar well diffusion; Antibacterial activity; Ethiopia; Human wounds; Medicinal plants; Micro titer plate; Plant extracts

- 339.** Melese E, Asres K, Asad M, Engidawork E. **Evaluation of the anti-peptic ulcer activity of the leaf extract of *Plantago lanceolata* L. in rodents.** *Phytother Res.* 2011 Aug;25(8):1174-80. doi: 10.1002/ptr.3411. Epub 2011 Feb 7.

**Abstract**

The effect of the leaf extract of *Plantago lanceolata* L. (Plantaginaceae) on gastric secretion and cytoprotection was evaluated using different models of gastroduodenal ulcer, including acetic acid induced chronic gastric ulcer, indomethacin induced gastric ulcer, cysteamine induced duodenal ulcer and pylorus ligation induced gastric ulcer. The aqueous extract was administered at 200 mg/kg and 400 mg/kg and 140 mg/kg and 280 mg/kg for mice and rats, respectively, and compared with vehicle or the standard, ranitidine (50 or 70 mg/kg) or misopristol (280 µg/kg). In addition, activity of the mucilage (172 mg/kg) was also evaluated in acetic acid induced chronic

gastric ulcer. Administration was done orally except in pylorus ligation, where the intraduodenal route was used. In all cases, higher doses of the extract provided better protection than lower doses and the mucilage, hinting at a dose-dependent effect. Whilst higher doses of the extract showed a better healing of the ulcer as well as protection in indomethacin and pylorus ligation models, activities of lesser magnitude than ranitidine were noted in the cysteamine model. Together these findings indicate that higher doses used in the present study provided an overall better protection against gastroduodenal ulcers than the standard drugs employed through antisecretory and cytoprotective mechanisms.

- 340.** Asamenew G, Bisrat D, Mazumder A, Asres K. ***In-vitro* antimicrobial and antioxidant activities of anthrone and chromone from the latex of *Aloe harlana* Reynolds.** *Phytother Res.* 2011 Dec;25(12):1756-60. doi: 10.1002/ptr.3482. Epub 2011 Mar 31.

#### Abstract

In the search for new antimicrobial and antioxidant compounds from plants, the latex of the medicinal plant *Aloe harlana* Reynolds from Ethiopia was subjected to bioassay-guided fractionation, which led to the isolation of two known compounds, anthrone (aloin) and chromone (7-O-methylaloesin A). The latex and its two constituents were assessed for their possible antimicrobial activities against 23 bacterial and four fungal strains using the disc diffusion method and their antioxidant activity by two complementary test systems, namely 2,2-diphenyl-1-picrylhydrazyl (DPPH) and 2-deoxyribose degradation assay methods. The isolated compounds showed promising results against various pathogenic bacterial and fungal strains in comparison with standard drugs. Moreover, 7-O-methylaloesin A exhibited good activity against multiple drug resistant *Staphylococcus aureus* (NCTC 11994) and *Salmonella typhimurium* (ATCC 1255) with MIC values of 0.72 and 0.18 mm, respectively. Among the fungal strains tested, *Candida albicans* (ATCC 10231) was the most susceptible organism to the latex and the two isolated compounds. The latex and isolated compounds also showed significant activities on both antioxidant assays with the highest activity being observed for 7-O-methylaloesin A, which gave

IC(50) values of 0.026 mm and 0.021 mm for DPPH and 2-deoxyribose degradation assay, respectively. These findings support the traditional uses of the plant for the treatment of various infectious and inflammatory diseases.

- 341.** Tamiru W, Engidawork E, Asres K. **Evaluation of the effects of 80% methanolic leaf extract of *Caylusea abyssinica* (fresen.) fisch. & Mey. on glucose handling in normal, glucose loaded and diabetic rodents.** *BMC Complement Altern Med.* 2012 Sep 11;12:151. doi: 10.1186/1472-6882-12-151.

#### Abstract

**BACKGROUND:** The leaves of *Caylusea abyssinica* (fresen.)Fisch.& Mey. (Resedaceae), a plant widely distributed in East African countries, have been used for management of diabetes mellitus in Ethiopian folklore medicine. However, its use has not been scientifically validated. The present study was undertaken to investigate antidiabetic effects of the hydroalcoholic leaf extract of *C. abyssinica* extract in rodents.

**MATERIALS AND METHOD:** Male Animals were randomly divided into five groups for each diabetic, normoglycemic and oral glucose tolerance test (OGTT) studies. Group 1 served as controls and administered 2% Tween-80 in distilled water, (TW80); Group 2 received 5 mg/kg glibenclamide (GL5); Groups 3, 4 and 5 were given 100 (CA100), 200 (CA200) and 300 (CA300) mg/kg, respectively, of the hydroalcoholic extract of *C. abyssinica*. Blood samples were then collected at different time points to determine blood glucose levels (BGL). Data were analyzed using one way ANOVA followed by Dunnet's post hoc test and  $p < 0.05$  was considered as statistically significant.

**RESULTS:** In normal mice, CA200 and GL5 induced hypoglycemia starting from the 2nd h but the hypoglycemic effect of CA300 was delayed and appeared at the 4th h ( $p < 0.05$  in all cases). In diabetic mice, BGL was significantly reduced by CA100 ( $p < 0.05$ ) and CA300 ( $p < 0.01$ ) starting from the 3rd h, whereas CA200 ( $p < 0.001$ ) and GL5 ( $p < 0.05$ ) attained this effect as early as the 2nd h. In OGTT, TW80 ( $p < 0.01$ ) and CA100 ( $p < 0.01$ ) brought down BGL significantly

at 120 min, while CA200 ( $p < 0.001$ ) and GL5 ( $p < 0.001$ ) achieved this effect at 60 min indicating the oral glucose load improving activity of the extract. By contrast, CA300 was observed to have no effect on OGTT. Acute toxicity study revealed the safety of the extract even at a dose of 2000 mg/kg. Preliminary phytochemical study demonstrated the presence of various secondary metabolites, including, among others, saponins, flavonoids and alkaloids.

**CONCLUSION:** The results indicate that *C. abyssinica* is endowed with antidiabetic and oral glucose tolerance improving actions, particularly at the dose of 200 mg/kg in experimental animals. These activities of the plant extract may be related to the presence of secondary metabolites implicated in antidiabetic activities of plant extracts via different hepatic and extra-hepatic mechanisms. These results thus support the traditional use of the leaf extract for the management of diabetes mellitus.

- 342.** Woldesellassie Mequanint, Eyasu Makonnen, Kelbessa Urga. **In vivo anti-inflammatory activities of leaf extracts of *Ocimum lamiifolium* in mice model.** *J Ethnopharmacol.* 2011 Mar 8;134(1):32-6. doi: 10.1016/j.jep.2010.11.051. Epub 2010 Dec 1.

Abstract

**AIM OF THE STUDY:** *Ocimum lamiifolium* Hochst.ex Benth. (Lamiaceae) has been used in Ethiopian traditional medicine for the treatment of different inflammatory disorders such as oropharyngitis, wound, pain, fever, and others. However, its use has mainly been based on empirical findings. Thus the objective of this study was therefore to evaluate the antiinflammatory effects and acute oral toxicities of the leaf extracts of *Ocimum lamiifolium* in mice.

**MATERIALS AND METHODS:** Aqueous and ethanol crude extracts were screened for their antiinflammatory activities in mice using carrageenin induced paw edema. And then the aqueous extract, the most active extract, was further fractionated and the fractions were tested for their anti-inflammatory activities using carrageenin, histamine and serotonin induced mice paw edema.

Distilled water and aspirin were employed as negative and positive controls, respectively. Acute oral toxicity of both extracts and fractions were also determined after giving graded doses.

**RESULTS:** The aqueous and ethanol extracts were able to reduce inflammation significantly, but greater anti-inflammatory activity was observed for the aqueous extract at all dose levels. Of all fractions the water residue showed highly significant anti-inflammatory activity.

**CONCLUSIONS:** *Ocimum lamiifolium* leaf extracts exhibited significant anti-inflammatory activities with less acute toxicity.

**343.** Umer S, Asres K, Veeresham C. **Hepatoprotective activities of two Ethiopian medicinal plants.** *Pharm Biol.* 2010 Apr;48(4):461-8. doi: 10.3109/13880200903173593.

#### Abstract

The present study evaluated the in vivo hepatoprotective activity of two medicinal plants, namely, *Justicia schimperiana* (Hochst. ex Nees) (Acanthaceae) and *Verbascum sinaiticum* Benth. (Scrophulariaceae) used in Ethiopian traditional medical practices for the treatment of liver diseases. The levels of hepatic marker enzymes, alanine aminotransferase (ALT), aspartate aminotransferase (AST) and alkaline phosphatase (ALP) were used to assess their hepatoprotective activity against carbon tetrachloride (CCl<sub>4</sub>)-induced hepatotoxicity in Swiss albino mice. The results revealed that pretreating mice with the hydro-alcoholic extracts of both plants significantly suppressed the plasma AST ((P < 0.01) *J. schimperiana*; (P < 0.05) *V. Sinaiticum*) and ALT ((P < 0.05) *J. schimperiana*) activity when compared with the CCl<sub>4</sub> intoxicated control. Among the Soxhlet extracts of each of the plants, the methanol extract of *J. schimperiana* showed significant hepatoprotective activity. Further fractionation of this extract using solid phase extraction and testing them for bioactivity indicated that the fractions did not significantly reverse liver toxicity caused by CCl<sub>4</sub>. However, the percentage hepatoprotection of the distilled water fraction was comparable with that of the standard drug silymarin at the same dose (50 mg/kg) as evidenced by biochemical parameters. Histopathological studies also supported these results. In vitro DPPH assay conducted on the water fraction of *J. schimperiana* and the Soxhlet methanol fraction of *V. sinaiticum* showed that they possess moderate radical scavenging activity (IC<sub>50</sub> = 51.2 and 41.7

microg/mL, respectively) which led to the conclusion that the hepatoprotective activity of the plants could be in part through their antioxidant action.

- 344.** S Tadesse, B Messele, A Seyoum, A Mazumder, F Bucar, K Asres **Essential Oil of *Otostegia integrifolia* Benth: Composition, Antimicrobial and Antioxidant Activities** Ethiopian Pharmaceutical Journal, 2011;29(2):

**Abstract**

Composition, antioxidant and antimicrobial activities of the essential oil of *Otostegia integrifolia* Benth. were studied. GC/MS analyses revealed the presence of 37 constituents representing 84.88% of the oil with  $\alpha$ -pinene (31.33%), 1-octen-3-ol (11.78%) and *trans*-caryophyllene (11.35%) constituting more than 50% of its components. When tested for its antioxidant activity using 2,2-diphenyl-1-picrylhydrazyl (DPPH), the oil reduced DPPH in a concentration dependent manner with an EC<sub>50</sub> value of 5.32  $\mu$ l/ml. Similarly, the oil was shown to possess strong and broad spectrum antimicrobial activity against several Gram-positive and Gram-negative bacterial strains as well as fungal pathogens. The minimum inhibitory concentration (MIC) of the oil ranged from 5 to 100  $\mu$ g/ml and 50 to 100  $\mu$ g/ml against the bacterial and fungal strains tested, respectively. The oil (MIC=5  $\mu$ g/ml) was found to be more potent than ciprofloxacin (MIC=10  $\mu$ g/ml) against some *E. coli* strains. The antifungal activity of the oil was either comparable to or better than griseofulvin against most of the fungal pathogens tested. The study provides evidence for an excellent broad spectrum antimicrobial and significant antioxidant activity of *O. integrifolia* essential oil, a possible explanation for the traditional use of the plant.

**Keywords:** essential oil, *Otostegia integrifolia*,  $\alpha$ -pinene, 2,2-diphenyl-1-picrylhydrazyl, antimicrobial activity

- 345.** B Paulos, D Bisrat, T Gedif, K Asres **Antimalarial and Antioxidant Activities of the Leaf Exudate and a Naphthalene Derivative from *Aloe otallensis* Baker** Ethiopian Pharmaceutical Journal, 2011; 29(2):

**Abstract**

*Aloe otallensis* Baker is endemic to Ethiopia where its leaf exudate is traditionally used in the southern part of the country for the treatment of malaria. The methanol-soluble portion of the leaf exudate which was subjected to preparative thin layer chromatography (PTLC) over silica gel led

to the isolation of a naphthalene derivative identified as 2,8-O,O-di( $\beta$ -D-gluco-pyranosyl)-1,2,8-trihydroxy-3-methylnaphtalene (plicataloside). The exudate and plicataloside were evaluated for their *in vivo* antimalarial activity using a 4- day *Plasmodium berghei* suppressive test method, and their *in vitro* antioxidant potential assessed by 2,2- diphenyl-1-picrylhydrazyl (DPPH) assay. The exudate (300 mg/kg) and plicataloside (100 mg/kg) inhibited parasite growth by 60.7% and 40.7%, respectively. They also exhibited comparable radical scavenging activity with an IC<sub>50</sub> value of about 26  $\mu$ g/ml. It was proposed that plicataloside may minimize oxidative stress thereby contributing to the antimalarial activity of the plant. The findings support the traditional use of *A. otallensis* in the treatment of malaria.

**Keywords:** Aloe otallensis; exudate, 2,8-O,O-di( $\beta$ -D-gluco-pyranosyl)-1,2,8-trihydroxy-3-methylnaphtalene antimalarial, antioxidant

**346.** T Feyera, G Terefe, W Shibeshi **Phytochemical Screening and *In Vitro* Antitrypanosomal Activity of the Aerial Parts of *Artemisia abyssinica* Against *Trypanosoma congolense* Field Isolate** Ethiopian Pharmaceutical Journal, 2011; 29(2):

### **Abstract**

African trypanosomiasis is a major public health problem having serious economic implications affecting both human and agricultural development. The present work dealt with phytochemical screening and *in vitro* antitrypanosomal activity testing of the hydromethanolic and dichloromethane (DCM) extracts of the aerial parts of *Artemisia abyssinica* Sch.Bip. ex A.Rich. against *Trypanosoma congolense* field isolate. The *in vitro* assay was conducted by incubating a mixture of infected blood and extracts at concentrations of 4, 2 and 0.4 mg/ml coupled with infectivity test in which a mixture of infected blood was inoculated to healthy mice. Phytochemical screening showed the presence of alkaloids, flavonoids, tannins, polyphenols, and cardiac glycosides in the hydromethanolic extract, and terpenoids, polyphenols and phytosteroids in the DCM extract. The result evidenced that the DCM extract had immobilized trypanosomes after 18 and 40 min of incubation at 4 and 2 mg/ml, respectively, while the hydromethanolic extract ceased the motility of the parasites after 35 min only at a concentration of 4 mg/ml. In the infectivity test, only 4 mg/ml of the DCM extract caused loss of infectivity of the parasites to mice. In conclusion,

the result obtained from this preliminary investigation renders the plant to be a potential candidate for development of new lead against African trypanosomiasis.

**Keywords:** *Artemisia abyssinica*, phytochemical screening, in vitro antitrypanosomal activity, *Trypanosoma congolense*, crude extracts

**347.** E Hailu, E Engidawork, K Asres **The Essential Oil of *Myrtus communis* L. Produces a Non-Sedating Anxiolytic Effect in Mice Models of Anxiety** *Ethiopian Pharmaceutical Journal*, 2014; 29(1):

**Abstract**

The myrtle shrub (*Myrtus communis* L., Myrtaceae) is rich in essential oils used in Ethiopian traditional medicine for the treatment of a variety of ailments, including anxiety. Anxiety is a common disorder that attacks many people in society and often accompanied by physiological sensations such as tachycardia, chest pain, shortness of breath, and insensitivity. The present study was undertaken to evaluate the anxiolytic effect of the essential oil of *M. communis* using different models of anxiety. Swiss Albino mice of either sex were randomly divided into six groups. Tween 80 (5%, v/v) in distilled water was administered to Group I and served as control. Group II was given diazepam (0.5 mg/kg, orally) suspended in Tween 80 and served as standard. Group III-VI were given the essential oil at doses of 50, 100, 200 and 400 mg/kg, respectively. Animals were then subjected to different anxiety tests, including elevated plus maze (EPM), stair case and open field. Parameters, among others, percentage of time spent in each arm and arm entries, number of steps climbed and number of rears, and number of crossings were then measured. Data were presented as mean  $\pm$  SEM and analyzed by ANOVA followed by Tuckey posthoc test. In EPM studies, the essential oil at both 100 mg/kg ( $p < 0.01$ ) and 200 mg/kg ( $p < 0.05$ ), as well as diazepam ( $p < 0.01$ ) produced a significant increase in percentage of open arm time compared to controls. In the staircase setting, rearing was significantly decreased with 100 mg/kg ( $p < 0.01$ ) and 200 mg/kg ( $p < 0.05$ ) of the oil, and diazepam ( $p < 0.05$ ) relative to controls. However, at doses of 50 mg/kg and 400 mg/kg no detectable changes were noted on the measured parameters in both EPM and stair case models. The total number of entries into open field was comparable in all groups. At a dose of 100 mg/kg, the essential oil of *M. communis* showed better anxiolytic activity than the standard

drug. The possible mechanism by which the oil showed the activity could be through GABA-related mechanisms. The present work, therefore, holds up the traditional use of the plant for the treatment of anxiety.

**Keywords:** *Myrtus communis*, essential oil, anxiety, elevated plus maze, stair case, open field

348. T Guji, T Gedif, T Gebre-Mariam **Ethnopharmaceutical Study of Medicinal Plants of Metekel Zone, Benishangul-Gumuz Regional State, Mid-West Ethiopia** Ethiopian Pharmaceutical Journal, 2011;29(1):

**Abstract**

Traditional medicine (TM) has been an important source of healthcare in Ethiopia, as in most developing countries around the world, and the TM practice is mainly based on medicinal plants. This cross-sectional, community-based survey was aimed at documenting the knowledge associated with the use of medicinal plants in the Benishangul-Gumuz Region. Six hundred households (HHs) were interviewed using semistructured questionnaires and six focused group discussions (FGDs) were conducted. Prevalence of illness episodes was 5.2%, in two weeks recall period and the overall action taken for the perceived illness was 95.7%; out of which 41.6% used TM. TM was a more frequent choice of care for females than males and for the Gumuz people than the other ethnic groups. Low cost, efficacy and geographical accessibility were the reasons for choosing TM. Fifty-one plant species belonging to 29 families were reported, each with local and scientific names, parts used, and methods of preparation and administration. Malaria and headache, and respiratory complaints have the highest informant consensus factor (ICF) values. The major proportion of plants was collected from wild sources and leaf and root parts were commonly used. The formulations were made in the form of liquids, raw herbs and pastes in order of frequency. The dominant route of administration was oral, followed by topical application. This study demonstrated that TM is still an important component of the public healthcare in the study community.

**Keywords:** ethnopharmacy, medicinal plants, traditional medicine, house-hold, focus group discussion

- 349.** Nasir Tajure Wabe, Mohammed Adem Mohammed, Nandikola Jaya Raju. **An ethnobotanical survey of medicinal plants in the Southeast Ethiopia used in traditional medicine** Spatula DD. 2011; 1(3): 153-158  
doi: 10.5455/spatula.20110921101924

**Abstract**

**BACKGROUND:** Medicinal plants are integral source of easily available remedy used in rural healthcare system. The aim of the study was to document available medicinal plants, methods of preparation and major uses in Southeast Ethiopia.

**METHODS:** An ethnobotanical survey was conducted in Bale Zone, Southeastern Ethiopia. A structured questionnaire was used to collect the specimens and record pertinent information on their use.

**RESULT:** Several medicinal plants recognized for the treatment of various diseases were collected. The leaf parts were widely used, followed by roots and stems. Some plants (31.0%) needed other ingredients either for taste preference or as a portion of medicine. Ten (25.0%) of the collected species consisted of more than one part of the plant parts as a source of medicine, while 29(79.5%) of them had a single part for use. The common method of preparation was decoction (39.0%) and vegetable drug constituted (37.0%). The major uses of the medicinal plants ranged from pain killer to malaria and cancer treatment.

**CONCLUSSION:** Rural communities in Bale Zone are a rich source of medicinal plants as revealed in this study. However, there is need to scientifically ascertain the authenticity of the claimed use these plants.

**Key words:** Ethnobotany, Medicinal plant, Traditional medicine, Bale Zone, Ethiopia

- 350.** Jemal Hussien, Chalachew Teshale and Jemal Mohammed, 2011. **Assessment of the Antimicrobial Effects of Some Ethiopian Aromatic Spice and Herb Hydrosols.** *International Journal of Pharmacology*, 7: 635-640.

**ABSTRACT**

The objective of the present study was to evaluate the **in vitro** antimicrobial effects of the hydrosols of basil (*O. basilicum*), thyme (*T. schimperi*), cardamon (*E. cardamom*), cinnamon (*C.*

Zeylanicum), mustard (*B. nigra*) and clove (*S. aromaticum*) against *S. aureus*, *E. coli*, *S. typhi*, *P. aeruginosa* and *Candida albicans*. Hydrosols were obtained from the selected plant species after hydro distillation using Clevenger type apparatus. The antimicrobial effects of the hydrosols were determined by measuring the zone of microbial growth on agar plates treated with hydrosol and control agar (hydrosol untreated agar) plates and then the percentage of **growth inhibition** was determined. Accordingly, the percent inhibition of the hydrosols were found to range from 20 to 100% (against *S. aureus*,  $p = 0.005$ ), 10 to 100% (against *E. coli*,  $p = 0.005$ ), 0 to 35% (against *P. aeruginosa*,  $p = 0.069$ ) and 15 to 100% *S. typhi*,  $p = 0.00$ ). Complete (100%) **growth inhibition** was demonstrated at 15% hydrosol concentration of cardamom and thyme (against *E. coli*), cardamom and cinnamon (against *S. aureus*) and cardamom, thyme and cinnamon (against *S. typhi*). *Candida albicans* were inactive to the test hydrosols. From this study, it can be concluded that the hydrosols of basil, cardamom, clove, cinnamon and thyme were effective to elicit inhibitory effect against *S. typhi*, *S. aureus* and *E. coli*. Further study is recommended to verify the activity of the plant hydrosols against wide range of microbial strains, characterize the chemical constituents of the hydrosols and see if the biological property can be correlated to the constituents.

351. Belay G, Tariku Y, Kebede T, et al. (2011). Ethnopharmacological investigations of essential oils isolated from five Ethiopian medicinal plants against eleven pathogenic bacterial strains. *Phytopharmacology* 1:133–43
352. Bussmann RW, Swartzinsky P, Worede A, Evangelista P. (2011). Plant use in Odo-Bulu and Demaro, Bale region, Ethiopia. *J Ethnobiol Ethnomed* 7:28
353. Getachew, B., Yinebeb, T., Tadesse, K., Ariaya, H. and Yalemtehay, M. (2011) Ethnopharmacological Investigations of Essential Oils Isolated from Five Ethiopian Medicinal Plants against Eleven Pathogenic Bacterial Strains. *Phytopharmacology*, 1, 133-143.
354. Tariku, Y., Hymete, A., Hailu, A. and Rohloff, J. (2011) In Vitro Evaluation of Antileishmanial Activity and Toxicity of Essential Oils of *Artemisia absinthium* and

Echinops kebericho. Chemistry & Biodiversity, 8, 614-623.  
<http://dx.doi.org/10.1002/cbdv.201000331>

- 355.** Jemal, H., Kaba, U., Fayissa, R., Awol, J., Sultan, A. and Nazif, H. (2011) Antihelmentic Effects of the Essential Oil Extracts of Selected Medicinal Plants against *Haemonchus contortus*. International Journal of Agricultural Research, 6, 290-298.  
<http://dx.doi.org/10.3923/ijar.2011.290.298>
- 356.** B. Taye, M. Giday, A. Animut, and J. Seid, “Antibacterial activities of selected medicinal plants in traditional treatment of human wounds in Ethiopia,” Asian Pacific Journal of Tropical Biomedicine, vol. 1, no. 5, pp. 370–375, 2011
- 357.** Bussmann WR, Swartzinsky P, Worede A, Evangelista P. Plant use in Odo-Bulu and Demaro, Bale region Ethiopia. J Ethnobiol Ethnomed. 2011;7:28.
- 358.** Tariku Y, Hymete A, Hailu A, Rohloff J In vitro evaluation of antileishmanial activity and toxicity of essential oils of *Artemisia absinthium* and *Echinops kebericho*. Chem Biodivers. 2011 Apr;8(4):614-23. doi: 10.1002/cbdv.201000331.

### **Abstract**

Potential toxicity, costs, and drug-resistant pathogens necessitate the development of new antileishmanial agents. Medicinal and aromatic plants constitute a major source of natural organic compounds. In this study, essential oils of *Artemisia absinthium* L. and *Echinops kebericho* Mesfin were investigated by GC and GC/MS analyses. Isolated oils were screened for antileishmanial activity against two *Leishmania* strains (*L. aethiopica* and *L. donovani*), and toxicity on the human monocytic leukemia (THP-1) cell line and red blood cells in vitro. GC/MS Analysis revealed 65 compounds (93.74%) for *Artemisia absinthium* and 43 compounds (92.85%) for *Echinops kebericho* oil. The oils contained the oxygenated monoterpene camphor (27.40%) and the sesquiterpene lactone dehydrocostus lactone (41.83%) as major constituents, respectively. Both oils showed activity against promastigote (MIC 0.0097-0.1565 µl/ml) and axenic amastigote forms (EC(50) 0.24-42.00 nl/ml) of both *leishmania* species. Weak hemolytic effect was observed for both oils,

showing a slightly decreased selectivity index (SI 0.8-19.2) against the THP-1 cell line. Among the two oils tested, E. kebericho exerted strong antileishmanial activity that was even higher than that of amphotericin B with significant cytotoxicity. This study, therefore, demonstrated the potential use of both oils as source of novel agents for the treatment of leishmaniasis.

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- 361.** Shimelis ND, Asticcioli S, Baraldo M, Tirillini B, Lulekal E, Murgia V. **Researching accessible and affordable treatment for common dermatological problems in developing countries. An Ethiopian experience.** *Int J Dermatol.* 2012 Jul;51(7):790-5. doi: 10.1111/j.1365-4632.2011.05235.x.

Abstract

**BACKGROUND:** Skin diseases are very common in rural and urban areas of Ethiopia, and traditional preparations of plant origin might represent the only alternative to synthetic drugs. Improving knowledge of traditional medicines and assessing their safety and effectiveness is necessary.

**METHODS:** We conducted a two-arm, randomized, double-blind, placebo-controlled trial assessing the efficacy of some cosmetic herbal preparations for common dermatologic problems: a 3% thyme essential oil antifungal cream and a 10% chamomile extract cream for eczema-like lesions.

**RESULTS:** Ten subjects (66.5%) treated with the 3% thyme active cream were completely healed vs. four subjects (28.5%) from the placebo group ( $P=0.040$ ). A large number of subjects treated with the chamomile cream were healed or improved, but no significant differences were found between active cream and placebo. A high rate of treatment acceptance was registered in both groups, no adverse effects were reported.

**CONCLUSIONS:** A 3% thyme essential oil cream could represent a cheap and easily available opportunity to treat and heal mild to moderate cases of fungal infections; a common emollient cream could be a very effective intervention when treating mild to moderate cases of pityriasis alba and eczema-like lesions. Further research is needed.

- 362.** Karunamoorthi K, Tsehaye E. **Ethnomedicinal knowledge, belief and self-reported practice of local inhabitants on traditional antimalarial plants and**

**phytotherapy.J** *Ethnopharmacol.* 2012 May 7;141(1):143-50. doi: 10.1016/j.jep.2012.02.012. Epub 2012 Feb 16.

#### Abstract

**ETHNOPHARMACOLOGICAL RELEVANCE:** This paper reveals the trend of knowledge and practice of traditional antimalarial plants (TAPs) to prevent/treat malaria.

**MATERIALS AND METHODS:** Stratified, systematic random sampling was adopted. The ethnomedicinal survey was conducted between January and March 2011 by involving the selected 371 household members on knowledge and practice of TAPs by administering a pre-tested questionnaire.

**RESULTS:** Overall, 54.4% respondents had adequate awareness and usage custom of TAPs and 16 types of plant have been most commonly known and employed by the respondents to prevent/treat malaria. Leaves (57.2%) were most commonly used plant part to prepare traditional antimalarial phytotherapy remedies. Decoction was one of the most commonly used methods to administer TAPs. The chi-square test result revealed that a significant association is found between the usage custom of traditional antimalarial plants and gender (P-value=0.0282), age (P-value=0.0024), educational status (P-value=0.0295), and monthly income (P-value=0.0001), although not with the ethnicity (P-value=0.7933) of the respondents.

**CONCLUSION:** TAPs usage is an integral part of the tradition and custom of the Ethiopians. However, nearly half of the respondents have had lack of awareness about TAPs and majority of them are reluctant in exercising either due to its ineffectiveness or its bitter taste. Therefore, further laboratory-based research is extremely imperative to identify their antiplasmodial activity and bioactive molecules which could pave the way to formulate the novel affordable as well as accessible potent antimalarials in the near future.

- 363.** Fikru A, Makonnen E, Eguale T, Debella A, Abie Mekonnen G. **Evaluation of *in-vivo* wound healing activity of methanol extract of *Achyranthes aspera*L.** *J Ethnopharmacol.* 2012 Sep 28;143(2):469-74. doi: 10.1016/j.jep.2012.06.049. Epub 2012 Jul 6.

## Abstract

**ETHNOPHARMACOLOGICAL RELEVANCE:** The leaves of *Achyranthes aspera* L. (Amaranthaceae) has been used traditionally for the treatment of wound in various parts of Ethiopia. However, the plant has not been explored scientifically for its wound healing activity. Therefore, this study was designed to investigate the wound healing activity of methanol extract of *Achyranthes aspera* L. leaves in rats.

**MATERIALS AND METHODS:** Incision and excision wounds were inflicted on albino rats of either sex, under diethyl ether anesthesia. Group I served as positive control and was treated with 1% silver sulphadiazine, group II, III, IV treated with simple ointment containing 2.5%, 5% and 10% (w/w) methanol extract of the leaves of *Achyranthes aspera* L., respectively, whereas group V served as negative control and was treated with simple ointment. All the animals were treated topically once a day. Wound healing potential was assessed with excision and incision wound model. Excision wound model was used to assess the change in percentage contraction of wound, epithelization time, DNA content and histological features whereas rats inflicted with the incision wounds were used to determine breaking strength.

**RESULTS:** Based on the results of percentage wound contraction, the DNA content and epithelization time, all groups of rats treated with methanol extract of the leaves of *Achyranthes aspera* L. showed significant ( $p < 0.05$ ) wound healing activity compared to group of rats treated with simple ointment (negative control) group. The difference in breaking strength was, however, significant ( $p < 0.05$ ) only for the 5% and 10% methanol extract of *Achyranthes aspera* (w/w) ointment treated groups. Histological evaluation showed well organized epidermal layer, increased number of fibrocytes, remarkable degree of neovascularization and epithelization which was comparable to the standard on the 21st day after treatment; especially in the 5% and 10% (w/w) extract treated group.

**CONCLUSION:** The present study provides a scientific rationale for the traditional use of the leaf extracts of *Achyranthes aspera* L. in the treatment of wound.

- 364.** Belayneh A, Asfaw Z, Demissew S, Bussa NF. **Medicinal plants potential and use by pastoral and agro-pastoral communities in Erer Valley of Babile Wereda, Eastern Ethiopia.** *J Ethnobiol Ethnomed.* 2012 Oct 22;8:42. doi: 10.1186/1746-4269-8-42.

Abstract

**BACKGROUND:** Ethiopian plants have shown remarkably effective medicinal values for many human and livestock ailments. Some research results are found on medicinal plants of the south, south west, central, north and north western parts of Ethiopia. However, there is lack of data that quantitatively assesses the resource potential and the indigenous knowledge on use and management of medicinal plants in eastern Ethiopia. The main thrust of the present ethnobotanical study centres around the potential and use of traditional medicinal plants by pastoral and agro-pastoral communities in Babile Wereda (district) of eastern Ethiopia. The results can be used for setting up of conservation priorities, preservation of local biocultural knowledge with sustainable use and development of the resource.

**MATERIALS AND METHODS:** Fifty systematically selected informants including fifteen traditional herbalists (as key informants) participated in the study. Semi-structured interviews, discussions and guided field walk constituted the main data collection methods. Techniques of preference ranking, factor of informant consensus and Spearman rank correlation test were employed in data analysis. Medicinal plant specimens were collected, identified and kept at the National Herbarium (ETH) of Addis Ababa University and Haramaya University Herbarium.

**RESULTS:** Fifty-one traditional medicinal plant species in 39 genera and 28 families were recorded, constituting 37% shrubs, 29% trees, 26% herbs, 6% climbers and 2% root parasites. Leaves contributed to 35.3% of the preparations, roots (18.8%) and lower proportions for other parts. Formulations recorded added to 133 remedies for 54 human ailments, in addition to some used in vector control. The majority of remedies were the juice of single species, mixtures being generally infrequent. *Aloe pirottae*, *Azadirachta indica* and *Hydnora johannis* were the most cited and preferred species. *Aloe pirottae*, a species endemic to Ethiopia, is valued as a remedy for malaria, tropical ulcer, gastro-intestinal parasites, gallstone, eye diseases and snake bite. The jel extracted from dried and ground plant material, called SIBRI (Oromo language), was acclaimed

as a cleaner of the human colon. Concoction made from leaf, seed and flower of *Azadirachta indica* was given for treatment of malaria, fungal infections and intestinal worms. Root preparations from *Hydnora johannis* were prescribed as remedy for diarrhoea, haemorrhage, wound and painful body swelling, locally called GOFLA (Oromo language).

**CONCLUSIONS:** The study documented many well known and effective medicinal species of relevance for human healthcare, including for the treatment of malaria which is rampant in the area as it is in many parts of Ethiopia. This underscores the importance of the traditional medicinal plants for the people living in the area and the potential of the resource for development. Consequently, the study area deserves urgent conservation priority coupled with mechanisms for the protection of the associated indigenous medical lore as well as development and effective use of the medicinal plant resource.

- 365.** Raja Nagappan **Evaluation of aqueous and ethanol extract of bioactive medicinal plant, *Cassia didymobotrya* (Fresenius) Irwin & Barneby against immature stages of filarial vector, *Culex quinquefasciatus* Say (Diptera: Culicidae)**  
Asian Pac J Trop Biomed 2012; 2(9): 707-711

#### ABSTRACT

**Objective:** To evaluate aqueous and ethanol extract of *Cassia didymobotrya* leaves against immature stages of *Culex quinquefasciatus*. **Methods:** The mortality rate of immature mosquitoes was tested in wide and narrow range concentration of the plant extract based on WHO standard protocol. The wide range concentration tested in the present study was 10 000, 1 000, 100, 10 and 1 mg/L and narrow range concentration was 50, 100, 150, 200 and 250 mg/L. **Results:** 2nd instar larvae exposed to 100 mg/L and above concentration of ethanol extract showed 100% mortality. Remaining stages such as 3rd, 4th and pupa, 100% mortality was observed at 1 000 mg/L and above concentration after 24 h exposure period. In aqueous extract all the stages 100% mortality was recorded at 1 000 mg/L and above concentration. In narrow range concentration 2nd instar larvae 100% mortality was observed at 150 mg/L and above concentration of ethanol extract. The remaining stages 100% mortality was recorded at 250 mg/L. In aqueous extract all the tested immature stages 100% mortality was observed at 250 mg/L concentration after 24 h exposure

period. The results clearly indicate that the rate of mortality was based dose of the plant extract and stage of the mosquitoes. Conclusions: From this study it is confirmed and concluded that *Cassia didymobotrya* is having active principle which is responsible for controlling *Culex quinquefasciatus*. The isolation of bioactive molecules and development of simple formulation technique is important for large scale implementation

- 366.** Mebrahtom Gebrelibanos\*1 , Ciddi Veeresham 2 and Kaleab Asres 3  
**PRELIMINARY PHYTOCHEMICAL AND ANTIBACTERIAL SCREENING ON EXTRACTS OF THE AERIAL PARTS OF GALIUM SPURIUM (SUBSPECIES-AFRICANUM)** IJPSR, 2012; Vol. 3(8): 2712-2715

#### ABSTRACT

The common usage of *Galium* spp. in the Ethiopian traditional medicine, as described in few documentations, are generally related to diseases associated with the nervous system, the immune system, infections and inflammation. Preliminary phytochemical and antimicrobial screening on extracts of the aerial parts of *Galium spurium* (subspecies africanum) was done in order to partly rationalize some of the claimed traditional uses of the plant. Results of the preliminary antimicrobial screening on extracts of *G. spurium* showed only weak antibacterial activity. The preliminary phytochemical screening revealed the presence of flavonoids and phenolics compounds. As phenolics and flavonoids are known to display multiple health benefits, the claimed traditional uses of the plant could be justified more through the possible pharmacological effects of these components than its weak antibacterial activities.

- 367.** Kalayou S, Haileselassie M, Gebre-Egziabher G, Tiku'e T, Sahle S, Taddele H, Ghezu M. ***In-vitro* antimicrobial activity screening of some ethnoveterinary medicinal plants traditionally used against mastitis, wound and gastrointestinal tract complication in Tigray Region, Ethiopia.** *Asian Pac J Trop Biomed.* 2012 Jul;2(7):516-22. doi: 10.1016/S2221-1691(12)60088-4.

#### Abstract

**OBJECTIVE:** To screen the antibacterial activity of nine ethnoveterinary plants traditionally used for the treatment of mastitis, wound and gastrointestinal complications.

**METHODS:** Hydroalcoholic extracts of medicinal plants namely, *Achyranthes aspera* (A. aspera) L. (Family Asparagaceae), *Ficus caria* (F. caria) (Family Moraceae), *Malvi parviflora* (M. parviflora) (Family Malvaceae), Vernonia species (V. species) (local name Alakit, Family Asteraceae), *Solanum hastifolium* (S. hastifolium) (Family Solanaceae), *Calpurinia aurea* (C. aurea) (Ait) Benth (Family Fabaceae), *Nicotiana tabacum* (N. tabacum) L. (Family Solanaceae), *Ziziphus spina-christi* (Z. spina-christi) (Family Rhamnaceae), *Croton macrostachys* (C. macrostachys) (Family Euphorbiaceae), were screened against clinical bacterial isolates of veterinary importance from October 2007 to April 2009. The antibacterial activity was tested using disc diffusion at two concentrations (200 mg/mL and 100 mg/mL) and broth dilution methods using 70% methanol macerated leaf extracts.

**RESULTS:** With the exception of *S. hastifolium* all plant extracts exhibited antibacterial activity. Among the medicinal plants tested *C. aurea*, *C. macrostachys*, *A. aspera*, *N. tabacum* and vernonia species (Alakit) showed the most promising antimicrobial properties.

**CONCLUSIONS:** It can be concluded that many of the tested plants have antibacterial activity and supports the traditional usage of the plants for mastitis, wound and gastrointestinal complications treatment. Further studies into their toxicity and phytochemistry is advocated.

- 368.** Mesfin A, Giday M, Animut A, Teklehaymanot T. **Ethnobotanical study of antimalarial plants in Shinile District, Somali Region, Ethiopia, and *in-vivo* evaluation of selected ones against *Plasmodium berghei*.** *J Ethnopharmacol.* 2012 Jan 6;139(1):221-7. doi: 10.1016/j.jep.2011.11.006. Epub 2011 Nov 11.

Abstract

**ETHNOPHARMACOLOGICAL RELEVANCE:** The study documented medicinal plants that are traditionally used for treatment of malaria in Shinile District, eastern Ethiopia, and evaluated selected medicinal plants for their antiplasmodial activities against *Plasmodium berghei*.

**MATERIALS AND METHODS:** The study was conducted in four kebeles of Shinile District, Somali Region, Ethiopia. A total of 15 traditional healers were sampled based on recommendations of local elders and administrators. Specimens of the reported antimalarial plants were collected and stored at the Mini Herbarium of the Aklilu Lemma Institute of Pathobiology, Addis Ababa University, following identification. Crude aqueous and ethanol extracts of *Aloe* sp., *Azadirachta indica* and *Tamarindus indica* were tested in vivo against *Plasmodium berghei*. The three plants were selected based on the frequency antimalarial use report by healers.

**RESULTS:** The study revealed 27 antimalarial plants, the majority of which were harvested from the wild. Root was the most frequently sought plant part. Most of the remedies were used in decoction form. *Aloe* sp., *Azadirachta indica* and *Tamarindus indica* were the most commonly reported plants for their antimalarial use. For the *in-vivo* test, all the plant extracts were given to mice orally. Ethanol and aqueous leaf extracts of *Aloe* sp. caused 73.94% and 58.10% parasitaemia suppression, respectively at dose of 650 mg/kg. Ethanol extract of *Azadirachta indica* leaves induced 54.79% parasitaemia suppression at the dose of 650 mg/kg and its water extract induced 21.47% parasite suppression at a similar dose. Water extract of the fruits of *Tamarindus indica* showed the highest parasitaemia suppression (81.09%) at the dose of 650 mg/kg. Most *Plasmodium berghei* infected mice treated with high dose of plant extracts survived relatively longer compared to their respective controls although the difference was not significant.

**CONCLUSIONS:** The result of this study may support the traditional use of *Aloe* sp., *Azadirachta indica* and *Tamarindus indica* in the study area against malaria. Results of this study can be used as a basis for further phytochemical and pharmacological investigations in the effort for search of new and locally affordable antimalarial agents.

- 369.** Mengistu M, Abebe Y, Mekonnen Y, Tolessa T. ***In-vivo* and *in-vitro* hypotensive effect of aqueous extract of *Moringa stenopetala*.** *Afr Health Sci.* 2012 Dec;12(4):545-51.

Abstract

**BACKGROUND:** *Moringa stenopetala*, Baker f. (Moringaceae) is used for food and medicine in Southern Ethiopia.

**OBJECTIVE:** To substantiate the hypotensive effect of *M. stenopetalain-vivo* and *in-vitro*.

**METHODS:** An in vivo experiment was carried out on male guinea pigs anaesthetized with pentobarbital. The arterial blood pressure was recorded from a carotid artery filled with heparinized saline via an arterial cannula connected to a pressure transducer. For the in vitro experiment the descending thoracic aorta was removed and kept moistened in Krebs-Henseleit solution and then mounted in a 20ml tissue bath maintained at 37°C and bubbled with a mixture of 95% oxygen and 5% carbon dioxide.

**RESULTS:** Crude aqueous leaf extract of *M. stenopetala* caused significant fall in systolic blood pressure (SBP), diastolic blood pressure (DBP) and mean arterial blood pressure (MABP) at doses of 10, 20, 30 and 40 mg/kg in normotensive anaesthetized guinea pigs (n = 12). The effect might have been mediated by non-autonomic nervous system as the effect is not altered by atropine and propranolol. The extract also caused significant dose and time dependent inhibition of K(+) induced contraction on guinea pig aorta.

**CONCLUSION:** *M.stenopetala* has blood pressure lowering effect substantiating the use of the plant in traditional medicine.

**KEYWORDS:** *Moringa stenopetala*; aqueous extract; hypotensive

- 370.** Masresha B, Makonnen E, Debella A. **In vivo anti-inflammatory activities of *Ocimum suave* in mice.** *J Ethnopharmacol.* 2012 Jun 26;142(1):201-5. doi: 10.1016/j.jep.2012.04.041. Epub 2012 Apr 25.

Abstract

**ETHNOPHARMACOLOGICAL RELEVANCE:** *Ocimum suave* has been used in the Ethiopian traditional medicine to relieve pain, fever, inflammation and other disease conditions.

**AIM OF THE STUDY:** The aim of the present study was to investigate the anti-inflammatory activities of the aqueous and ethanol leaf extracts and some fractions of *Ocimum suave* in mice.

**MATERIALS AND METHODS:** The crude extracts were screened for their anti-inflammatory activities on carrageenan-induced mouse paw edema at three dose levels. The butanol and aqueous fractions of the aqueous extract were also evaluated for their anti-inflammatory activities using carrageenan, histamine and serotonin-induced mouse paw edema at three dose levels. Normal saline and aspirin were employed as negative and positive control groups, respectively.

**RESULTS:** Both ethanol and aqueous extracts significantly decreased carrageenan-induced inflammation at all the three doses used. However, greater paw edema inhibition was observed with the aqueous extract. The two fractions also showed significant reduction of inflammation against inflammatory models in which the aqueous residue exhibited the highest inhibition.

**CONCLUSIONS:** From the present findings, it can be concluded that the ethanol and aqueous leaf extracts as well as butanol and aqueous fractions of *Ocimum suave* have shown anti-inflammatory properties.

- 371.** Asres K, Tadesse S, Mazumder A, Bucar F. **Composition, antimicrobial and free-radical scavenging activities of the essential oil of *Plectranthus marrubatus*.** *Nat Prod Commun.* 2012 May;7(5):667-70.

#### Abstract

Essential oil from the aerial part of *Plectranthus marrubatus* J. K. Morton (Lamiaceae), obtained by hydrodistillation was analyzed by gas chromatography/mass spectrometry (GC/MS) and evaluated for antimicrobial and free radical scavenging activities. Twenty-four compounds representing 99% of the total oil were identified. The major constituents were thymol, p-cymene and gamma-terpinene. The oil was tested against 21 bacterial and 4 fungal strains using the disc diffusion method and found to be active against a broad spectrum of pathogens including Gram-positive and Gram-negative bacteria as well as some fungal strains. The minimum inhibitory concentrations (MICs) of the oil against the bacterial strains tested ranged from 10 to 800 microg/mL, and from 400 to 800 microg/mL against the fungal strains employed. The in vitro

antioxidant activity was assessed using 2,2-diphenyl-1-picrylhydrazil (DPPH) and showed a low EC50 value of 0.15 microl/mL. The study provides evidence for the broad-spectrum antimicrobial and antioxidant effect of *Plectranthus marrubatus* essential oil, and a possible explanation for its traditional use in the treatment of cold, fever, stomach disorder, diarrhea and as a skin cleaner.

**372.** Solomon B, Sahle FF, Gebre-Mariam T, Asres K, Neubert RH. **Microencapsulation of citronella oil for mosquito-repellent application: formulation and *in-vitro* permeation studies.** *Eur J Pharm Biopharm.* 2012 Jan;80(1):61-6. doi: 10.1016/j.ejpb.2011.08.003. Epub 2011 Sep 8.

#### Abstract

Citronella oil (CO) has been reported to possess a mosquito-repellent action. However, its application in topical preparations is limited due to its rapid volatility. The objective of this study was therefore to reduce the rate of evaporation of the oil via microencapsulation. Microcapsules (MCs) were prepared using gelatin simple coacervation method and sodium sulfate (20%) as a coacervating agent. The MCs were hardened with a cross-linking agent, formaldehyde (37%). The effects of three variables, stirring rate, oil loading and the amount of cross-linking agent, on encapsulation efficiency (EE, %) were studied. Response surface methodology was employed to optimize the EE (%), and a polynomial regression model equation was generated. The effect of the amount of cross-linker was insignificant on EE (%). The response surface plot constructed for the polynomial equation provided an optimum area. The MCs under the optimized conditions provided EE of 60%. The optimized MCs were observed to have a sustained *in vitro* release profile (70% of the content was released at the 10th hour of the study) with minimum initial burst effect. Topical formulations of the microencapsulated oil and non-microencapsulated oil were prepared with different bases, white petrolatum, wool wax alcohol, hydrophilic ointment (USP) and PEG ointment (USP). *In vitro* membrane permeation of CO from the ointments was evaluated in Franz diffusion cells using cellulose acetate membrane at 32 °C, with the receptor compartment containing a water-ethanol solution (50:50). The receptor phase samples were analyzed with GC/MS, using citronellal as a reference standard. The results showed that microencapsulation decreased membrane permeation of the CO by at least 50%. The amount of CO permeated was dependent on the type of ointment base used; PEG base exhibited the highest degree of release.

Therefore, microencapsulation reduces membrane permeation of CO while maintaining a constant supply of the oil.

- 373.** de Rapper S, Van Vuuren SF, Kamatou GP, Viljoen AM, Dagne E. **The additive and synergistic antimicrobial effects of select frankincense and myrrh oils--a combination from the pharaonic pharmacopoeia.** *Lett Appl Microbiol.* 2012 Apr;54(4):352-8. doi: 10.1111/j.1472-765X.2012.03216.x. Epub 2012 Feb 20.

Abstract

AIMS:

The in vitro antimicrobial activity of three essential oil samples of frankincense (*Boswellia rivae*, *Boswellia neglecta* and *Boswellia papyrifera*) and two essential oil samples of myrrh and sweet myrrh (*Commiphora guidotti* and *Commiphora myrrha*), collected from different regions of Ethiopia, was investigated independently and in combination to determine their anti-infective properties.

METHODS AND RESULTS:

The microdilution minimum inhibitory concentration (MIC) assay was performed, whereby it was noted that generally *Cryptococcus neoformans* (MIC values in the range of 0.8-1.4 mg ml<sup>-1</sup>) and *Pseudomonas aeruginosa* (MIC values in the range of 0.5-1.3 mg ml<sup>-1</sup>) often appeared to be the most susceptible micro-organisms against oils of both *Boswellia* and *Commiphora* spp. When assayed in various combinations, the frankincense and myrrh oils displayed synergistic, additive and noninteractive properties, with no antagonism noted. When investigating different ratio combinations against *Bacillus cereus*, the most favourable combination was between *B. papyrifera* and *C. myrrha*. The composition of the oils was determined by gas chromatography coupled to mass spectrometry (GC-MS) to document the specific chemotypes used in the study, and the chemical profiles were found to be congruent with previously reported data.

CONCLUSIONS:

The majority of interactions identified synergistic and additive effects, with strong synergism noted between *B. papyrifera* and *C. myrrha*.

#### SIGNIFICANCE AND IMPACT OF THE STUDY:

Frankincense and myrrh essential oils have been used in combination since 1500 bc; however, no antimicrobial investigations have been undertaken to confirm their effect in combination. This study validates the enhanced efficacy when used in combination against a selection of pathogens.

- 374.** Tamiru W1, Engidawork E, Asres K. **Evaluation of the effects of 80% methanolic leaf extract of *Caylusea abyssinica* (fresen.) fisch. & Mey. on glucose handling in normal, glucose loaded and diabetic rodents.** BMC Complement Altern Med. 2012 Sep 11;12:151. doi: 10.1186/1472-6882-12-151.

#### Abstract

#### BACKGROUND:

The leaves of *Caylusea abyssinica* (fresen.) Fisch. & Mey. (Resedaceae), a plant widely distributed in East African countries, have been used for management of diabetes mellitus in Ethiopian folklore medicine. However, its use has not been scientifically validated. The present study was undertaken to investigate antidiabetic effects of the hydroalcoholic leaf extract of *C. abyssinica* extract in rodents.

#### MATERIALS AND METHOD:

Male Animals were randomly divided into five groups for each diabetic, normoglycemic and oral glucose tolerance test (OGTT) studies. Group 1 served as controls and administered 2% Tween-80 in distilled water, (TW80); Group 2 received 5 mg/kg glibenclamide (GL5); Groups 3, 4 and 5 were given 100 (CA100), 200 (CA200) and 300 (CA300) mg/kg, respectively, of the hydroalcoholic extract of *C. abyssinica*. Blood samples were then collected at different time points

to determine blood glucose levels (BGL). Data were analyzed using one way ANOVA followed by Dunnet's post hoc test and  $p < 0.05$  was considered as statistically significant.

#### RESULTS:

In normal mice, CA200 and GL5 induced hypoglycemia starting from the 2nd h but the hypoglycemic effect of CA300 was delayed and appeared at the 4th h ( $p < 0.05$  in all cases). In diabetic mice, BGL was significantly reduced by CA100 ( $p < 0.05$ ) and CA300 ( $p < 0.01$ ) starting from the 3rd h, whereas CA200 ( $p < 0.001$ ) and GL5 ( $p < 0.05$ ) attained this effect as early as the 2nd h. In OGTT, TW80 ( $p < 0.01$ ) and CA100 ( $p < 0.01$ ) brought down BGL significantly at 120 min, while CA200 ( $p < 0.001$ ) and GL5 ( $p < 0.001$ ) achieved this effect at 60 min indicating the oral glucose load improving activity of the extract. By contrast, CA300 was observed to have no effect on OGTT. Acute toxicity study revealed the safety of the extract even at a dose of 2000 mg/kg. Preliminary phytochemical study demonstrated the presence of various secondary metabolites, including, among others, saponins, flavonoids and alkaloids.

#### CONCLUSION:

The results indicate that *C. abyssinica* is endowed with antidiabetic and oral glucose tolerance improving actions, particularly at the dose of 200 mg/kg in experimental animals. These activities of the plant extract may be related to the presence of secondary metabolites implicated in antidiabetic activities of plant extracts via different hepatic and extra-hepatic mechanisms. These results thus support the traditional use of the leaf extract for the management of diabetes mellitus.

- 375.** Leteane MM1, Ngwenya BN, Muzila M, Namushe A, Mwinga J, Musonda R, Moyo S, Mengestu YB, Abegaz BM, Andrae-Marobela K. **Old plants newly discovered: *Cassia sieberiana* D.C. and *Cassia abbreviata* Oliv. Oliv. root extracts inhibit in vitro HIV-1c replication in peripheral blood mononuclear cells (PBMCs) by different modes of action.** J Ethnopharmacol. 2012 May 7;141(1):48-56. doi: 10.1016/j.jep.2012.01.044. Epub 2012 Feb 2

Abstract

## **ETHNOPHARMACOLOGICAL RELEVANCE:**

Despite advances in anti-retroviral therapy which has transformed HIV/AIDS from a fatal to a manageable chronic disease, increasing viral drug resistance, side effects and uneven access to anti-retroviral drugs remain considerable therapeutic challenges. Partly as a consequence of these shortcomings and partly based on the fact that HIV/AIDS gives rise to opportunistic infections whose symptoms have been managed in Africa in an HIV/AIDS-independent context by traditional healers for centuries, many HIV/AIDS patients use herbal medicines. The aim of this study was to screen selected medicinal plants from Botswana, used by traditional healers to treat/manage HIV/AIDS, for inhibitory activities on HIV replication.

## **MATERIALS AND METHODS:**

Based on an ethnomedical survey, ethanolic tannin-containing and tannin-free extracts from 10 medicinal plants were tested for inhibitory properties against a clone of HIV-1c (MJ(4)) measuring cytopathic effect protection and levels of viral p24 antigen in infected PBMCs.

## **RESULTS:**

*Cassia sieberiana* D.C., *Cassia abbreviata* Oliv. Oliv. and *Plumbago zeylanica* L. extracts showed significant inhibition of HIV-1c (MJ(4)) replication. The inhibitory activity of the *Plumbago zeylanica* extract could be attributed to its tannin content. Anti-HIV activity of *Cassia sieberiana* root and bark extracts, and *Cassia abbreviata* root extracts occurred in a concentration-dependent manner with an effective concentration (EC(50)) of 65.1µg/ml, 85.3µg/ml and 102.8µg/ml, respectively. Experiments to elucidate possible mechanism(s) of action revealed that *Cassia sieberiana* root and bark extracts blocked HIV replication at its binding- (EC(50)=70.2µg/ml and 90.8µg/ml, respectively) and entry stage (EC(50)=88.9µg/ml and 100.5µg/ml, respectively) while *Cassia abbreviata* extracts did not.

## **CONCLUSIONS:**

We report here for the first time a direct inhibitory effect on HIV-1c replication of extracts from two extremely popular medicinal plants, *Cassia sieberiana* and *Cassia abbreviata*. Considering the

traditional uses of both Cassia species, our findings strongly suggest pilot clinical observational studies involving traditional healers to further evaluate the therapeutic potential of the Cassia extracts.

2013

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376. Abdella Gemechu, Mirutse Giday, Adane Worku and Gobena Ameni *In vitro* Anti-mycobacterial activity of selected medicinal plants against *Mycobacterium tuberculosis* and *Mycobacterium bovis* Strains *BMC Complementary and Alternative Medicine* 2013, 13:291 doi:10.1186/1472-6882-13-291

### **Background**

Tuberculosis (TB) is a global burden with one –third of the world’s population infected with the pathogen *Mycobacterium tuberculosis* complex and annually 1.4 million deaths occur due to the disease. This high incidence of infection and the increased rate of multi-drug resistant and extensively-drug resistant strains of the organism further complicated the problem of TB control and have called for an urgent need to develop new anti-TB drugs from plants. In this study, the in vitro activity of root of *Calpurnia aurea*, seeds of *Ocimum basilicum*, leaves of *Artemisia abyssinica*, *Croton macrostachyus*, and *Eucalyptus camaldulensis* were evaluated against *M. tuberculosis* and *M. bovis* strains.

### **Methods**

Five Ethiopian medicinal plants, root of *Calpurnia aurea*, seeds of *Ocimum basilicum*, leaves of *Artemisia abyssinica*, *Croton macrostachyus*, and *Eucalyptus camaldulensis* used locally for the management of TB. They were investigated for in vitro antimycobacterial activity against *M. tuberculosis* and *M. bovis* strains. 80% methanolic extracts of the plant materials were obtained by maceration. The antimycobacterial activity was determined using 96 wells of microplate with the help of visual Resazurin Microtiter Assay.

### **Results**

The crude 80% methanolic extracts of the root of *C. aurea*, seeds of *O. basilicum*, and leaves of *A. abyssinica*, *C. macrostachyus*, and *E. camaldulensis* had anti-mycobacterial activity with minimum inhibitory concentration (MIC) ranging from 6.25–100 µg/mL. The MIC of 80%

methanol extracts in the order mentioned above ranged 25-100 µg/ml and 12.5-75 µg/mL, 25–100 µg/mL and 25–50 µg/mL, 6.25-50 µg/mL and 12.5-50 µg/mL, 12.5-100 µg/mL and 18.25-50 µg/mL and 6.25-50 µg/mL and 12.5-50 µg/mL, respectively for *M. tuberculosis* and *M. bovis* strains.

### **Conclusions**

The results support the local use of these plants in the treatment of TB and it is suggested that these plants may have therapeutic value in the treatment of TB. However, further investigations are needed on isolating chemical constituents responsible for eliciting the observed activity in these plants.

Keywords: Antimycobacterial activity; Medicinal plants; MIC; REMA; *M. tuberculosis* & *M. bovis* strains; Ethiopia

- 377.** Yonas Eshetu Gizachew<sup>1</sup> , Mirutse Giday<sup>2</sup> and Tilahun Teklehaymanot<sup>2</sup>  
**Antimycobacterial Activities of Selected Ethiopian Traditional Medicinal plants used for treatment of symptoms of Tuberculosis** Global Advanced Research Journal of Medicinal Plants (GARJMP) Vol. 2(2) pp. 022-029, November, 2013

Tuberculosis (TB) is serious infectious diseases affecting many people across the world particularly sub-Saharan Africans. Ethiopia is ranked 7th among TB burden shouldering countries in the world. Conventional chemotherapeutic control approach has faced serious, flourishing drug resistance strains. Traditional herbal remedies have endeavored to supplement or replace ineffective drugs. This study determined the antimycobacterial activity of selected Ethiopian medicinal plants traditionally used to treat TB. Leaf of *Ocimum lamiifolium*, *Clausena antisata* and *Myrsine africana* were collected, air dried and extracted with distilled water and absolute methanol (MeOH). The crude aqueous and MeOH crude extracts of the plants were tested against *Mycobacterium tuberculosis* H37Rv strain and *M. bovis* (SB 1176). Broth micro-dilution method (BMM) was used to determine the anti-mycobacterial activities and minimum inhibitory concentration of the plant extracts. MeOH and aqueous crude extracts of *O. lamiifolium*, *C. antisata* and *M. africana* have demonstrated promising activity against at least one species of two *Mycobacterium* species. Both MeOH and aqueous crude extracts of *M. africana* were active

against both species. Antimycobacterial activity was documented within inclusive MIC range of 400- 1600 $\mu$ g/m for the extracts of three plant species. The plant extracts have anti-mycobacterial activities pin pointing scientific ground for ethnomedicinal use of the plants against TB. This finding could serve as baseline information for further antimycobacterial agent study of these plants. Future studies ought to assess the exact chemicals involved and identify, if any toxicity. There will also be way to encourage the traditional use of the plant against TB after further research.

Keywords: Plant extracts, Test organisms, antimycobacterial activity, BMM, MIC,

- 378.** Mekonnen A, Sidamo T, Asres K, Engidawork E. ***In-vivo* wound healing activity and phytochemical screening of the crude extract and various fractions of *Kalanchoe petitiiana* A. Rich (Crassulaceae) leaves in mice.** *J Ethnopharmacol.* 2013 Jan 30;145(2):638-46. doi: 10.1016/j.jep.2012.12.002.

Abstract

**ETHNOPHARMACOLOGICAL RELEVANCE:** The leaves of *Kalanchoe petitiiana* A. Rich (Crassulaceae) are used in Ethiopian folk medicine for treatment of evil eye, fractured surface for bone setting and several skin disorders including for the treatment of sores, boils, and malignant wounds.

**AIM OF THE STUDY:** In order to scientifically prove the claimed utilization of the plant, the effects of the extracts and the fractions were investigated using in vivo excision, incision and dead space wound models.

**MATERIALS AND METHOD:** Mice were used for wound healing study, while rats and rabbit were used for skin irritation test. For studying healing activity 80% methanolic extract and the fractions were formulated in strength of 5% and 10%, either as ointment (hydroalcoholic extract, aqueous and methanol fractions) or gel (chloroform fraction). Oral administration of the crude extract was used for dead space model. Negative controls were treated either with simple ointment or sodium carboxyl methyl cellulose xerogel, while positive controls with nitrofurazone (0.2 w/v) skin ointment. Negative controls for dead space model were treated with 1% carboxy methyl

cellulose. Parameters, including rate of wound contraction, period of complete epithelialization, hydroxyproline contents and skin breaking strength were evaluated.

**RESULTS:** Significant wound healing activity was observed with ointment formulated from the crude extract at both 5% and 10% concentration ( $p < 0.01$ ) compared to controls in both excision and incision models. In dead space model, 600 mg/kg ( $p < 0.01$ ) but not 300 mg/kg significantly increased hydroxyproline content. Fractions showed variable effect, with the chloroform fraction lacking any significant effect. Both 5% and 10% formulations of the aqueous and methanolic fractions significantly increased wound contraction, decreased epithelialization time and increased hydroxyproline content in excision wound model ( $p < 0.05$ ) as compared to controls. These fractions were also endowed with higher skin breaking strength in incision wound model ( $p < 0.01$ ).

**CONCLUSIONS:** The present study provided evidence that the leaves of *Kalanchoe petitiiana* A. Rich possess remarkable wound healing activities supporting the folkloric assertion of the plant. Fractionation revealed that polar or semi polar compound may play vital role, as both aqueous and methanolic fractions were endowed with wound healing activity.

- 379.** Lulekal E, Asfaw Z, Kelbessa E, Van Damme P. **Ethnomedicinal study of plants used for human ailments in Ankober District, North Shewa Zone, Amhara Region, Ethiopia.** *J Ethnobiol Ethnomed.* 2013 Aug 28;9(1):63. doi: 10.1186/1746-4269-9-63.

#### Abstract

**BACKGROUND:** Ankober District has long been inhabited by people who have a long tradition of using medicinal plants to treat human ailments. Overexploitation of medicinal plants coupled with an ever-increasing population growth, deforestation and agricultural land expansion threatens plants in the area. Hence, this study aimed at documenting and analyzing the plant-based ethnomedicinal knowledge of the people in order to preserve the dwindling indigenous knowledge.

**METHODS:** Ethnobotanical data were collected using semi-structured interviews, focus group discussions, participant observation and walk-in-the-woods. Quantitative approaches were used to

determine Informant Consensus Factor (ICF) and Fidelity level (FL) values. Statistical tests were used to compare the indigenous knowledge on medicinal plants among different informant categories.

**RESULTS:** A total of 135 medicinal plant species belonging to 128 genera and 71 botanical families were reported to treat human diseases in the District. Families Asteraceae (12 species, 9%) and Fabaceae (10, 7.4%) were found to be best represented in the area. About 44% of preparations were reported to be obtained from roots. Significant difference ( $P < 0.05$ ) was observed on the mean number of medicinal plants reported by groups of respondents compared within age, literacy level and experience parameters. Highest ICF values were recorded for gastrointestinal & parasitic and dermatological disease categories (0.70 each) indicating best agreement among informants knowledge on medicinal plants used to treat ailments in these categories. Highest fidelity level values were recorded for *Zehneria scabra* (95%) and *Hagenia abyssinica* (93.75%) showing conformity of knowledge on species of best healing potential. *Podocarpus falcatus* was ranked first in a direct matrix ranking exercise of multipurpose medicinal plants. The output of preference ranking exercise indicated that *Olea europaea* subsp. *cuspidata* was the most preferred species to treat atopic eczema.

**CONCLUSION:** The study revealed that Ankober District is rich in medicinal plant diversity and associated indigenous knowledge. However, anthropogenic factors coupled with acculturation and very poor conservation efforts threaten medicinal plant survival in the area. Promoting a complementary in situ and ex situ conservation strategy for medicinal plants of the District is highly recommended.

- 380.** Hassan-Abdallah A, Merito A, Hassan S, Aboubaker D, Djama M, Asfaw Z, Kelbessa E. **Medicinal plants and their uses by the people in the Region of Randa, Djibouti.** *J Ethnopharmacol.* 2013 Jul 9;148(2):701-13. doi: 10.1016/j.jep.2013.05.033. Epub 2013 May 22.

Abstract

**ETHNOPHARMACOLOGICAL RELEVANCE:** The article presents the local knowledge on medicinal plants and their relevance in managing health problems. Important ethnobotanical leads

are given with priority species and disease categories, casting insight on future phytochemical and pharmacological studies.

**AIM OF THE STUDY:** The use of traditional medicinal plants has been an integral part of the traditional healthcare systems in Djibouti. However, scientific studies on the traditional herbal healing systems of the various cultural groups have never been undertaken. This study has, therefore, aimed at assessing plant-related ethnomedicinal knowledge of the people in Randa Region; prioritising the plants with respect to common disease categories and inferring about prospects of new pharmacological products.

**MATERIALS AND METHODS:** Interview-based ethnobotanical field study was carried out to document the plant-based ethnomedicinal knowledge handed down to the present by the oral tradition of people living in 24 villages in Tadjourah District of Randa Region (north Djibouti). Informant Consensus Factors (ICF) and Fidelity Level (FL) values of the medicinal plants were calculated to check the level of informant agreement and the healing potentials of the species.

**RESULTS:** A total of 91 plant species that belong to 72 genera and 40 families were documented. Most of these species (92%) were collected from non-cultivated areas. Their local names and traditional uses in medicine were also studied. The plant family Fabaceae was represented by the highest number of taxa (17 species). Strong informant agreements hinted at good healing potentials of some species as shown by high values of consensus factors for eye diseases (0.98), mouth diseases (0.93), kidney problems (0.89) and microbial infections (0.84). *Dodonea angustifolia*, *Solanum cordatum*, *Grewia erythraea*, *Acalypha indica*, *Acacia etbaica*, *Fagonia schweinfurthii*, *Solanum coagulans*, *Senna alexandrina* and *Grewia tembensis* scored high FL values emerging as promising priority species for future pharmacological screening against microbial infections.

**CONCLUSION:** The results of this study may inspire further ethnobotanical and ethnopharmacological research and investigations toward drug discovery in Djibouti and beyond.

**381. Giday M, Teklehaymanot T. Ethnobotanical study of plants used in management of livestock health problems by Afar people of Ada'ar District, Afar**

**Regional State, Ethiopia.** *J Ethnobiol Ethnomed.* 2013 Jan 23;9:8. doi: 10.1186/1746-4269-9-8.

#### Abstract

**BACKGROUND:** The great majority of the Afar people of Ethiopia are pastoralists, highly dependent on livestock and livestock products. Livestock productivity is, however, frequently affected by different diseases. Although many districts in the Region have veterinary clinics, they lack basic facilities. As a result, the Afar people are still dependent on local materials, mainly plants, and traditional knowledge to manage livestock health problems. However, there is a serious threat to such local resources mainly due to recurrent drought and influence of modernization. Hence there is a need for proper documentation and evaluation of the existing ethnoveterinary knowledge in the Region. This study was aimed at documenting and analysing ethnoveterinary knowledge of people in Ada'ar District of the Afar Region associated with the use of plants.

**METHODS:** The study involved interviewing selected knowledgeable Afar people in Ada'ar District on the use of plants to manage livestock ailments. Fidelity Level (FL) values were calculated for the reported medicinal plant to estimate their healing potentials. Specimens of reported medicinal plant were collected, identified and deposited at the National Herbarium, Addis Ababa University.

**RESULTS:** The study revealed 49 medicinal plants as being used by the Afar people of Ada'ar District for the treatment of various livestock ailments, the majority of which (67.3%) were shrubs. Highest number of medicinal plants was used to treat blackleg, contagious caprine pleuropneumonia (CCPP), sudden sickness and pneumonia. Leaf was the most frequently sought plant part, accounting for 47% of the reported plants. All the medicinal plants used in the District were uncultivated ones growing in semi-disturbed and disturbed habitats as remnant plants and weeds. *Cissus quadrangularis* and *Solanum incanum* were the plants scoring the highest fidelity level values for their use to treat blackleg and respiratory tract problems, respectively.

**CONCLUSION:** The study revealed that there is still rich knowledge of ethnoveterinary medicine in Ada'ar District. There was no habit of cultivating medicinal plants by people in the study area. Efforts, should, therefore, be made to protect these medicinal plants from further depletion,

especially those that are scarcely available. Better attention should be given to medicinal plants with the highest fidelity level values as such values could indicate potencies of the plants.

- 382.** Molla E, Giday M, Erko B. **Laboratory assessment of the molluscicidal and cercariacidal activities of *Balanites aegyptiaca*.** *Asian Pac J Trop Biomed.* 2013 Aug;3(8):657-62; discussion 661. doi: 10.1016/S2221-1691(13)60132-X.

#### Abstract

**OBJECTIVE:** To assess the molluscicidal and cercariacidal activities of aqueous extracts of *Balanites aegyptiaca* (*B. aegyptiaca*) against Ethiopian *Biomphalaria pfeifferi* (*B. pfeifferi*), *Lymnaea natalensis* (*L. natalensis*) and *Schistosoma mansoni* (*S. mansoni*) cercariae.

**METHODS:** Extracts of seeds, endocarp, mesocarp, and fruit of *B. aegyptiaca* were tested for their activities against adult *B. pfeifferi* and *L. natalensis*. The cercariacidal activity of the seeds of the plant was also evaluated against *S. mansoni*. Bioassays were carried out following the methods recommended by WHO. Snail mortalities were compared between each plant part and snail species, and LC50 and LC90 values for the plant parts tested were computed. The cercariacidal activity of the plant was assessed by exposing the mice to the cercariae pre-exposed to aqueous extract of *B. aegyptiaca* seeds.

**RESULTS:** For the molluscicidal activities of seeds, endocarp, mesocarp and whole fruit, the LC50 values against *B. pfeifferi* were 56.32, 77.53, 65.51 and 66.63 mg/L, respectively, while the respective LC90 values were 77.70, 120.04, 89.50 and 97.55 mg/L. Similarly, the LC50 values for the seeds, endocarp, mesocarp and whole fruit against *L. natalensis* were 80.33, 92.61, 83.52 and 87.84 mg/L, respectively, while the respective LC90 values were 102.30, 138.21, 115.42 and 127.69 mg/L. *B. pfeifferi* were found to be more susceptible to *B. aegyptiaca* than *L. natalensis*. *S. mansoni* cercariae exposed to 15 mg/L of extract of seeds were incapable of infecting mice. The mean egg load of tissue was reduced in mice infected with the cercariae exposed to 5 and 10 mg/L of the extract.

**CONCLUSIONS:** The aqueous extracts of different parts of *B. aegyptiaca* exhibited reasonable molluscicidal activity against *B. pfeifferi* and *L. natalensis*, as well as cercariacidal activity against

*S. mansoni* cercariae. However, comprehensive laboratory evaluation is recommended prior to field tests of the plant parts since their impact on other aquatic biota is not known.

KEYWORDS: *Balanites aegyptiaca*; *Biomphalaria pfeifferi*; Cercariacide; *Lymnaea natalensis*; Molluscicide; *Schistosoma mansoni*

- 383.** Veeresham C, Swetha E, Rao AR, Asres K. **In vitro and in vivo aldose reductase inhibitory activity of standardized extracts and the major constituent of *Andrographis paniculata*.** *Phytother Res.* 2013 Mar;27(3):412-6. doi: 10.1002/ptr.4722. Epub 2012 May 25.

Abstract

Aldose reductase is the first enzyme in the polyol pathway and catalyzes the reduction of glucose to sorbitol by coupling with the oxidation of NADPH to NADP(+). This sorbitol accumulation leads to various diabetic complications, including neuropathy, nephropathy, cataracts, and retinopathy. In the present study, aldose reductase inhibitory (ARI) activity of the methanolic as well as standardized extracts of *Andrographis paniculata* (Burm. f.) Wall.ex Nees (Acanthaceae) and its chief constituent, andrographolide, were studied using in vitro and in vivo methods. In the in vitro method, rat lens as well as kidney homogenates were used for the preparation of enzyme, whereas the effect of these test samples on the galactitol level in the eye lens was studied in a galactosemic rat model in vivo. The results of the study revealed that both extracts of the plant and its major compound, andrographolide, possess ARI activity in vitro. They were also found to significantly decrease galactitol accumulation in vivo.

- 384.** Endale A, Bisrat D, Animut A, Bucar F, Asres K. **In-vivo antimalarial activity of a labdane diterpenoid from the leaves of *Otostegia integrifolia* Benth.** *Phytother Res.* 2013 Dec;27(12):1805-9. doi: 10.1002/ptr.4948. Epub 2013 Feb 11.

Abstract

In Ethiopian traditional medicine, the leaves of *Otostegia integrifolia* Benth. are used for the treatment of several diseases including malaria. In an ongoing search for effective, safe and cheap antimalarial agents from plants, the 80% methanol leaf extract *O. integrifolia* was tested for its in vivo antimalarial activity, in a 4-day suppressive assay against *Plasmodium berghei*. Activity-guided fractionation of this extract which showed potent antiplasmodial activity resulted in the isolation of a labdane diterpenoid identified as otostegindiol. Otostegindiol displayed a significant ( $P < 0.001$ ) antimalarial activity at doses of 25, 50 and 100 mg/kg with chemosuppression values of 50.13, 65.58 and 73.16%, respectively. Acute toxicity studies revealed that the crude extract possesses no toxicity in mice up to a maximum dose of 5000 mg/kg suggesting the relative safety of the plant when administered orally. The results of the present study indicate that otostegindiol is among the antimalarial principles in this medicinal plant, and further support claims for the traditional medicinal use of the plant for the treatment of malaria.

- 385.** Kebebew Z, Shibeshi W. **Evaluation of anxiolytic and sedative effects of 80% ethanolic *Carica papaya* L. (Caricaceae) pulp extract in mice.** *J Ethnopharmacol.* 2013 Nov 25;150(2):665-71. doi: 10.1016/j.jep.2013.09.023. Epub 2013 Oct 9.

#### Abstract

**ETHNOPHARMACOLOGICAL RELEVANCE:** *Carica papaya* has been used in the Ethiopian traditional medicine to relieve stress and other disease conditions.

**AIM OF THE STUDY:** The present study was undertaken to evaluate the anxiolytic and sedative effects of 80% ethanolic *Carica papaya* (Caricaceae) pulp extract in mice.

**MATERIALS AND METHODS:** *Carica papaya* pulp extract was screened for anxiolytic effect by using elevated plus maze, staircase and open field tests, and ketamine-induced sleeping time test for sedation at doses of 50, 100, 200, 400 mg/kg. Distilled water and Diazepam were employed as negative and positive control groups, respectively.

**RESULTS:** *Carica papaya* pulp extract 100 mg/kg significantly increased the percentage of open arm time and entry, and reduced the percentage of entry and time spent in closed arm in elevated plus maze test; reduced the number of rearing in the staircase test; and increased the time spent and entries in the central squares while the total number of entries into the open field were not significantly affected, suggesting anxiolytic activity without altering locomotor and sedative effects. A synergistic reduction in the number of rearing and an inverted U-shaped dose response curves were obtained with important parameters of anxiety

**CONCLUSIONS:** The results of this study established a support for the traditional usage of *Carica papaya* as anxiolytic medicinal plant.

- 386.** Scantlebury CE, Peachey L, Hodgkinson J, Matthews JB, Trawford A, Mulugeta G, Tefera G, Pinchbeck GL. **Participatory study of medicinal plants used in the control of gastrointestinal parasites in donkeys in Eastern Shewa and Arsi zones of Oromia region, Ethiopia.** *BMC Vet Res.* 2013 Sep 11;9:179. doi: 10.1186/1746-6148-9-179.

#### Abstract

**BACKGROUND:** Gastrointestinal nematode infections constitute a threat to the health and welfare of donkeys worldwide. Their primary means of control is via anthelmintic treatments; however, use of these drugs has constraints in developing countries, including cost, limited availability, access to cheaper generic forms of variable quality and potential anthelmintic resistance. As an alternative, bioactive plants have been proposed as an option to treat and control gastrointestinal helminths in donkeys. This study aimed to use participatory methodology to explore donkey owner knowledge, attitudes and beliefs relating to the use of plant-based treatments for gastrointestinal parasites of donkeys in Ethiopia.

**RESULTS:** In focus groups, 22/29 groups stated they knew of plants used for the treatment of gastrointestinal parasites in donkeys. All groups volunteered plants that were used in cattle and/or small ruminants. In total, 21 plants were named by participants. 'Koso' (*Hagenia abyssinica*) 'Grawa' (*Vernonia amygdalina*) and a mixed roots and leaves preparation were the most frequently named plant preparations. 'Enkoko' (*Embelia shimperi*) and 'a mixture of roots and leaves' were ranked highly for effectiveness in donkeys. However, 'Grawa' and 'Koso' were the highest ranked

when taking into account both the rank position and the number of groups ranking the plant. Thematic analysis of participants' current attitudes and beliefs surrounding traditional plant-based remedies for gastrointestinal parasites revealed that anthelmintics obtained from clinics were generally favoured due to their ease of administration and perceived higher effectiveness. There was doubt surrounding the effectiveness of some plant-based treatments, but there were also perceived advantages including their low cost, ease of cultivation and availability. However, plant-based treatments were considered a "past trend" and people favoured "modern" medicine, particularly among the younger generation.

**CONCLUSIONS:** There was extensive knowledge of plant-based treatments for gastrointestinal parasites in livestock in Ethiopia. In donkeys, Koso (*Hagenia abyssinica*), Grawa (*Vernonia amygdalina*), Enkoko (*Embelia shimperi*) and 'mixed roots and leaves' were the most frequently named and/or highest ranked plants with reported efficacy against gastrointestinal parasites. Further in vitro and in vivo investigation of these plants is now required to determine viable alternatives for the treatment and control of gastrointestinal parasites in Ethiopia.

- 387.** Megersa M, Asfaw Z, Kelbessa E, Beyene A, Woldeab B. **An ethnobotanical study of medicinal plants in Wayu Tuka District, East Welega Zone of Oromia Regional State, West Ethiopia.** *J Ethnobiol Ethnomed.* 2013 Sep 25;9(1):68. doi: 10.1186/1746-4269-9-68.

#### Abstract

**BACKGROUND:** This paper reports an ethnobotanical study that focused on the traditional medicinal plants used by local communities to treat human and livestock ailments. A cross-sectional study was undertaken from September 2009 to June 2010 in Wayu Tuka District of Oromia Region, Ethiopia. The aim of the study is to document medicinal plants used by local people of the study area and the threats currently affecting medicinal plants.

**METHODS:** Ethnobotanical data were collected using semi-structured interviews, field observations and group discussion in which 63 (41 men & 22 women) randomly selected informants participated. Of which, 11 (10 male and 1 female) were local healers. Paired

comparison method, direct matrix ranking and Informant consensus factors (ICF) were used to analyze the importance of some plant species.

**RESULTS:** A total of 126 medicinal plant species, distributed in 108 genera and 56 families, were collected together with their medicinal uses. Of the 126 species of medicinal plants collected from the study area, eighty six (68%) were obtained from the wild whereas thirty three (26%) were from homegardens. The Fabaceae came out as a leading family with 15 medicinal species while the Solanaceae followed with eight species. Seventy eight (62%) of the medicinal plants were reported as being used for treating human ailments, 23 (18.2%) for the treatment of livestock ailments and 25 (20%) for both. The most frequently used plant parts were leaves (43%), followed by roots (18.5%) while crushing, which accounted for (29%) and powdering (28%) were the widely used methods of preparation of traditional herbal medicines.

**CONCLUSION:** The number of reported medicinal plants and their uses by the local people of the District indicate the depth of the local indigenous knowledge on medicinal plants and their application. The documented medicinal plants can serve as a basis for future investigation of modern drug.

- 388.** Gemechu A, Giday M, Worku A, Ameni G. **In vitro anti-mycobacterial activity of selected medicinal plants against *Mycobacterium tuberculosis* and *Mycobacterium bovis* strains.** *BMC Complement Altern Med.* 2013 Oct 29;13:291. doi: 10.1186/1472-6882-13-291.

Abstract

**BACKGROUND:** Tuberculosis (TB) is a global burden with one -third of the world's population infected with the pathogen *Mycobacterium tuberculosis* complex and annually 1.4 million deaths occur due to the disease. This high incidence of infection and the increased rate of multi-drug resistant and extensively-drug resistant strains of the organism further complicated the problem of TB control and have called for an urgent need to develop new anti-TB drugs from plants. In this study, the *in-vitro* activity of root of *Calpurnia aurea*, seeds of *Ocimum basilicum*, leaves of

*Artemisia abyssinica*, *Croton macrostachyus*, and *Eucalyptus camaldulensis* were evaluated against *M. tuberculosis* and *M. bovis* strains.

**METHODS:** Five Ethiopian medicinal plants, root of *Calpurnia aurea*, seeds of *Ocimum basilicum*, leaves of *Artemisia abyssinica*, *Croton macrostachyus*, and *Eucalyptus camaldulensis* used locally for the management of TB. They were investigated for in vitro antimycobacterial activity against *M. tuberculosis* and *M. bovis* strains. 80% methanolic extracts of the plant materials were obtained by maceration. The antimycobacterial activity was determined using 96 wells of microplate with the help of visual Resazurin Microtiter Assay.

**RESULTS:** The crude 80% methanolic extracts of the root of *C. aurea*, seeds of *O. basilicum*, and leaves of *A. abyssinica*, *C. macrostachyus*, and *E. camaldulensis* had anti-mycobacterial activity with minimum inhibitory concentration (MIC) ranging from 6.25-100 µg/mL. The MIC of 80% methanol extracts in the order mentioned above ranged 25-100 µg/ml and 12.5-75 µg/mL, 25-100 µg/mL and 25-50 µg/mL, 6.25-50 µg/mL and 12.5-50 µg/mL, 12.5-100 µg/mL and 18.25-50 µg/mL and 6.25-50 µg/mL and 12.5-50 µg/mL, respectively for *M. tuberculosis* and *M. bovis* strains.

**CONCLUSIONS:** The results support the local use of these plants in the treatment of TB and it is suggested that these plants may have therapeutic value in the treatment of TB. However, further investigations are needed on isolating chemical constituents responsible for eliciting the observed activity in these plants.

- 389.** Ayele Y, Kim JA, Park E, Kim YJ, Retta N, Dessie G, Rhee SK, Koh K, Nam KW, Kim HS. **A Methanol Extract of *Adansonia digitata* L. Leaves Inhibits Pro-Inflammatory iNOS Possibly via the Inhibition of NF-κB Activation.** *Biomol Ther (Seoul)*. 2013 Mar;21(2):146-52. doi: 10.4062/biomolther.2012.098.

Abstract

This study examined the total polyphenol content of eight wild edible plants from Ethiopia and their effect on NO production in Raw264.7 cells. Owing to its relatively high polyphenol concentration and inhibition of NO production, the methanol extract of *Adansonia digitata* L. leaf (MEAD) was subjected to detailed evaluation of its antioxidant and anti-inflammatory effects. Antioxidant effects were assessed by measuring free-radical-scavenging activity using 1,1-diphenyl-2-picrylhydrazyl (DPPH) and oxygen-radical-absorbance capacity (ORAC) assays, while anti-inflammatory effects were assessed by measuring inducible nitric oxide synthase (iNOS) expression in lipopolysaccharide (LPS)-stimulated RAW264.7 cells. In the ORAC assay, MEAD was 10.2 times more potent than vitamin C at eliminating peroxy radicals. In DPPH assay, MEAD also showed a strong ROS scavenging effect. MEAD significantly inhibited iNOS activity (IC<sub>50</sub>=28.6 µg/ml) of LPS-stimulated Raw264.7 cells. We also investigated the relationship between iNOS expression and nuclear factor kappa B (NF-κB) activation. MEAD inhibited IκBα degradation and NF-κB translocation from the cytosol to the nucleus in LPS-induced RAW264.7 cells without significant cytotoxic effects, as confirmed by MTT assay. These results suggest that MEAD inhibits anti-inflammatory iNOS expression, which might be related to the elimination of peroxy radicals and thus the inhibition of IκBα-mediated NF-κB signal transduction.

**390.** Teklay A, Abera B, Giday M. **An ethnobotanical study of medicinal plants used in Kilte Awulaelo District, Tigray Region of Ethiopia.** *J Ethnobiol Ethnomed.* 2013 Sep 8;9(1):65. doi: 10.1186/1746-4269-9-65.

#### Abstract

**BACKGROUND:** The Ethiopian people have been dependent on traditional medicine, mainly medicinal plants, from time immemorial for control of human and animal health problems, and they still remain to be largely dependent on the practice. The purpose of the current study was to conduct ethnobotanical study to document medicinal plants used to treat diseases of human and domestic animals in Kilte Awulaelo District in the Tigray Region of Ethiopia.

**METHODS:** Ethnobotanical data were collected between July and September 2011 through semi-structured interviews, ranking exercises and field observations. For the interviews, 72 knowledgeable informants were sampled using purposive sampling method. For the different

ranking exercises, key informants were identified with the help of elders and local administrators from informants that were already involved in the interviews.

**RESULTS:** The study revealed 114 medicinal plant species belonging to 100 genera and 53 families. The plants were used to treat 47 human and 19 livestock diseases. Of the species, the majority (74%) were obtained from the wild. Herbs were the most utilized plants, accounting for 44% of the species, followed by shrubs (29%). Leaf was the most commonly used plant part accounting for 42.98% of the plants, followed by roots (25.73%). Preference ranking exercise on selected plants used against abdominal pain indicated the highest preference of people for *Solanum marginatum*. Direct matrix ranking showed *Cordia africana* as the most preferred multipurpose plant in the community. Preference ranking of selected scarce medicinal plants indicated *Myrica salicifolia* as the most scarce species, followed by *Boscia salicifolia* and *Acokanthera schimperi*. According to priority ranking, drought was identified as the most destructive factor of medicinal plants, followed by overgrazing and firewood collection.

**CONCLUSION:** Medicinal plants are still playing significant role in the management of various human and livestock diseases in the study area with herbs taking the lead in the number of plants used in the preparation of remedies, which may be an indication of their relatively better abundance as compared to other life forms. Recurrent drought was reported to have seriously threatened medicinal plant resources in the District. Awareness is thus needed be raised among local people on sustainable utilization and management of plant resources. Ex situ and in situ conservation measures should be taken to protect the medicinal plants of the District from further destruction and special attention should be given to the medicinal plants that were indicated by preference ranking exercise as the most threatened ones.

- 391.** Adem Yesuf, Kaleab Asres Wound healing and antiinflammatory properties of *Allophylus abyssinicus* (Hochst.) Radlk *Phytopharmacology* 2013, 4(2), 442-453

#### Abstract

The leaves of *Allophylus abyssinicus* (Hochst.) Radlk. (Sapindaceae) are used for the treatment of wounds, burns, skin diseases and to arrest bleeding in the Ethiopian folk medicine. In this study, the hydroalcoholic extract and the different solvent fractions obtained from the leaves of A.

abyssinicus were evaluated for their wound healing and antiinflammatory activities. Wound healing activity was studied using excision, incision and dead space wound models whilst carrageenan-induced mouse paw oedema model was used to evaluate antiinflammatory activity. The methanolic fraction levigated in simple ointment at concentrations of 5% and 10% was found to be the most active in the excision wound model. Also, the same fraction exhibited good healing effect in incision and dead space models in a dose dependant manner. At a dose of 200 mg/kg, all the test substances except the chloroform fraction exerted significant antiinflammatory effects when compared to the control, the methanolic fraction being the most active. The present study supports the folkloric use of the plant for the treatment of wounds and inflammatory conditions.

Keywords: *Allophylus abyssinicus*; hydroalcoholic extract; solvent fractions; wound healing; antiinflammatory

392. Getachew Addis **Development of plant based medicines against major Ectoparasites of ruminants: Accomplishments and future directions***Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

**Background:** In developing countries like Ethiopia, livestock are lifeline for the rural communities; important as food source, income generating through export. Ectoparasites affects the ruminants which causes reduction in production & productivity through direct effect such as sucking and chewing, and under extreme cases fatality and indirect effects such as disease transmission such as bacterial, fungal, rickettsial, viral and protozoan diseases, exposing to opportunistic infections. Ectoparasites causes economic losses through lowering meat production, drop in quality or complete rejection of tannery products. Ectoparasites are of Zoonotic importance and have higher prevalence due to the inaccessibility & toxicity of modern drugs. Searching alternative medicine against ectoparasites of ruminants is of the current concern. The objective of this project was the Development of effective and safe plant based acaricide(s) against four ectoparasites (mange mites, ticks, lice and sheep ked) of small ruminants.

**Methodology:** Plant extracts, essential oils and appropriate formulations were developed for the study. Adult mites, sheep keds, lice and ticks were collected from infested animals. The parasites were incubated until nymph is produced and placed in petridishes. The experimental designs were both *in-vivo* and *in-vitro* with positive controls (Diazinon/Ivermectin), Negative controls (Excipients excluding extract). For *In vitro* efficacy study on ectoparasites twelve medicinal plants were tested against Sheep ked and seven medicinal plants against mange mite, ticks & lice. The *in-vitro* efficacy of the extracts and formulations were tested directly on the parasites.

**Results:** The *C citratus*, *E globules* showed a comparable *in-vitro* accaricidal effect on the sheap ked (*Melophagus Ovinus*) with standard Ivermectin, at 1.565 $\mu$ l/ml and 6.25  $\mu$ l/ml; respectively. Superior mange mite mortality were observed at 0.3125% *E globules*, 0.15625% *C citratus* than diazinon(0.1%) and Ivermectine(0.01%). *C citratus* (0.625%) and *E globules* (1.25%) of up to 3hrs

showed a higher mortality than the diazinon (0.1%) on Lice (*Damalina ovis*). Two formulations: 2.5% *C citratus* with Fixative *Jatropha curcas* oil and 5 % *E globulus* with Fixative *Jatropha curcas* oil show a 100% lethal effect on Lice & sheep ked. The formulations containing *C citratus* & *E globulus* were safe for skin sensitization potential, the community based/simulation efficacy trial was also similar with *in vivo* result.

**Conclusions & Recommendation:** Formulations prepared from *C citratus* and *E globulus* essential oils are found to be effective and safe acaricides. Ticks are relatively resistant to extracts of the selected medicinal plants. The selected plants used for this study are amenable to large scale production. Product optimization using cheaper & safe emulsifier is recommended. Creating linkage with manufacturing industry, Continue study on use of the plant as a byproducts for forage, compost production and pilot and industrial scale production of the formulated drug(s) is highly recommended.

**393.** Abinet G/Mickael **Toxicological study of anti-ectoparasitic formulations comprised of essential oils obtained from *C. citrates* and *E. globules* mixed with *J. curcas* oil on Liver, Kidney and some blood parameters in mice.** *Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

**Background:** Ethiopia's economy is based on agriculture. Livestock was the 2nd major source of foreign currency. Skins from goats and sheep contribute the largest share to export commodities. However in recent years, this rank has been getting down. External parasites cause 35% of sheep skins and 56% of goat skin rejections. Therefore, ectoparasitic infection constitute an important health problem. Lice, keds, mange mites and ticks are the major ectoparasites. Synthetic drugs are available with different grades of success. Rapid development of resistance, high cost and other problems were associated with synthetic drugs. *Cymbopogon citratus* (DC.) Stapf Commonly called lemon grass (LomiSar). It is used against common cold, fever and as insect repellent. *E globules* Labill in Ethiopia, it is known as “NechBahrzaf” is an evergreen tree. Its leaf extracts

have been used to treat influenza, chest rub, and skin rashes. Eucalyptus oil can act as a natural insect repellent. The formulations comprised of essential oil extracts of *C. citratus* and *E. globules* showed anti-ectoparasitic efficacy. So, the present toxicological study is carried out to evaluate any toxic effects of the formulations after oral treatment in mice.

**Methods:** Volatile oils of *C. citratus* and *E. globules* were obtained from WARC. Different formulations were prepared. Acute Toxicity Study was conducted on adult albino Swiss mice as grouped in to different doses starting with 0.5ml/kg up to 4ml/kg of each formulation while one group was placed as a control group received vehicle. For sub-chronic toxicity study each mice were treated for 12 consecutive weeks in 24 hrs interval by using gavage. At the end of 12th week, blood samples were taken by cardiac puncture. The serum and blood samples were then analyzed in automated analyzer. All animals were sacrificed by cervical dislocation. Then, the liver and kidney were collected for pathological analysis.

**Results and discussions:** In acute toxicity study: No mortality up to 2.5ml/kg doses of formulations. Signs of toxic effects like debilitation, piloerection and restlessness were observed at and above 2.5ml/kg. Mortality was recorded at and above 3ml/kg doses. No gross changes observed on the liver and kidney. No statistically significant ( $p>0.05$ ) changes in any of the selected hematological parameters and serum biochemical parameters at both doses tested in the sub chronic study. No noticeable changes in the general behavior, and abnormal gross findings on vital organs however, dose-dependent focal alterations were observed in the liver and kidney sections. Mice in all group showed final weight gain.

**Conclusion and Recommendations:**The formulations do not produce obvious toxic effects in acute and sub chronic treatment. Further toxicological investigation is recommended on: Other vital internal organs of the body and on non- rodent species.

- 394.** Ashenif Tadele, Marta Alemye, Negero Gemed, Hirut Lemma, Christina Haile, Asfaw Debella, Getachew Addis, Berhanu Tesfaye, Yehualashet Belete, Abiy Abebe, Bekesho Geleta; **Development of Dermatological Formulations of some Herbal Remedies claimed to have Antifungal Activities** *Proceeding of Scientific Review on the*

*Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

**Background:** Skin disease is very common in both developing and developed countries. One-quarter to one-third of the population are suffering from a skin problem. Skin diseases have been of major concern recently due to their association with HIV AIDS. More than 90% of HIV infected individuals develop skin and mucosal complications at some stage during the disease. In Ethiopia, it is among the most frequent causes of morbidity, the sixth most frequent cause of outpatient visits. The prevalence rate of skin infection is 49.2 %, of which fungal and bacterial infection are the most common. Fungal infections account 18.5 - 33%. Treatment of dermatophytosis: azoles and allylamines. Side-effects including hepatotoxicity, neurotoxicity, nephrotoxicity, Skin problems like Stevens-Johnson syndrome; Drug interactions; Increasing resistance -result in treatment failure; The treatment of these infections is prolonged and expensive. Essential oils are rich sources of biologically active compounds and constitute a major source of natural organic compounds: possessing antibacterial, antifungal, antiviral, insecticidal and antioxidant properties, and are used in food preservation, aromatherapy and fragrance industries. Thus the discoveries of essential oil preparations have been the subject of many investigations.

**Objective:** To develop Safe and Effective Topical Formulations against some fungal strains from medicinal plants.

**Methods:** the plant materials were collected and their essential oils were collected by using distillation. The Chemical Composition of the oils was analyzed by using GC-MS, GC, and TLC. Antimycotic activity was determined by using both the standard and clinical isolate fungal strains. Acute and Sub chronic toxicity was conducted on mice and rat. Different topical formulations were prepared and evaluated for their organoleptic and physicochemical properties. On the Formulated Products Antifungal activity will be determined by agar well diffusion technique. Skin irritation test - using rabbits, (OECD, 2002, Skin sensitization - using albino guinea-pigs, Acute dermal toxicity test - using mice, Repeated dermal toxicity test - using Albino rats and Shelf Life Determination will be conducted.

**Results:** Identification of the Chemical constituents of the essential oils were carried out by GC, GC.MS and TLC experiments were generated. No lethality at administered dose range up to 2.5 ml/kg and 3.0 ml/kg for *C Citratus* oil and *T ammi*; respectively. The oils were not produce as toxic effects deferent from the control group on Hematology of and Blood chemistry parameters. The essential oils; *T ammi* and *C citratus* showed antimycotic activity at a concentration of 1% and 0.125%, respectively on *Trychphyton mentagraphytes*, *Trychophyton vercusolium*, *Mycosporium Cannis*, and *Aspirigilus Niger*. On the formulation 1% 1% *C citratus* , and 1% *T. ammi* Macrogol blend ointment shows a higher inhibition zone than the standard clotrimazol and miconazole cream. Pilot study of skin sensitization by using 5% preparation of this ointment, does not produce any skin irritation according to the Magnusson and Kligman Grading Scale.

**Conclusion and Recommendation:**Both essential oils show a promising antifungal activity. Two formulations show a comparable activity on the common pathogenic fungi. The oils do not produce series mortality up to 4 ml/kg except minor change on liver and kidney. The formulated product does not skin sensitization potential skin up to 5%. Substitution of the synthetic dermatological bases with natural origin such as Shea butter, Aloe vera, Castor oil, *Jatropha curcas* is an ongoing process. There is a need for standardization of the extracts/plant materials and feasibility study of the project.

395. Claire E Scantlebury, Laura Peachey, Jane Hodgkinson, Jacqui B Matthews, Andrew Trawford, Getachew Mulugeta, Gebre Tefera and Gina L Pinchbeck  
**Participatory study of medicinal plants used in the control of gastrointestinal parasites in donkeys in Eastern Shewa and Arsi zones of Oromia region, Ethiopia**  
*BMC Veterinary Research* 2013, **9**:179 doi:10.1186/1746-6148-9-179

Abstract

## ***Background***

Gastrointestinal nematode infections constitute a threat to the health and welfare of donkeys worldwide. Their primary means of control is via anthelmintic treatments; however, use of these drugs has constraints in developing countries, including cost, limited availability, access to cheaper generic forms of variable quality and potential anthelmintic resistance. As an alternative, bioactive plants have been proposed as an option to treat and control gastrointestinal helminths in donkeys. This study aimed to use participatory methodology to explore donkey owner knowledge, attitudes and beliefs relating to the use of plant-based treatments for gastrointestinal parasites of donkeys in Ethiopia.

## ***Results***

In focus groups, 22/29 groups stated they knew of plants used for the treatment of gastrointestinal parasites in donkeys. All groups volunteered plants that were used in cattle and/or small ruminants. In total, 21 plants were named by participants. ‘Koso’ (*Hagenia abyssinica*) ‘Grawa’ (*Vernonia amygdalina*) and a mixed roots and leaves preparation were the most frequently named plant preparations. ‘Enkoko’ (*Embelia shimperi*) and ‘a mixture of roots and leaves’ were ranked highly for effectiveness in donkeys. However, ‘Grawa’ and ‘Koso’ were the highest ranked when taking into account both the rank position and the number of groups ranking the plant.

Thematic analysis of participants’ current attitudes and beliefs surrounding traditional plant-based remedies for gastrointestinal parasites revealed that anthelmintics obtained from clinics were generally favoured due to their ease of administration and perceived higher effectiveness. There was doubt surrounding the effectiveness of some plant-based treatments, but there were also perceived advantages including their low cost, ease of cultivation and availability. However, plant-based treatments were considered a “*past trend*” and people favoured “*modern*” medicine, particularly among the younger generation.

## ***Conclusions***

There was extensive knowledge of plant-based treatments for gastrointestinal parasites in livestock in Ethiopia. In donkeys, Koso (*Hagenia abyssinica*), Grawa (*Vernonia amygdalina*), Enkoko

(*Embelia shimperi*) and ‘mixed roots and leaves’ were the most frequently named and/or highest ranked plants with reported efficacy against gastrointestinal parasites. Further *in vitro* and *in vivo* investigation of these plants is now required to determine viable alternatives for the treatment and control of gastrointestinal parasites in Ethiopia.

Keywords:

Ethnoveterinary; Anthelmintic; Nematode; Participatory; Donkey; Equid; Ethiopia; Thematic analysis

- 396.** Negero Gameda, Asfaw Debella, Mesfin Tefera, Yehualashet Belete, Rejea, Bekesho Geleta, Yared Debebe, Hirut Lemma, Abiy Abebe, Temesgen Memberu and Mekonnen Debebe; **Investigation on Chemical Profiles, Efficacy and Safety of Some Promising Medicinal Plants against Common Diarrhea causing Bacterial Pathogens** *Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

**Background:** Intestinal infection is the most common cause of diarrhea. Diarrhea kills 2,195 children every day - more than AIDS, malaria, and measles combined. In Ethiopia, various studies reported that diarrheal disease as the major causes of infant and child mortality and morbidity. So far, diarrhea is routinely treated with antibiotics. However, antibiotics are ineffective against many pathogens, due to antimicrobial drug resistance. Investigation of these traditionally claimed anti diarrheal plants could give alternative antimicrobial agent. So far many plant species have been screened for substances with therapeutic activity against diarrhea causing pathogens. Out of the investigated plants, the crude extracts of: *Albizzia gummifera*, *Syzygium guineense*, showed good antimicrobial activities against a diarrhea causing bacterial pathogens. Plants have complex chemical composition; the use of TLC autography (Bio-autography) bioassay allows the detection of bioactive components in crude plants which show activity against pathogens. The objective of this work was further evaluation of 2 to 3 most promising medicinal plants and identify the active antimicrobial constituent(s) that are active against common bacterial culprits involved in the etiology of diarrheal disease

**Methods:** Following botanical identification, hydroalcoholic (Methanol 80% /Ethanol Ethanol (70%)) extract of the air-dried plants were prepared. These extracts were evaluated for their antidiarrhoeal properties on Clinical isolates and standard microorganisms. Acute toxicity and subchronic toxicity study was conducted by using rats. All the measurements were replicated three times. Antibacterial zone of inhibition diameter, data were entered into excel spreadsheet and are presented as mean  $\pm$  SD. For the significance of treatment and control; data were first tested for normality and then ANOVA using statistical software (Minitab 16.0, England). Significant differences between mean values were determined using Tukey's multiple range tests following one-way ANOVA and P values  $< 0.05$  were considered as significant.

**Results:** A total of 6 medicinal plants have been assessed for their antibacterial activity against diarrhea causing bacteria. *Albizia gummifera* seed methanol extract have showed good antibacterial activity against *E. coli* (10 mm –inhibition zone diameter), *S. aureus* ( 12- inhibition zone diameter),( *S. pyogen* 15- inhibition zone diameter) and *S. pneumonia* (14- inhibition zone diameter) bacteria; when compared to ciprofloxacin with 22, 20 20 21 mm, respectively. The highest antibacterial activity was shown by *Albizia gummifera* against diarrhea causing bacteria (*E. coli* MIC = 0.5mg/ml, *Shigella boydii* MIC = 1mg/ml, *Shigella spp* MIC = 0.5 mg/ml and *Salmonella spp* MIC = 0.5mg/ml) and general infection causing bacteria (*S. pneumonia*, *S. pyogen* and *S. aureus* with MIC of 0.25 mg/ml). Another remarkable activity was excreted by methanol extract of *Syzygium guineense* with MIC range of 0.25 -2 mg/ml. Bioautographic evaluation of methanol extract of *A. gummifera* showed high number antibacterial constituents. In acute toxicity study the methanol extract of *A. gummifera* did not show any mortality up to a dose of 3000 mg/kg. Mortality was observed at a dose of 4000mg/kg *A. gummifera* seed extract. Animals have shown no sign of toxicity up to 3000mg/kg such as CNS effect (excitement, ataxia, and sleep), altered feeding and vomiting (4000 mg/kg). And no gross necropsy (on liver and kidneys) was evident in the sub chronic test.

**Conclusion and recommendations:** The study indicates that *A. gummifera* showed excellent bioactivity. It could be the best botanical alternative for the treatment of diarrheal diseases. Bioautography assay of *S. guineense* and other promising plants and Isolation and identification of bioactive components of *A. gummifera* and a comparative study of the most regenerative part of the plant like leaves and flowers are also recommended.

- 397.** Kidist Zealiyas **Anti-promastigote and haemolytic Activity of selected Ethiopian Traditional Medicinal Plants Used for Treatment of Leishmaniasis**  
*Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela  
November 15-17, 2013 Ambo, Ethiopia

**Background:** Leishmaniasis is a disease caused by protozoan parasite of the genus *Leishmania*. It is transmitted by female sandfly. Globally, more than 12 million people infected 350 million people at risk developing the disease and about 2 million new cases occur annually. The clinical manifestations of leishmaniasis are known to three forms: cutaneous leishmaniasis (CL), visceral leishmaniasis or Kala-azar (VL) and mucocutaneous leishmaniasis (MCL). In Ethiopia, cutaneous leishmaniasis is endemic in highland of the country and it is caused mainly by *L. aethiopica* and occasionally by *L. tropica* and *L. major*. Visceral leishmaniasis is mainly found in the arid and semi-arid area and it is caused by *L. donovani*. The chemotherapy of leishmaniasis is unsatisfactory because of their limited efficacy, significant toxicity and increasing drug resistance. Therefore, there is a need for the developments of herbal medicines which have safer and affordable therapeutic agents.

**Objective:** To screen traditional medicinal plants for anti-promastigote activity against human *Leishmania* parasites in vitro.

**Materials and methods:** Based on ethno medicinal information, *Verbascum sinaiticum*, *Albizia gummifera*, *Balanites aegyptica*, *Millettia ferruginea*, *Moringa stenopetala* were collected and 70% ethanol and water crude extracts were prepared. Reference strains of *Leishmania* parasites *L. donovani* (MHOM/50/68/15), *L. chagasi* (MCAN/BR/84/CO9/0), *L. major* (MHOM/IR/72/NAD/MS), *L. tropica* (IROS/NA/80/HD3) and Clinical isolate of *L. aethiopica* were used in this study. The Red Blood Cell lysis and Anti-promastigote activity of the crude extract and fractionate were tested. The different extracts of the plants were dissolved by 1% DMSO. Amphotericin B was used as a standard reference in this study. Absorbance of the supernatant were recorded at 540 nm using ELISA reader and compared to positive control for Red Blood Cell lysis activity of the extracts and standard drug. Optical density of each plate measured using ELISA reader fluorometrically and percent growth inhibition of treated samples

compared to control for measuring the Anti-promastigote activity test extract and reference drug. Graphpad Prism version 6 (Graphpad Software, Inc. USA) was used for statistical analysis of IC50 and LC50 values at 95% CI.

**Results:** *A. gummifera* showed anti-promastigote effect comparable to the standard Amphotercin B drug. The crude ethanol extract of *A gummifera* (seed) have effects on the growth of Leishmania promastigote with IC50 (  $\mu\text{g/ml}$ ) of 0.78, 0.94, 8.65, 0.35, 9.21 on *L. tropical*, *L. major*, *L. donovani*, *L. changes*, and *L. aethiopica* respectively. The IC50 ( $\mu\text{g/ml}$ ) values of the aqueous partition of *A. gummifera* had 1.11, 1.11, 1.11, 1.41 and 2.83 on *L. tropical*, *L. major*, *L. donovani*, *L. changes*, and *L. aethiopica* respectively. The n-butanol partition of the same plant also showed very high anti-promastigote effect with IC50 ( $\mu\text{g/ml}$ ) 0.22, 0.18, 0.28, 0.18, 0.27 on *L. tropical*, *L. major*, *L. donovani*, *L. changes*, and *L. aethiopica* respectively. Ethanol extracts of *B. aegyptica* (leaf) and *M. ferruginea*. IC50 values of 17.91 and 1.01 $\mu\text{g/ml}$  against *L. aethiopica* .However, *B. aegyptica* (fruit) and *M. stenopetala* lack of antileishmanial effect.

**Conclusion and recommendations:** *A. gummifera* could potentially be developed in to a broad spectrum anti-leishmanial drug. The n- butanol and aqueous residue showed an excellent activity against all Leishmanian species. *B aegyptica* (leaf) and *M.ferruginea* (seed) extracts showed very high activity against *L aethiopica*. It is that In-vivo studies must be carried out on *A gummifera* crude extracts/ n-butanol and aqueous residue. Most active fractions of *A gummifera* (n-butanol and aqueous) must be further isolated

- 398. Yared Debebe**, Mesfin Tefera, Walelign Mekonnen, Dawit Abebe, Asfaw Debella, Samuel Woldekidan, Abiy Abebe, Yehualashet Belete, Temesgen Menberu, Martha Alemeye, Hirut Basha, Birhanu Tesfaye, Kidist Yirsaw, Bethelhem Belayneh, Melkamu Demeke, Zenebech Adela, Birhanu Asaye; Ethiopian Public Health Institute **Overview on the studies of some traditionally used medicinal plants against parasitic helminthic infestations** Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia **Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia**

**Background:** Parasitic infections are important public health issue particularly in developing world in which Social and economic deprivation, Poor hygienic condition, Warm climates are the major challenges. Globally, 3.5 billion people are affected by intestinal parasites. In Ethiopia more than half million visits of OPD was due to Intestinal parasitic infections. Taeniasis is among the most prevalent IPIs in Ethiopia. Conventional drugs used praziquantel and niclosamide. In addition Traditional herbal remedies such as *Embelia schimperi* (Enkoko), *Maesa lanceolata* (Kelewa), *Myrsine Africana* (Kechemo) have been used in treating tapeworm infestations for ages. However, there is a lack of scientific based evidences regarding efficacy studies, safety studies, phytochemical analysis and appropriate dosage form formulations those plants despite their frequent use as anthelmintics.

**Objective:** To generate scientific evidence on efficacy, safety, phytochemistry & other relevant preclinical information there by develop Anthelmintic herbal drug.

**Materials and methods:** *E. schimperi*, *M. lanceolata*, *M. Africana* fruits were collected from their natural habitat (Jimma, Menagesha, Bahirdar, Gonder). Voucher specimen were collected, identified and deposited in the herbarium of TMMRD of EPHI. The 80% EtOH crude extract and different fractionate were prepared. The Phytochemical screening via chemical tests and TLC and Chemical characterization using UV-spectrophotometry, HPLC, NMR were conducted. The Anthelmintic activity evaluation was conducted using *In vivo* by infecting albino mice with *H. nana* and *In vitro* by eggs of Hookworm & strongyloides spp from human stool and allowed to hatch into larvae. The assay methodology was set-up in a 96- well micro titer plates. Data analysis was carried out using SPSS version 16. The mean difference between the treatment and control group was compared using one way ANOVA and Post-hoc analysis. P-values less than 0.05 were considered significant.

**Results:** the crude extracts of both *E. schimperi* & *M. Africana* contains tannins, cardiac glycosides, anthraquinones, free quinones, Polyphenols. The Safety study indicated that the two plants have LD50 above 5,000mg/kg. The Sub chronic toxicity study indicated that no statistically significant observed in the Changes in body weight, hematological & biochemical parameters in treated & control groups. No changes in histology of the kidney tissues at 1200mg/kg and no abnormalities

observed on the Liver & kidney tissues of mice at 400mg/kg. *In vivo* Cestocidal activity of 80% EtOH crude extract of *E. schimperi* showed that

100% parasite clearance at 2gm/kg, while embelin isolated from *E. schimperi* showed 85.3% parasite clearance at 750mg/kg. The crude extract of *E. schimperi* showed that 90, 69, 33 and 25 % mortality of Hook worm spp and 93, 80, 64, 23 % mortality of strongyloid spp at 400, 200, 100, and 50mg/ml, respectively. 25mg/ml 80 % ethanol fraction (67%), 25mg/ml dichloro methan fraction (67%) showed better percent mortality of hook worm spp than 20 mg/ml of standard albendazole drug (60%). The n-butanol, aqueous and pet-ether fraction have less or no mortality effects on hook worm spp.

**Conclusion & recommendations:** Fruit extracts of *E. schimperi* and *M. africana* have indeed an anthelmintic activity. *E. schimperi* has wide range of safety margin & may be relatively safe for oral medication for human use if further investigation is carried out. Further experimentation is mandatory for *In vitro* assay on taenia spp and toxicity in non-rodent animals.

**399.** Endale Seifu **Characterization, Elixir Formulation and Evaluation of Ammonia-Treated and Defatted Hydroalcoholic Extract of Fruits of *Embelia schimperi* Vatke** *Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

**Background:** *Embeliaschimperi* Vatke belongs to *Myrsinaceae* family. It is locally known as (Enkoko(Amh.). Traditionally the fruit is used for the treatment of tape worm infestations and it is believed to eliminate adult stage of the human tapeworm. Pharmacological *in-vitro* studies indicated that a single oral dose of 1g/kg showed a 100 % hookworm and at 400 mg/ml showed 92% of strongyloides killing activity. The plant has wide of safety margin, LD50 above 10,000mf/kg. Therefore studying the suitable dosage form is required for the better use of the plant for the management of helminthic infestations by the society.

**Objective:** To develop Safe and Effective Anthelmintic herbal remedy from traditionally used *Embeliaschimperi*.

**Methods:**the dried fruits of *E. shimperi* were collected from the local market (Bahir Dar, Gondar) botanical identified and voucher specimen were deposited at herbarium of EPHI. The traditional dose of the extract was prepared by extracting 8.23g of the powdered plant material as a single dose using 6% Ethanol. For elixir preparation the crude extract was treated with ammonia and then defatted and filtered. Quantification and characterization of embeline was conducted using HPLC. The stability of the elixir of *E. shimperi* was conducted at ambient (25<sup>0</sup>C/60 RH and accelerated stability conditions 40<sup>0</sup>C/75 RH) and then the general physical screenings (such as clarity, pH, assay and microbial load) was conducted on the elixir samples.

**Results:** The solubility, moisture content and total ash content of the crude extract was 6.03± 0.50g/100ml, 8.2± 1.5%, 7.17 ± 0.89%, respectively. The concentration of embelin in the traditional dose (0.44mg/ml) and final extract (0.15mg/ml) was 13±0.024µg/ml and 20± 0.015 µg /ml, respectively. The absorbance of the elixir samples stored under ambient and accelerated stability conditions at λ<sub>max</sub> 428nm were 0.51±0.002, 0.5±0.001, 0.5±0.001, 0.5±0.002, and 0.48±0.001, 0.48±0.001, 0.47±0.002, 0.50±0.001 and the pH values were 7.51±0.02, 7.50±0.001, 7.50±0.02, 7.52±0.01 and 7.52±0.03, 7.50±0.02, 7.49±0.03, 7.50±0.02, at 0,1,2 and 3 months of storage, respectively.

**Conclusion and recommendations:** Water solubility of Embelin can be improved by the addition of a weak base, ammonia. RP-HPLC can be used to determine the dose of the plant material in the crude extract. The elixir formulation of the plant material preserved its stability over three months of storage under ambient and accelerated storage conditions. The safety and efficacy of the formulation will be ascertained before conducting clinical trials. The effect of other stability factors, such as light, should be studied. Other dosage forms should also be considered.

**400.** Temsgen Menberu **Overview on the studies of some traditionally used medicinal plants against malaria and insect repellent activity** *Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

**Background:** Malaria is currently the leading global health problem, especially in the poor nations of Africa and Asia. Globally, 3.3 billion people at risk, an estimated 219 million cases, and 660,000 deaths mostly children under 5 years of age in sub-saharan Africa. In Ethiopia, approximately 4-5 million cases of malaria are reported annually and it is prevalent in 75% of the country, putting over 50 million people at risk. An epidemic which traditionally occurs every 5-8 years is a hallmark of malaria. The deadliest form of malaria, *P. falciparum* occurs with combined infection with *p. vivax*. The malaria control program such as vector control interventions, preventive therapies and treatment strategies are challenged by emerging parasite resistance to the treatment and insecticides. This leads for the urgent need for new, safe and effective drug for the treatment of malaria.

**Objective:** Developing safe and effective antimalarial herbal drug from traditionally claimed locally available medicinal plants.

**Methods and materials:** Various plant materials were collected from different parts of the country. Voucher specimen were collected, identified and deposited in the herbarium of TMMRD of EPHI. The aqueous, hydroalcoholic and different fractionate were prepared for subsequent study. Phytochemical studies of the extracts were conducted. *In-vivo* efficacy test in animal models (4 day-suppressive, curative and prophylactic test were conducted according to the standard methods in addition to the *In-vitro* efficacy test in laboratory cell culture plates. The acute and chronic toxicity protocols were conducted on animal model according to the OECD guidelines. The root of *G. stenophylla* and *Cordia sinensi* were tested for analgesic and antipyretic activity in Swiss albino mice.

**Results:** A total of 19 plants have been screened for their antimalarial activity. Among them *Cissampelos mucronata*, *Asparagus africanus*, *Gnidia stenophylla* shows a promising activity. The root aqueous extract of *G. stenophylla* showed a 55 % inhibition in *p. berghei*, the hydroalcoholic extract of the roots of *A. africanus* 55.5% inhibition in *p. berghei* and 52.7% inhibition in *p. berghei* was obtained from the aqueous extract of the leaf of *V. bipontini*. The analgesic and antipyretic activity of *G. stenophylla* and *Cordia sinensi* was in progress. The mosquito Repellent test showed that *Cympobogo nardose* and *Clinia spp* have 4 hour and 3 hour

complete protection time at 10% conc. The experiment is on progress. The acute and sub chronic test showed that extracts have no significant toxic effect on the animals at their effective dose level.

**Conclusion and recommendation:** The research findings conducted so far show the possibility of finding a promising antimalarial drug from plant in the future, if a rigorous search is made and the capacity of the lab, and the researchers working there maintained at best performing state. The ethnobotanical survey and evaluation of additional medicinal plants should be consolidated. The search for traditional medicinal plants in ethno botanic survey is currently undergoing to cover various cultures and traditions throughout the country to bring additional candidates for scientific evaluation.

- 401.** Mebruka Mohammed **Standardization of the Roots of *Gnidia stenophylla* Gilg**  
*Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela  
November 15-17, 2013 Ambo, Ethiopia

**Background:** *Gnidia stenophylla* Gilg belongs to the family Thymelaeaceae. The family contains 50 genera and 600 species. It is a small perennial shrub; it has slender stems, needle like leaves with yellow/white flower. The plant locally known as Kataricha (Oromigna) and used in folk remedies for Malaria, Syphilis, Wound, cancer etc.... the In-vivo study showed that at 400 mg/kg per day 87.8% paracetamol inhibition. The plant also showed LD<sub>50</sub> greater than 6000mg/kg. Hence there is a need for the standardization of the plant material before conducting further clinical study.

**Objective:** To set pharmacopoeial standard/monograph of *G. stenophylla* root

**Methods:** The fresh roots/ off aerial portion the plant was collected from Gongoma (557 km SE of Addis). The root was washed and dried under shade then ground to powder. Then macroscopic (color, taste, odor and test), microscopic, physicochemical (Moisture content (%), Ash Values (mg/g), Swelling Index ml/g), Tannin content, Extractive values, Foaming Index), phytochemical were conducted. The purity/Residue Analysis such as heavy metal, pesticide and radio chemical

residue analysis were conducted by using AAS (Shimadzu, AA-6800), GC/ECD (Agilent 7890A) and Rados survey meter (RDS, 30).

**Results:** The powder is khaki, dark brown color, highly bitter taste, dusty, pungent, irritating and unpleasant odor internally smooth and 10-15cm long and 1-3cm in width. The physicochemical analysis indicated that the powder had Moisture content -6.689 ( $\pm$  0.053) %, total ash- 40.800 ( $\pm$ 1.076) mg/g, Acid insoluble ash- 8.000 ( $\pm$  0.150)mg/g, Water soluble ash- 7.550 ( $\pm$  0.433)mg/g, Swelling index- 7.600 ( $\pm$  0.854) ml/g, Foaming Index- 100.012 ( $\pm$  1.987), Tannin content- 401.910 ( $\pm$ 5.523) mg/100g, the highest Methanol soluble extractive value -15.266 ( $\pm$  0.524)% and the lowest Hexane soluble Extractive value-0.7272 ( $\pm$  0.238)%. The extract of the plant showed g-BHC 0.0005, p,p-DDT 0.0013 and p,p-DDE0.0011  $\mu$ g/g which very much lower than the WHO limit 0.6, 1 and 1( $\mu$ g/g, respectively. However the Heavy metal residue is much greater than the WHO limit, Cd- 0.9, Co-5.7, Ni-8.4, Cr-7.5, Pb-17.2, Cu-205.4  $\mu$ g/g while the WHO limit is <0.3, <3, <6, <2, <10 and <150  $\mu$ g/g, respectively.; and contamination of Radiochemical residue is 0.110+0.012 (mSv/h) while the WHO limit negligible amount.

**Conclusion and Recommendations:** The finding showed that there is Purity/Trace/residue contamination of *Gnidia stenophylla* Gilg plant. This is an indication of the needs of standardization of other medicinal plants, strengthen regulatory process in addition to assuring the safety, efficacy and promote effective use. The source of pesticide and heavy metal such as As and Hg should be assessed. Bioassay guided isolation is mandatory for further standardization of the plant materials. It should be encouraged that standardization of other medicinal plants of Ethiopia and issue a policy to regulate quality of medicinal plants and their products.

**402.** Berhanu Tesfaye **Overview on the studies of some traditionally used medicinal plants against Diabetes mellitus** *Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

**Background:** Diabetic Mellitus (DM) - a systemic metabolic disease characterized by hyperglycemia and hyperlipidemia. It is Resulting from reduced insulin secretion, insulin action,

or both. Long-term hyperglycemia leads to micro & macrovascular complications. Global prevalence of diabetes estimated to increase from 8.3 % (366M) in 2011 to 9.9 % (522M) by 2030. Almost 80% of diabetes deaths occurred in low and middle-income countries. Diabetic cases in Ethiopia in the year 2000 were estimated 800,000 and are expected to increase to 1.8 million by 2030. The therapeutic agents for these are long live that leads to patient compliance problem and have disreputable side effects in addition to unaffordability. There is a great need for the development of therapeutic agents from medicinal plants. Some research finding showed that the crude aqueous extract and its solvent fractions of the leaves *M. stenopetala* demonstrated hypoglycemic and antihyperglycemic activity. The hydro alcoholic extract of the leaves *J. schimperiana* demonstrated bronchodilatory, anti-inflammatory. Therefore, the aim of this study is in-depth evaluation of the pharmacological activity of these plants.

**Objective:-**To evaluate pharmacological activity using different models.

**Methods and materials:** The leaves of *M stenopetala* was collected from Gammo Gofa zone, identified and authenticated, dried under shade and crushed to powder for extraction. Aqueous, hydroalcoholic and solvent fractions were prepared for subsequent laboratory experiments. Mice were injected intraperitonea diabetogenic agent, alloxan monohydrate dissolved in distilled water. The diabetic mice were randomly allocated to different dose of the extract, fractionate and standard drugs. The blood glucose level each mouse were checked at 60,120,180 and 240minutes interval. Acute toxicity study was conducted by using mice according to OECD guideline.

**Results:** *M Stenopetala* showed blood glucose and lipid lowering activity in solvent and chromatographic fractions. The butanol fraction has low toxicity profile with wide safety margin (LD50 >5000mg/kg). The butanol fraction of the extract showed a significant lowering of blood glucose and antihyperglycemic effect in alloxan induced diabetic mice in a dose dependent manner through time intervals. The

**Conclusions and recommendations:** Active principles in butanol fraction have role in the management of hyperglycemia on chronic administration. Further studies are needed to determine the mechanism(s) of action and conducting subchronic toxicity test is mandatory.

- 403.** Alemayehu Toma, Eyasu Makonnen, Yalemtehay Mekonnen, Asfaw Debella, Sirichai Addiskwattana; **Phytochemical Analysis and *In-vitro* Enzyme Inhibitory Activity of Hydro-alcoholic extract of *Moringa stenopetala* Leaves** AAU *Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

**Background:** Diabetes mellitus (DM) is systemic metabolic disorder characterized by hyperglycemia. Long-term hyperglycemia leads to micro & macrovascular complications which in turn decreased quality of life and increased morbidity and mortality. It could occur alone but more often co-exists with other systemic diseases such as hypertension, dyslipidaemia, ischaemic heart disease, renal diseases, Glycation, hypercholesterolemia and hypertriglyceridemia are common complications of diabetes mellitus in addition to hyperglycemia. Currently, no drug in the market that is devoid of any adverse effect. This leads to an increasing search of affordable, accessible and safe antidiabetic drugs from medicinal plants. Globally, more than 1000 plant species are being used as folk medicine for diabetes. Up to 30% of patients with DM use complementary medicine. One of the commonly used medicinal plant in folk medicine is used for antihyperglycemic activity is *Moringa stenopetala* leaves.

**Objective:** To evaluate contents of phytochemicals and enzyme inhibitory activities of *Moringa stenopetala* leaves

**Methods and materials:** The leaves of *M stenopetala* was collected from Gammu Gofa zone, identified and authenticated (voucher number AL-001), dried under shade and crushed to powder for extraction. The powdered leaves (1.2 Kg) were extracted by percolation using 70 % (V/V) ethanol. The extract was dried by evaporating it using rotary vaporizers under reduced pressure at a temperature of 40-45°C. The phytochemical contents (total flavanoid content, total polyphenolic content and condensed tannin content) of *M stenopetala* leaves were determined by standard established methods. The percent inhibition of hydroalcoholic extract on alpha amylase, alpha glucosidase, pancreatic lipase and cholesterol esterase activities were evaluated by using well established methods. The results were expressed as milligram equivalent of standard/gram dry weight of extract.

$$\% \text{ Inhibition} = \frac{\text{Abs control} - \text{Abs sample}}{\text{Abs control}} \times 100$$

**Results:** The phytochemical contents of the hydro alcoholic extract of *M stenopetala* showed that the total flavanoid, total polyphenolic and condensed tannin content were 71.73±2.48, 79.81±2.85 and 8.82± 0.77mg equivalent of their respective standards per gram of *M stenopetala* leaves extract, respectively. The enzyme inhibitory activities of *M stenopetala* leaves increases as the dose increased. 5mg/ml of the hydroalcoholic extract on alpha amylase, sucrase, maltase, pancreatic lipase and cholesterol esterase activities with potent effect on sucrase enzyme

**Conclusion and Recommendation:** High content of phytochemicals especially total polyphenolic and total flavanoids may contribute to pleiotropic effects of *M stenopetala* leaves that support use of the plant for different metabolic disorders. Antihyperglycemic activity of *M stenopetala* may be associated with inhibition of alpha glucosidase and its antihyperlipidemic activity could be due to inhibition of lipase and cholesterol esterase enzymes. *In-vitro* Antiglycation activity of hydroalcoholic extract of *M stenopetala* leaves on fructose induced Bovine Serum Albumin glycation is on progress. Further illustration on mechanism(s) of the *M stenopetala* leaves on insulin secretion and plasma lipid inhibition on animal models.

404. Bekesho Geleta, Asfaw Debella, Amelework Eshetu, Mekoya Mengistu, Yehualashet Belete, Yohannes Ayele, Selamu Kebamo, Wondim Melkam, **Overview of the evaluation and development of drugs from claimed medicinal plants for the treatment of Hypertension.** *Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

**Background:** Non-communicable diseases caused two thirds of all deaths globally; about 36million deaths in 2008. Nearly 80% of deaths are occurred in low-and middle-income countries. Cardiovascular disease is leading cause mortality in none communicable diseases. It contributes

17million deaths (48% of NCD deaths) a year. According to WHO estimate, Hypertension is responsible for 45% of deaths due to heart disease, and 51% of deaths due to stroke. Hypertension affects around one billion people worldwide and 10% of the global disease burden. In Ethiopia, hypertension causes and 12<sup>th</sup> top killing diseases. Several modern antihypertensive medications are available thus far, but expensive, full of side effects and unpalatable due to polypharmacy. Various herbal preparations have been used and claimed to have benefit for hypertension in the folk medicine such as *S guineense*, *T serrulatus*, *T schimperi*, *M stenopetala*.

**Objective:** To evaluate and develop drugs from claimed medicinal plants for the treatment of Hypertension.

**Methods and materials:** The plants used in this study were collected from wild and identified and authenticated, dried under shade and crushed to powder for extraction. Aqueous, hydroalcoholic and solvent fractions were prepared for subsequent laboratory experiments. The diuretic and antihypertensive activities were conducted using rat model by metabolic cage and Blood pressure Analyzer (Model 179 IITC INC USA), respectively. Rats were randomly allocated to the treatment group, the control and reference group. After administration of the sample, a rat was placed on a metabolic cage. The urine will be collected in measuring cylinder up to 5hrs after dosing and compared with standard diuretic agents like Furosemide (10mg/kg body weight). The saluretic potential of the different extract was measured based on  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+/\text{K}^+$ . Vasorelaxant effects of the different extracts were conducted on guinea pigs thoracic aorta by reversing the vasoconstriction activity of KCl using Organ bath and Polygraph. Results were expressed as means  $\pm$  standard errors of means.

**Results:** The crude extract of *Sguineense* showed lowering the SBP, MABP and DBP at 50,100,150 mg/kg oral doses on the rat model on each three consecutive date. The same extract also showed an increase in vaso-relaxant effect to 43.8% by cumulative addition of the extracts to a dose of 70 mg/ml. The n-butanol fraction of *Sguineense* at the dose of 500 and 1000 mg/kg possessed the same diuretic potential and comparable electrolyte excretion ( $\text{Na}^+$  and  $\text{K}^+$ ) to that of hydrochlorothiazide (10mg/kg). The saluretic index of the hydro alcoholic extract (500 mg/kg) and essential oil (1ml/kg) of *T serulatus* is higher on of  $\text{k}^+$ , but less on  $\text{Na}^+$  than the of hydrochlorothiazide (10mg/kg). Different fractions of *M stenopetala* in swiss albino mice showed

that 50mg/kg of 70% ethanol extract (1.33), 50mg/kg of the n-butanol fraction (1.44), and 150 mg/kg of the aqueous fraction (1.17) showed more diuretic activity than Furosemide (10mg/kg) (1). Diuretic effect of the tea simulation of fine and coarse powder of the *T serulatus*, *M stenopetala* and *T shimberi* showed better diuretic activity than the standard drug Furosemide (10 mg/kg).

**Conclusions and Recommendation:**The study validates the claimed antihypertensive uses of these medicinal plants in folk medicine. Both plants showed a promising efficacy study on the antihypertensive activity. The acute toxicity study showed the plants are safe. The herbal tea preparation requires standardization of the tea preparation. Further efficacy and safety study (chronic toxicity test) is mandatory by using different models and techniques. A detailed study is needed to establish the mechanism of action and duration of action of both plants.

- 405.** Hussein Haji **Evaluation of diuretic and antihypertensive activity of *Thymus schimperi*** *Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

Hypertension is a major risk factor for several cardiovascular diseases such as atherosclerosis, Heart failure, renal insufficiency, cardiovascular diseases and stroke. Hypertension affects approximately 1 billion people globally and 7.1 million deaths annually. According to the latest estimation of WHO, deaths in Ethiopia reached 9,743 or 1.19% of total deaths. There are various antihypertensive drugs for the management of hypertension. These drugs are effective for 40-60% and combinations drugs are used, this leads to increase the cost of treatment and side effects. Therefore newer antihypertensive agents are required needed to to expand therapeutic options, to increase the treatment efficacy and to enhance and to enhance patient adherence. This effort looks to explore alternative therapies particularly from herbal sources. *Thymus schimperi* locally known as “tossign” is a perennial herb endemic to the Ethiopian highlands between 2200-4000 m above sea level. It has many traditional medicinal applications such as gonorrhoea, respiratory problems, rheumatism, urinary retention and hypertension.

**Objective:** To evaluate diuretic and antihypertensive activity of *Thymus schimperi*

**Methods and Material:** Fresh plant leaves were collected from Chilalo Mountain, identified and a voucher number (HH001) was given and deposited. The plant material was dried under shade and crushed to powder for aqueous extraction. The Essential oil was prepared by hydro-distillation in a Clevenger-type apparatus for 3 h, at a temperature of 70°C. Hypertension was induced on male albino rats by using 10 % table sugar and 2% salt. The experimental animals were warmed to about 32–35.4 °C. The blood pressure was measured from the tail of rats using non-invasive BP monitoring apparatus (Model 179, IITC Inc, USA). The SBP and MABP were read from the pulse tracings. The DBP was calculated from SBP and MBP using the equation:  $DBP = (3MBP - SBP)/2$ . Results were expressed as means  $\pm$  standard errors of means. Data analysis was carried out using SPSS version 16. The mean difference between the treatment and control group was

compared using one way ANOVA and post hoc comparisons were made by Dunnet's and Tuckey's HDS. P-values less than 0.05 were considered significant. The oral acute toxicity study was conducted on wistar female rats (160-200 g).

**Results:** The aqueous extracts of leaves of *T. schimperi* showed a dose dependent and significant diuretic activity in normal rats at a dose of greater than or equal to 250 mg/kg ( $p < 0.05$ ), however the diuretic activity of its essential oil is not statistically significant. The aqueous extract and essential oil showed a significant difference than the control group (normal saline) on electrolyte excretion at a dose of 750 and 1000 mg/kg of  $\text{Na}^+$ ,  $\text{K}^+$ , and  $\text{Cl}^-$ . The essential oil also showed a significant difference from the control group on  $\text{K}^+$  and  $\text{Cl}^-$  at the dose of 1ml and 5ml/kg. The aqueous extract has anti hypertension effect against the SBP at higher dose. The aqueous extract of *T. schimperi* showed a significant change on body weight and LDL at a dose of 250 and 500 mg/kg, respectively compared to control groups (only tap water). The plant does not show any clinical signs of toxicity and any behavioral change up to dose of 5 g/Kg.

**Conclusions and Recommendation:** The study indicated that *T. schimperi* possesses strong dose independent diuretic activity. The aqueous extract has anti hypertension effect against the SBP at higher dose. The finding of the acute toxicity showed the leaf extract was safe. In general study may account, at least in part, for the reported beneficial action for urinary retention and hypertension activity in folk medicine. It is recommended that further studies are could be conducted to determine needed the effects of different fractions on the diuretic and antihypertensive activity on renovascular, endocrine, neurogenic, psychogenic hypertension, exact mechanism of action and site (s) of action and to determine the effect.

- 406.** Hirut lemma, Christina Haile, Redwon Muzain, Negero Gameda, Getachew Addis (Dr.), Mulugeta Guta, Frehiwot Teka, Kirubel Tesfaye, Aynalem Lakew, Kidist Yirsaw, Asfaw Debella; **Development of effective water treating agent from *Moringa Stenopetala* seeds** *Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

**Background:** *Moringa stenopetala* – A branched tree that grows 6-10m tall. It grows abundantly in south western Ethiopia. It is known by different vernacular names such as shiferaw, Aleko and cabbage tree. *M. stenopetala* is known in folk medicine as having value in treating a wide variety of ailments. Among 14 species of moringa tree, *M. oleifera* is well studied with regard to potential medicinal uses and the identification of compound of potential therapeutic importance, which is native to India.

**Objective:** To investigate the Antibacterial activity of extracts and Evaluate the efficacy of optimum concentration of *M. stenopetala* for water clarifying activity and to develop appropriate dosage form for water clarifying agent from *Moringa stenopetala* seeds.

**Methodology:** The seeds of the plant were collected from Arbaminch where it is widely cultivated. A voucher specimen was identified by taxonomists and deposited at TMDRD in EPHI. The seeds were air dried and then powdered for extraction. Powdered seeds were defatted with petroleum ether. Defatted marc was then extracted with 70% ethanol. The aqueous extract was macerated with distilled water, filtered and freeze dried using lyophilizes. The Anti-bacterial activity was determined by using both Agar well diffusion and Agar dilution method. The Optimum concentration of *M. stenopetala* for water clarifying activity was also conducted and the comprehensive physico-chemical and microbiological analysis moringa treated water was studied

**Results:** Both the petroleum (5, 10, 20, 40%) and ethanol (5, 10, 25, 50 and 100 mg/ml) and aqueous (5, 10, 25, 50 and 100 mg/ml) extract of the plant did not show any zone of inhibition against standard and clinical strains of E coli, Salmonella, and shigella. Serial agar dilution of petroleum ether (0.5-8%), both ethanol and aqueous extract (0.25-4mg/ml) of the seeds didn't show activity against the above test organisms. More over the contaminated water treated with the optimum concentration of extract (62.5mg/ml) didn't show any effect on physicochemical and microbiological quality of the water

**Conclusions and Recommendations:** From this study the result of different extracts of *M. stenopetalla* seed didn't show antibacterial activities. The optimized concentration of extract (62.5mg/250ml) didn't have any effect on physicochemical and microbiological analysis of treated water. The aqueous extract of seeds works as a flocculent by binding the bacteria to the solids in

water and causing them to sink to the bottom but additional treatment of filtering and boiling of water is needed to render it completely safe to drink. So, there is a need to study other dosage forms.

- 407.** Christina Haile, Redwan Muzeyin, Melaku Gizaw and Daniel Abera **Dosage optimization and standardization of *Moringa stenopetala* seeds powder as water purifying agent** *Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

**Background:** Safe water is not an option rather it is basic human right. Over a billion people still do not have access to improved water sources. About 3.4 million deaths recorded annually with relation to inadequate supply of safe water. In Ethiopia Only 24% of the rural populations have access to safe drinking water sources. Only 20% is served by utility piped supplies and 37% from protected source like public standpipe and protected boreholes, springs and dug wells. The rest 63% relies on sources that are unimproved source, such as ponds, lakes, rivers and open dug wells. By considering the socio economic states of the country and the severity of the situation there is a need for developing safe effective, standardized and economically sound plant base water clarifying agent.

**Objective:** To develop water purifying agent from *Moringa stenopetala* seeds.

**Methods:** Fresh seeds of *M. stenopetala* were collected from Arba Minch (505 km south of Addis Abeba). The seeds were powdered and extracted with 0.1 M NaCl for 2hr. The extractive were filtered and lyophilized after freezing. The dirt water collected from different places were treated by different concentration of moringa extract ranging from 0.2gm to 0.5gm/500 ml. Beshangari 0.6125/500ml and untreated dirt water were used as a control. Turbidity, total dissolved solutes, pH and conductivity were measured.

**Result:** The water treated with extract showed a higher turbidity, total dissolved solutes, and conductivity than bishangari and control for both tested doses for the first 7 hrs. The pH of the treated water is all the same but it decreases to 7.0 for a concentration of 0.5gm/500ml. Organoleptic properties of the plant extract showed that it has creamy color with 14.5mm length

and 31.3mm width, have moldy odor, sweet in low dose and bitter in higher doses and had rough texture and smooth fracture. The phytochemical constituents of the extract contain alkaloids, tannins, saponins, glycosides, proteins and carbohydrates. The moringa seed Water soluble extractives (cold extraction) 5.88%, Water soluble extractives (hot extraction) 7.04%, Total ash 12.25%, Acid insoluble ash Below detection, water soluble ash 7.15%, Moisture content 5.5%, swelling indx 5.1ml, Microbial load All indicator microorganisms were absent.

**Conclusion and Recommendation:** *M stenopetala* seed is one of the natural products which are safe for its water purifying activities. There is a need for the purification of the active protein coagulant to potentiate its effectiveness, characterization of the marker compounds and designing appropriate dosage forms for stability study, quality control and conducting community trial study for final product development as water clarifying agent.

- 408.** Asfaw Debella, Yonas Woletaw, Kissi Mudi, Frehiwot Teka, Messay Getachew, Dawit Abebe, Zenebech Adella, Beruk Teka, Samuel Woldekidane, Feyessa Challa, Abel W/Tensi, Asgedech Sirak, Chrisitna Haile, Yehuwalashet Belete, Aynalem Lakew; **Investigation of the mosquito larvicidal effect activities of some medicinal plants against *Anopheles gambiae*** *Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

**Background:** Mosquitoes are most important insects in terms of public health, which transmits vector born diseases that causes millions of deaths every year. *Anopheles* mosquitoes (female): usual definitive hosts and transmitters of plasmodium species. To control the malaria, one approach is controlling the vector. Medicinal plants tried for the control of the vector. Thirty three medicinal plants screened for the anti-larvae activity of the vector mosquito species.

**Objective:** In-depth evaluation of the efficacy, safety and develop appropriate dosage forms

**Methodology:** Plant parts were collected from their natural habitat from South and Southwest Ethiopia at altitudinal range of 900 – 1600 m. Identified by a taxonomist & voucher specimen was

deposited at the herbarium of TMMD. Hydro alcoholic, aqueous extract and their solvent partition were used for subsequent experiments. Larval susceptibility test, toxicity, histological and toxicity of effluents in marine organisms were conducted on the extracts and formulated products.

**Results:** Larval efficacy of *Albizia gummifera* and *Milletia ferruginea* 70% ethanol extract in ppm LC50 50, LC95 100, and 25 and 50 respectively. Oral administration of 125, 250 mg per Kg body weight does not show any physical changes in the skin, fur, eyes, respiratory system and general behavioral patterns, no significant weight difference between the control and the treated groups. LD50 > 3000 mg/Kg body weight. There were no any pathological findings in the liver and kidneys up to a dose of 125 mg per Kg body weight, however congestion was observed in the liver at the dose of 250 mg per Kg body weight. No toxicity of fish for *A. gummifera* up to 12.50 µg per ml in 20,000 liter aquarium volume until 24 hours, however *M. ferruginea* extract was found to be lethal for fish at concentration of 6.25 µg per ml in 20,000 liter aquarium volume after 8 hours.

**Conclusion and recommendation:** *A. gummifera* (hydroalcoholic extract) and *M. ferruginea* (aqueous extract) were found to susceptible to *A. gambiae* larvae and safe at the effective dose, shelf life determination of the formulated sample.

*Proceeding of Scientific Review on the Ongoing Efficacy and Safety Investigations of Traditionally Used Medicinal Plants in Ethiopia* Editors: Ashenif Tadele, Asfaw Debela November 15-17, 2013 Ambo, Ethiopia

**409.** Unnithan CR, Dagnaw W, Undrala Sand Subban Ravi ***Chemical Composition and Antibacterial activity of Essential oil of Ocimum basilicum of Northern Ethiopia***

International Research Journal of Biological Sciences Vol. 2(9), 1-4, September (2013)

Abstract

The constituents of essential oil isolated by hydro distillation of the aerial parts of *Ocimum basilicum* L, Lamiaceae family, from Ethiopia was examined by GC-MS. A total of 30 components were identified accounting for 76.7% of the oil of *O. basilicum*. The oil contained, as main components, copaene (25.5%), p-menth-2-en-1-ol (7.7%), eugenylacetate (4.8%), bornyl acetate (4.0%),  $\gamma$  – himachalene (3.6%), rosimfoliol (3.0%) and  $\alpha$  – cubebene (2.5%). The essential oil of

*O. basilicum* showed significant anti bacterial activity against gram positive (*Staphylococcus aureus*) than gram negative bacteria (*Escherichia coli*).

Keywords: *O. basilicum* L., Lamiaceae, essential oil, antibacterial activity.

- 410.** Elias Ahmed Sadik, Tesfaye Gobena and Bizatu Mengistu (2013). Aspects of Common Traditional Medical Practices Applied for Under-Five Children in Ethiopia, Oromia Region, Eastern-Harargie District, Dadar Woreda, 2011 G.CJ Community Med Health Educ, 3:6

Traditional medical practices (TMPs) are widely used in Ethiopia. Among these, some of them may be harmful and others can be useful. The type and degree of the practices with their risks and benefits vary from place to place in the country requiring the need for researches. Thus, this study was conducted to investigate aspects of common TMPs applied for under-five children. Objectives: To identify the major pushing and pulling factors for the use of common traditional health practices for under-five children in the area, during, 2011 G.C. To rule out the health hazards of invasive traditional health practices which were applied as alternative options for under-five children. To point out the contribution of the most common traditional health practices applied for under-five children to the achievement of MDG 4. A cross-sectional study was conducted in Dadar woreda from January to April 2011. Data as collected mainly by using qualitative technique from 24 FGDs participants and 12 in-depth interview respondents using guiding questions and interview questionnaires. Data were analyzed by using SPSS v16 software. According to the study result, Uvulectomy, tonsillectomy, cauterization, milk tooth extraction, spiritual healing and herbal medicine provision are commonly used as a therapeutic purpose. Culture, availability of practitioners, relief response, cost and distance were reported as the main reasons for use of TMPs. This study result has reminded us of the fact that practicing invasive traditional practices was abusing the health rights of children and hindering the country from achieving MDG 4. Generally, some TMPs were harmful while others were useful from health science perspective. For example, “Huddufor” TMP that was identified by this study, is more harmful because of three reasons:

1) Insertion of green stick into anus is more stressful, 2) It repeatedly ulcerates anal region and causes bleeding, 3) The site is prone to develop infection and prolapsed rectal sphincter. Though it has been practiced as a healing practice was found to be a killing practice for children. On the other hand, oral rehydration solution (honey, water, lemon and salt) used by herbalist to treat diarrhea and Spiritual healer's advices on personal and environmental hygiene to prevent evil attack need to be strengthened, while non-invasive practices were somewhat contributing positively. Finally, continuous and sustainable health education, integration of HEWs, Traditional practitioners, and religious leaders; Banning and Broadcasting information about HTHPs, Strong political leadership, community mobilization and involvement as well as further cross sectional to determine perception of the communities toward use of HTHPs and analytical studies for safety and efficacy of important medicinal plants for conservation are recommended.

296. Ketema Tolossa, Etana Debela, Spiridoula Athanasiadou, Adugna Tolera, Gebeyehu Ganga, and Jos GM Houdijk Ethno-medicinal study of plants used for treatment of human and livestock ailments by traditional healers in South Omo, Southern Ethiopia *J Ethnobiol Ethnomed.* 2013; 9: 32.

2014

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**295. Yared Yigezu, Demissew Berihun Haile and Wubeante Yenet Ayen**

Ethnoveterinary medicines in four districts of Jimma zone, Ethiopia: cross sectional survey for plant species and mode of use *BMC Veterinary Research* 2014, **10**:76 doi:10.1186/1746-6148-10-76

Abstract

### **Background**

Traditional medicines have been used for nearly 90% of livestock populations in Ethiopia where complimentary remedies are required to the modern health care system. All plants with pharmacological activity complementarily prescribed as best choice against livestock diseases. A community based cross - sectional survey was conducted to investigate ethno-veterinary knowledge and practices of study area by purposive sampling techniques. The data from respondents were collected through face-to face interview using pre-tested semi-structured questionnaires, which was further accompanied by field observations of the medicinal plants. The vast majority of the statistics were analyzed descriptively by SPSS 16 Windows version to extrapolate our findings in ethno-botanical knowledge.

### **Results**

In the study, a total of 74 species of ethnoveterinary medicinal plant species from 31 families have been identified for treating 22 different livestock ailments. The three families: Asteraceae, Cucurbitaceae and Solanaceae make up larger proportion of reported medicinal plants which accounted for 10.41%, 8.33% and 6.25%, respectively. Of reported medicinal plants, 16.7% informant consensus was recorded for the species *Croton macrostachyus* Del., 10.7% for *Nicotiana tabacum* L. and 9.5% for *Olea capensis* L. Subsp. *macrocarpa* (C.H. Wright) I. Verd. in treatment of one or more veterinary ailments. The greater varieties of medicinal plant species that accounted for 28.2% were used against management of blackleg which was common livestock

diseases in the study area. The findings showed, trees accounted for 43.24%, followed by shrubs (33.78%) and herbs (14.86%). Eighty one percent of medicinal plants reported by respondents were collected from wild habitats, and leaves reported to be used by 68% of the informants for ethnoveterinary medicines preparations. The preparations were applied through different routes of administration; oral administration accounted for (76.2%), followed by application of topical (9.53%) and nasal (5.19%).

### ***Conclusions***

Ethnoveterinary practices significantly suggested to play greater roles in livestock health care as an alternative or integral part of modern veterinary practices. The traditional knowledge in treatment of livestock diseases of the study districts needs further scientific evaluations by phytochemical and antimicrobial experimentation to determine safety, efficacy, mode of delivery, drug development and dosage in pharmacological laboratory.

Keywords:

Ethnoveterinary; Medicines; Plant species; Mode of use; Jimma; Ethiopia

**295.**Seid Yimer, Manoharan and Omprakash Sahu **Extraction of Essential oil from Eucalyptus Leaves as Antibacterial Application on Cotton Woven Fabric** International Journal of bacteriology, Virology and Immunology 1(1): pp 001-007, March, 2014.

Many aromatic and medicinal plants are available in Ethiopia from which the essential oil can be extracted and used for medicinal purpose. In this research project Eucalyptus leaves are extracted for essential oil by steam distillation process using soxhlet apparatus. The extracted oil has antimicrobial, antibacterial and anti fungal properties. The extracted oil is applied on cotton fabrics by pad-dry-cure method using padding mangle and value adding to the ordinary cotton fabric as Medical fabric. Extracted oil from these leaves shows 81.1% with acetic acid and 79.9% with citric

acid resistance to antibacterial growth. The market value and demand of such medical fabrics are high.

Keywords: Bacterial; Composition; Essential oil; Growth rate; Microbes

**296.**Berhan Mengiste, Yohannes Hagos, Fetene Moges, HabtamuTassew, G/hiwotTadesse, and Awet Teklu **Invitro Antibacterial Screening of Extracts from Selected Ethiopian Medicinal Plants** Momona Ethiopian Journal of Science (MEJS), V6(1):102-110, 2014

#### ABSTRACT

Indigenous knowledge, literature reports and ethnobotanical records suggest that plants are the basis for medicines. They constitute natural source of antimicrobial drugs that will provide novel or lead compounds for the fight against disease. In this study, the antimicrobial activity of three selected Ethiopian medicinal plants was studied with the objective of screening their antibacterial activity. The fruits of *Measalanceolata*, aerial part of *Cissus quadrangularis* and leaf of *Dodonae angustifolia* were collected, air dried under shed, powdered and soaked in 80% methanol and extracted. In vitro antibacterial activity of the extracts was tested at different concentrations by using agar disc diffusion method and measuring the zone of inhibition. The plant extracts showed broad spectrum activity against gram positive (*S. aureus*) as well as gram negative (*E. coli*) bacteria, except *Cissus quadrangularis* which did not show any activity against *E. coli*. Furthermore, the plant extracts had also concentration dependant zone of inhibition against the tested bacteria. In fact, the highest activity was obtained for *Dodonae angustifolia* at 1000mg/ml against *S. aureus*. The activities are attributed to the presence of some secondary metabolites present in the tested plants which have been associated with antibacterial activities. This finding suggests that these medicinal plants can be potential source to isolate antibacterial drugs.

Keywords: Antibacterial activity, Disc diffusion, *E. coli*, Plant extract and *S. aureus*

**297.**d'Avigdor E, Wohlmuth H, Asfaw Z, Awas T. **The current status of knowledge of herbal medicine and medicinal plants in Fiche, Ethiopia.***J Ethnobiol Ethnomed.* 2014 May 6;10:38. doi: 10.1186/1746-4269-10-38.

## Abstract

**BACKGROUND:** A majority of Ethiopians rely on traditional medicine as their primary form of health care, yet they are in danger of losing both their knowledge and the plants they have used as medicines for millennia. This study, conducted in the rural town of Fiche in Ethiopia, was undertaken with the support of Southern Cross University (SCU) Australia, Addis Ababa University (AAU) Ethiopia, and the Ethiopian Institute of Biodiversity (EIB), Ethiopia. The aim of this study, which included an ethnobotanical survey, was to explore the maintenance of tradition in the passing on of knowledge, the current level of knowledge about medicinal herbs and whether there is awareness and concern about the potential loss of both herbal knowledge and access to traditional medicinal plants.

**METHODS:** This study was conducted using an oral history framework with focus groups, unstructured and semi-structured interviews, field-walk/discussion sessions, and a market survey. Fifteen people were selected via purposeful and snowball sampling. Analysis was undertaken using a grounded theory methodology.

**RESULTS:** Fourteen lay community members and one professional herbalist provided information about 73 medicinal plants used locally. An ethnobotanical survey was performed and voucher specimens of 53 of the plants, representing 33 families, were collected and deposited at the EIB Herbarium. The community members are knowledgeable about recognition of medicinal plants and their usage to treat common ailments, and they continue to use herbs to treat sickness as they have in the past. A willingness to share knowledge was demonstrated by both the professional herbalist and lay informants. Participants are aware of the threat to the continued existence of the plants and the knowledge about their use, and showed willingness to take steps to address the situation.

**CONCLUSION:** There is urgent need to document the valuable knowledge of medicinal herbs in Ethiopia. Ethnobotanical studies are imperative, and concomitant sustainable programmes that support the sustainability of herbal medicine traditions may be considered as a way to collect and disseminate information thereby supporting communities in their efforts to maintain their heritage.

This study contributes to the documentation of the status of current traditional herbal knowledge in Ethiopia.

**298.**Hailu W, Engidawork E. **Evaluation of the diuretic activity of the aqueous and 80% methanol extracts of *Ajuga remota* Benth (Lamiaceae) leaves in mice.** *BMC Complement Altern Med.* 2014 Apr 10;14:135. doi: 10.1186/1472-6882-14-135.

#### Abstract

**BACKGROUND:** In the Ethiopian traditional medicine, the leaves of *Ajuga remota* B. (Local name, Armagusa) is used in the treatment of hypertension. Since this claim has not been investigated scientifically, the aim of the present study was to evaluate the diuretic potential of the aqueous and 80% methanol extracts of the leaves of *Ajuga remota* in mice after acute oral administration.

**METHODS:** Adult mice were administered orally either aqueous (250 mg/kg, AA250; 500 mg/kg, AA500 and 1000 mg/kg, AA1000) or 80% methanol (250 mg/kg, AM250; 500 mg/kg, AM500 and 750 mg/kg, AM750) extract. Urine output and electrolyte contents were then quantified up to 5 h and compared with those administered with furosemide 10 mg/kg (F10) and distilled water (CON).

**RESULTS:** The larger dose of 80% methanol extract produced significant diuresis ( $p < 0.01$ ), while the aqueous extract had shown diuresis both at the middle ( $p < 0.01$ ) and higher ( $p < 0.01$ ) doses by the end of the fifth hour compared to CON mice. Regarding electrolyte excretion, larger doses of both extracts had increased natriuresis ( $p < 0.001$  for AA1000 and  $p < 0.01$  for AM1000), while the effect on kaliuresis were smaller when compared with the standard, suggesting the plant could possibly have a potassium-sparing effect. Phytochemical screening revealed the presence of secondary metabolites like phenolic compounds, tannins, saponins, flavonoids, terpenoids, steroids, and cardiac glycosides, which might account for the diuretic activity.

**CONCLUSIONS:** The results indicate that the plant is endowed with significant diuretic activity at various doses, providing evidence for its folkloric use. The major components like flavonoids, tannins, terpenoids and alkaloids found in the plant might have contributed to the observed diuretic activity.

**299.**Feyera T, Terefe G, Shibeshi W. **Evaluation of in vivo antitrypanosomal activity of crude extracts of *Artemisia abyssinica* against a *Trypanosoma congolense* isolate.***BMC Complement Altern Med.* 2014 Apr 1;14:117. doi: 10.1186/1472-6882-14-117.

Abstract

**BACKGROUND:** African trypanosomiasis is a major disease of economic and public health importance affecting agricultural and human development. The search for alternative compounds against African trypanosomiasis is justified by various limitations of existing chemotherapeutic agents. This study was aimed at screening the hydromethanolic and dichloromethane (DCM) crude extracts of aerial parts of *Artemisia abyssinica* for in vivo antitrypanosomal activity against *Trypanosoma congolense* isolate in mice.

**METHODS:** The aerial parts of the plant were extracted by maceration technique using dichloromethane and 80% methanol to obtain the corresponding crude extracts. The plant extracts at doses of 100, 200 and 400 mg/kg body weight were administered intraperitoneally daily for 7 days to mice infected with *Trypanosoma congolense*. Diminazene aceturate and distilled water were used as positive and as negative controls respectively. The level of parasitaemia, body weight, packed cell volume, differential leukocyte counts and mean survival period were monitored.

**RESULTS:** The study showed that the DCM extract at 200 and 400 mg/kg, and the hydromethanolic extract at 400 mg/kg reduced parasitaemia ( $p < 0.05$ ), ameliorated anaemia ( $p < 0.05$ ), prevented body weight loss ( $p < 0.05$ ) and resulted in significant increase in neutrophil levels ( $p < 0.05$ ) and marked decrease in lymphocyte levels ( $p < 0.05$ ) compared to the negative control.

CONCLUSIONS: This study established that aerial parts of *A. abyssinica* have antitrypanosomal potential and can be considered a potential source of new drugs for the treatment of tropical diseases caused by trypanosomes.

**300.**Yared Wasihun<sup>1</sup> ; Tesfalem Adrar<sup>2</sup> ; & Solomon Ali<sup>3</sup> Evaluation of Antibacterial Activity and Phytochemical Constituents of Leaf Extract of *Lippia adoensis* Asia Pacific Journal of Energy and Environment, Volume 1, No 1 (2014)

ABSTRACT There are quite large numbers of traditionally used medicinal plants that are used to treat skin disorder in the ethno medical system of Ethiopia. Medicinal plants namely *L. adoensis*, was screened for antibacterial activity against different strains of bacteria which are known to cause various types of skin infections and food poisoning. Anti bacterial effect of the plant species was evaluated against different bacterial strains. The leaves of plant species were extracted by maceration and soxhelt extraction technique for preparation of crude and fractional extract respectively. And anti bacterial screening of different concentration of both crude and fractional extract of the plant species were determined using agar well diffusion method. The test organisms were one gram positive (*S.aures*) and three gram negative (*Salmonella typhi*, *E.coli* and *P.aeruginosa*) standard organisms. The results of the initial antibacterial screening test indicated the potential of these herbal drugs in treating bacterial infections of the skin and food poisoning. Among the different fractions (petroleum ether, chloroform, acetone and methanol) tested for antibacterial activity, the non-polar fractions were found to be more active than the polar fractions. The Phytochemical screening tests carried out on *L. adoensis* indicated the presence of tannins, flavonoids and saponins. Different extracts *L.adoensis* were showed significant antibacterial activity against the *S.aueres*,*P.aeruginosa*,*E.coli* and *S.typhi*. Hence further study is recommended to identify the specific active ingredient and potential formulation of effective antibiotic.

Key Words: Antibacterial activity, Phytochemical screening, plant species *Lippia adoensis*

**301.**Mesfin M, Asres K, Shibeshi W. **Evaluation of anxiolytic activity of the essential oil of the aerial part of *Foeniculum vulgare* Miller in mice.** *BMC Complement Altern Med.* 2014 Aug 23;14:310. doi: 10.1186/1472-6882-14-310.

Abstract

**BACKGROUND:** *Foeniculum vulgare* locally known as ensilal, is an aromatic plant widely cultivated in temperate and tropical regions. The anti-anxiety activity of the crude extract of *F. vulgare* has been reported. However, the fraction responsible for anxiolytic activity is not known and there is no any report on the anti-anxiety activity of the essential oil of *F. vulgare*. The objective of study was to evaluate the anxiolytic activity of the essential oil of *Foeniculum vulgare* Miller.

**METHODS:** Adult Swiss albino male mice were randomly divided into six groups (n = 6). Groups I and II received Tween 80 (5%, v/v) and diazepam (0.5 mg/kg, ip), respectively, while groups III to V received orally 50, 100, and 200 and 400 mg/kg doses of the essential oil of *F. vulgare*, respectively. The mice were then individually placed in animal anxiety models: elevated plus maze (EPM), staircase test (SCT) and open field test (OFT) and evaluated for various parameters.

**RESULTS:** In EPM test, 100 and 200 mg/kg doses of the essential oil significantly increased percent number of entries and time spent in open arms compared to control. In SCT these doses also reduced rearing significantly compared to controls, while only the 200 mg/kg dose significantly increased number of squares crossed at the center in the OFT test.

**CONCLUSION:** The essential oil of *F. vulgare* was found to exhibit a promising anxiolytic activity.

**302.**Gemeda N, Woldeamanuel Y, Asrat D, Debella A. **Effect of essential oils on *Aspergillus* spore germination, growth and mycotoxin production: a potential source of botanical food preservative.***Asian Pac J Trop Biomed.* 2014 May;4(Suppl 1):S373-81. doi: 10.12980/APJTB.4.2014C857.

Abstract

**OBJECTIVE:** To investigate effect of essential oils on *Aspergillus* spore germination, growth and mycotoxin production.

**METHOD:** In vitro antifungal and antiaflatoxic activity of essential oils was carried out using poisoned food techniques, spore germination assay, agar dilution assay, and aflatoxin arresting assay on toxigenic strains of *Aspergillus* species.

**RESULTS:** *Cymbopogon martinii*, *Foeniculum vulgare* and *Trachyspermum ammi* (T. ammi) essential oils were tested against toxicogenic isolates of *Aspergillus* species. T. ammi oil showed highest antifungal activity. Absolute mycelial inhibition was recorded at 1 µl/mL by essential oils of T. ammi. The oil also showed, complete inhibition of spore germination at a concentration of 2 µl/mL. In addition, T. ammi oil showed significant antiaflatoxic potency by totally inhibiting aflatoxin production from *Aspergillus niger* and *Aspergillus flavus* at 0.5 and 0.75 µl/mL, respectively. *Cymbopogon martinii*, *Foeniculum vulgare* and T. ammi oils as antifungal were found superior over synthetic preservative. Moreover, a concentration of 5 336.297 µl/kg body weight was recorded for LC50 on mice indicating the low mammalian toxicity and strengthening its traditional reputations.

**CONCLUSIONS:** In conclusion, the essential oils from T. ammi can be a potential source of safe natural food preservative for food commodities contamination by storage fungi.

**303.**Gemeda N, Mokonnen W, Lemma H, Tadele A, Urga K, Addis G, Debella A, Getachew M, Tekla F, Yirsaw K, Mudie K, Gebre S.**Insecticidal Activity of Some Traditionally Used Ethiopian Medicinal Plants against Sheep Ked *Melophagus ovinus*.***J Parasitol Res.* 2014;2014:978537. doi: 10.1155/2014/978537. Epub 2014 Feb 4.

#### Abstract

Twelve medicinal plants and a commercially used drug Ivermectin were examined for insecticidal activity against *Melophagus ovinus* sheep ked at different time intervals using in vitro adult immersion test. The findings show that at 3.13 µL/mL, 6.25 µL/mL and 12.5 µL/mL concentration of *Cymbopogon citratus*, *Foeniculum vulgare* and *Eucalyptus globulus* essential oils respectively, recorded 100% mortalities against *M. ovinus* within 3 hour of exposure. Significantly higher insecticidal activity of essential oils was recorded (P = 0.00) when compared to 10 µ g/mL Ivermectin after 3-hour exposure of *M. ovinus* at a concentration of  $\geq 1.57$  µ L/mL,  $\geq 3$  µ L/mL, and  $\geq 12.7$  µ L/mL essential oils of *C. citratus*, *F. vulgare*, and *E. globulus*, respectively. Among

essential oils, *C. citratus* has showed superior potency at a three-hour exposure of the parasite ( $P = 0.00$ ) at a concentration of  $\geq 0.78 \mu\text{L/mL}$ . Strong antiparasitic activity was recorded by aqueous extract of *Calpurnia aurea* (80% mortality) at a concentration of 200 mg/mL within 24 h among aqueous extracts of 9 medicinal plants. The results indicated all the four medicinal plants, particularly those tested essential oils, can be considered as potential candidates for biocontrol of *M. ovinus* sheep ked.

**304.** Toma A, Makonnen E, Mekonnen Y, Debella A, Addisakwattana S. **Intestinal  $\alpha$ -glucosidase and some pancreatic enzymes inhibitory effect of hydroalcoholic extract of *Moringa stenopetala* leaves.** *BMC Complement Altern Med.* 2014 Jun 3;14:180. doi: 10.1186/1472-6882-14-180.

#### Abstract

**BACKGROUND:** *Moringa stenopetala* has been used in traditional health systems to treat diabetes mellitus. One of the successful methods to prevent of the onset of diabetes is to control postprandial hyperglycemia by the inhibition of  $\alpha$ -glucosidase and pancreatic  $\alpha$ -amylase activities, resulting in the aggressive delay of the carbohydrate digestion of absorbable monosaccharides. The aim of the present study is to investigate the effect of the extract of the leaves of *Moringa stenopetala* on  $\alpha$ -glucosidase, pancreatic  $\alpha$ -amylase, pancreatic lipase, and pancreatic cholesterol esterase activities, and, therefore find out the relevance of the plant in controlling blood sugar and lipid levels.

**METHODS:** The dried leaves of *Moringa stenopetala* were extracted with hydroalcoholic solvent and dried using rotary vapor under reduced pressure. The dried extracts were determined for the total phenolic compounds, flavonoid content and condensed tannins content by using Folin-Ciocateu's reagent,  $\text{AlCl}_3$  and vanillin assay, respectively. The dried extract of plant-based food was further quantified with respect to intestinal  $\alpha$ -glucosidase (maltase and sucrase) inhibition and pancreatic  $\alpha$ -amylase inhibition by glucose oxidase method and dinitrosalicylic (DNS) reagent, respectively.

RESULTS: The phytochemical analysis indicated that flavonoid, total phenolic, and condensed tannin contents in the extract were  $71.73 \pm 2.48$  mg quercetin equivalent/g of crude extract,  $79.81 \pm 2.85$  mg of gallic acid equivalent/g of crude extract,  $8.82 \pm 0.77$  mg catechin equivalent/g of crude extract, respectively. The extract inhibited intestinal sucrase more than intestinal maltase with IC<sub>50</sub> value of  $1.47 \pm 0.19$  mg/ml. It also slightly inhibited pancreatic  $\alpha$ -amylase, pancreatic lipase and pancreatic cholesterol esterase.

CONCLUSION: The result demonstrated the beneficial biochemical effects of *Moringa stenopetala* by inhibiting intestinal  $\alpha$ -glucosidase, pancreatic cholesterol esterase and pancreatic lipase activities. A daily supplement intake of the leaves of *Moringa stenopetala* may help in reducing hyperglycemia and hyperlipidemia.

**305.**Abeje F, Bisrat D, Hailu A, Asres K. **Phytochemistry and Antileishmanial Activity of the Leaf Latex of *Aloe calidophila* Reynolds.** *Phytother Res.* 2014 Jul 28. doi: 10.1002/ptr.5204. [Epub ahead of print]

#### Abstract

Leishmaniasis is a major protozoal disease threatening the lives of 350 million people throughout the world. However, the therapeutic options for the disease are limited. In the present study, the antiprotozoal activity of the latex obtained from the Ethiopian plant *Aloe calidophila* Reynolds was evaluated by in vitro testing against *Leishmania aethiopica* and *Leishmania major*. It was found that the latex possesses moderate activity against both parasites with IC<sub>50</sub> values of 64.05 and 82.29  $\mu$ g/mL, respectively. Phytochemical investigation resulted in the isolation of three anthrones identified as aloinoside, aloin, and microdontin on the basis of IR, MS, <sup>1</sup>H NMR, and <sup>13</sup>C NMR spectral data. The isolated compounds showed strong antileishmanial activity with IC<sub>50</sub> values ranging from 1.76 to 6.32  $\mu$ g/mL against *L. aethiopica* and from 2.09 to 8.85  $\mu$ g/mL against *L. major*. Although these values were higher than those of amphotericin B (IC<sub>50</sub> = 0.109 and 0.067  $\mu$ g/mL), the selectivity indices (813.35 and 694.90, respectively, against *L. aethiopica* and *L. major*) of aloinoside were much better than those of the standard drug (423.49 and 688.96). The results indicate that the isolated compounds have the potential to be used as a scaffold for the development of safe and cost-effective antileishmanial agents

- 306.** Tewabe Y, Bisrat D, Terefe G, Asres K. **Antitrypanosomal activity of aloin and its derivatives against *Trypanosoma congolense* field isolate.** *BMC Vet Res.* 2014 Mar 10;10:61. doi: 10.1186/1746-6148-10-61.

Abstract

**BACKGROUND:** There is an urgent need for the development of new, cheap, safe and highly effective drugs against African trypanosomiasis that affects both man and livestock in sub-Saharan Africa including Ethiopia. In the present study the exudate of *Aloe gilbertii*, an endemic Aloe species of Ethiopia, aloin, aloe-emodin and rhein were tested for their in vitro and in vivo antitrypanosomal activities against *Trypanosoma congolense* field isolate. Aloin was prepared from the leaf exudate of *A. gilbertii* by acid catalyzed hydrolysis. Aloe-emodin was obtained by oxidative hydrolysis of aloin, while rhein was subsequently derived from aloe-emodin by oxidation. In vitro trypanocidal activity tests were conducted on parasites obtained from infected mice, while mice infected with *T. congolense* were used to evaluate in vivo antitrypanosomal activity of the test substances.

**RESULTS:** Results of the study showed that all the test substances arrested parasites motility at effective concentration of 4.0 mg/ml within an incubation period ranging from 15 to 40 min. Moreover, the same concentration of the test substances caused loss of infectivity of the parasites to mice during 30 days observation period. Among the tested substances, rhein showed superior activity with minimum inhibitory concentration (MIC) of 0.4 mg/ml. No adverse reactions were observed when the test substances were administered at a dose of 2000 mg/kg. Rhein at doses of 200 and 400 mg/kg, and the exudate, aloin and aloe-emodin at a dose of 400 mg/kg reduced the level of parasitaemia significantly ( $P < 0.05$ ) and improved anaemia.

**CONCLUSION:** The results obtained in this investigation indicate that aloin and its derivatives particularly rhein have the potential to be used as a scaffold for the development of safe and cost effective antitrypanosomal drugs that can be useful in the continuing fight against African trypanosomiasis.

- 307.** Veeresham C, Rama Rao A, Asres K. **Aldose reductase inhibitors of plant origin.** *Phytother Res.* 2014 Mar;28(3):317-33. doi: 10.1002/ptr.5000. Epub 2013 May 15.

Abstract

Diabetic complications are attributed to hyperglycaemic condition which is in turn associated with the polyol pathway and advanced glycation end products. Aldose reductase (AR) is the principal enzyme of polyol pathway which plays a vital role in the development of diabetic complications. AR inhibitory activity can be screened by both in vitro and in vivo methods. In vitro assays for AR enzyme are further classified on the basis of the source of enzyme such as rat lens, rat kidney, cataracted human eye lens, bovine eyes and human recombinant AR enzymes, whereas the in vivo model is based on the determination of lens galactitol levels. A number of synthetic AR inhibitors (ARIs) including tolrestat and sorbinil have been developed, but all of these suffer from drawbacks such as poor permeation and safety issues. Therefore, pharmaceutical companies and many researchers have been carrying out research to find new, potent and safe ARIs from natural sources. Thus, many naturally occurring compounds have been reported to have AR inhibitory activity. The present review attempts to highlight phytochemicals and plant extracts with potential AR inhibitory activity. It also summarizes the classes of compounds which have proven AR inhibitory activity. Phytochemicals such as quercetin, kaempferol and ellagic acid are found to be the most promising ARIs. The exhaustive literature presented in this article clearly indicates the role of plant extracts and phytochemicals as potential ARIs.

**308.**Lulekal E, Asfaw Z, Kelbessa E, Van Damme P. **Ethnoveterinary plants of Ankober District, North Shewa Zone, Amhara Region, Ethiopia.***J Ethnobiol Ethnomed.* 2014 Feb 11;10(1):21. doi: 10.1186/1746-4269-10-21.

Abstract

**BACKGROUND:** Traditional herbal preparations for addressing veterinary problems have been applied in Ankober District, Ethiopia, for generations. However, the millennia-old ethnoveterinary knowledge of the community, and the plants are subjected to loss without being scientifically documented due to anthropogenic and environmental threats. Hence, this study aims at providing a comprehensive documentation on ethnoveterinary plant knowledge of the people in order to preserve the fast-eroding knowledge and resources of the area.

**METHODS:** Semi-structured interviews, focus group discussions, participant observation and walk-in-the-woods methods were used to gather ethnoveterinary data. Informant Consensus Factor (ICF) and Fidelity level (FL) values were calculated using quantitative approaches so as to check the level of informants' agreement on plant use and healing potential of ethnoveterinary medicinal plant species, respectively. Indigenous knowledge on use of medicinal plants for ethnoveterinary purposes among different informant groups was compared using One-way ANOVA and t-tests.

**RESULTS:** A total of 51 plant species representing 50 genera and 35 botanical families used in the treatment of 33 different ailments were identified. Medicinal plant species belonging to families Asteraceae, Asclepiadaceae, Euphorbiaceae and Ranunculaceae were reported to be of frequent use in the local ethnoveterinary medical system. Roots (65%, 33 species) were most often utilized for remedy preparation. Highest ICF values were recorded for gastro-intestinal (0.71) ailments depicting best agreement on knowledge of medicinal plants used to treat ailments in this category. *Embelia schimperi* Vatke showed highest fidelity level value (90%) to treat gastro-intestinal diseases showing conformity of knowledge on this species' healing potential. Significant difference ( $P < 0.05$ ) was observed in average number of therapeutic plants reported by senior members of the community than younger groups. *Embelia schimperi* Vatke and *Rubus steudnerii* Schweinf. were the most-preferred species to treat diarrhoea.

**CONCLUSION:** The study indicated that indigenous knowledge on ethnoveterinary medicinal plant use is still rich and active in the District. Species with recorded highest consensus for curative role are a useful pool for further phytochemical and pharmacological validation for better utilization. Declining wild medicinal flora of the area calls for implementation of a coordinated complementary in situ and ex situ conservation strategy.

**309.** Lulekal E, Rondevaldova J, Bernaskova E, Cepkova J, Asfaw Z, Kelbessa E, Kokoska L, Van Damme P. **Antimicrobial activity of traditional medicinal plants from Ankober District, North Shewa Zone, Amhara Region, Ethiopia.** *Pharm Biol.* 2014 May;52(5):614-20. doi: 10.3109/13880209.2013.858362. Epub 2014 Jan 6.

Abstract

**CONTEXT:** Traditional medicinal plants have long been used in Ethiopia to treat human and livestock ailments. Despite a well-documented rich tradition of medicinal plant use in the country, their direct antimicrobial effects are still poorly known.

**OBJECTIVE:** To investigate the antimicrobial activity of 19 medicinal plant species that were selected based on the ethnobotanical information on their traditional use to treat infectious diseases in Ankober District.

**METHODS:** About 23 different ethanol extracts of plants obtained by maceration of various parts of 19 medicinal plant species were studied for potential antimicrobial activity using a broth microdilution method against *Bacillus cereus*, *Bacteroides fragilis*, *Candida albicans*, *Clostridium perfringens*, *Enterococcus faecalis*, *Escherichia coli*, *Listeria monocytogenes*, *Pseudomonas aeruginosa*, *Salmonella enteritidis*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Streptococcus pyogenes*.

**RESULTS:** Plant extracts from *Embelia schimperi* Vatke (Myrsinaceae) showed the strongest antibacterial activity with a minimum inhibitory concentration (MIC) value of 64 µg/ml against *B. cereus*, *L. monocytogenes*, and *S. pyogenes*. Growth inhibitory activities were also observed for extracts of *Ocimum lamiifolium* Hochst. (Lamiaceae) against *S. pyogenes*, and those of *Rubus steudneri* Schweinf.(Rosaceae) against *S. epidermidis* at an MIC value of 128 µg/ml. Generally, 74% of ethanol extracts (17 extracts) showed antimicrobial activity against one or more of the microbial strains tested at an MIC value of 512 µg/ml or below.

**DISCUSSION AND CONCLUSIONS:** Results confirm the antimicrobial role of traditional medicinal plants of Ankober and warrant further investigations on promising medicinal plant species so as to isolate and characterise chemicals responsible for the observed strong antimicrobial activities.

**310.**Bantie L, Assefa S, Teklehaimanot T, Engidawork E. *In-vivo antimalarial activity of the crude leaf extract and solvent fractions of Croton macrostachyus Hocsht.(Euphorbiaceae) against Plasmodium berghei in mice.* *BMC Complement Altern Med.* 2014 Mar 1;14:79. doi: 10.1186/1472-6882-14-79.

Abstract

**BACKGROUND:** The issue of resistance in malarial infection makes development of novel drugs a necessity. An alternative source for discovering such drugs is natural products. *Croton macrostachyus* H. (Euphorbiaceae) is used in Ethiopian folklore medicine for the treatment of malaria and found to possess antimalarial activity in vitro. However, no further scientific investigations have been carried out to substantiate the claim. This study therefore aimed at investigating the in vivo antiplasmodial activity of 80% methanol extract and solvent fractions of the leaves of *Croton macrostachyus* H. in rodent model of malaria.

**METHODS:** A rodent malaria parasite, *Plasmodium berghei*, was used to inoculate healthy male Swiss Albino mice of age 6-8 weeks and weight 23-27 g. A hydro-alcoholic crude extract and the solvent fractions (chloroform, methanol and aqueous) were administered at different doses 200, 400 and 600 mg/kg. Parameters, including parasitemia, survival time, body weight, temperature, and packed cell volume were then determined using standard tests such as Peter's and Rane's test.

**RESULTS:** Chemoprotective effect exerted by the crude extract and fractions ranged between 44-91% and 12-76%, respectively. The chemotherapeutic effect of the crude extract and chloroform fraction was in the range of 39-83% and 66-82%, respectively. Maximum effect in both tests was observed with the larger dose of the crude extract and chloroform fraction. The crude extract prevented loss of weight and reduction in temperature but did not affect packed cell volume. However, the chloroform fraction did also reverse reduction in packed cell volume due to the absence of saponins in the fraction.

**CONCLUSIONS:** The results collectively indicate that the plant has a promising antiplasmodial activity against *Plasmodium berghei*, which upholds the earlier in vitro findings as well as its folkloric use. Thus, it could be considered as a potential source to develop new antimalarial agents.

**311.** Mohammed T, Erko B, Giday M. **Evaluation of antimalarial activity of leaves of *Acokanthera schimperi* and *Croton macrostachyus* against *Plasmodium berghei* in Swiss albino mice.** *BMC Complement Altern Med.* 2014 Aug 26;14:314. doi: 10.1186/1472-6882-14-314.

Abstract

**BACKGROUND:** Malaria is one of the most important tropical diseases and the greatest cause of hospitalization and death. Recurring problems of drug resistance are reinforcing the need for finding new antimalarial drugs. In this respect, natural plant products are the main sources of biologically active compounds and have potential for the development of novel antimalarial drugs. A study was conducted to evaluate extracts of the leaves of *Croton macrostachyus* and *Acokanthera schimperi* for their in vivo antimalarial activity.

**METHODS:** The plants were selected based on their ethnomedicinal information. Acute and sub-acute toxicity studies of the crude extracts were carried out in Swiss albino mice. To assess the effect of extracts of the plants on the parasite, a 4-day suppressive standard test was performed using *Plasmodium berghei* (ANKA strain). Data were analyzed using paired t-test and ANOVA.

**RESULTS:** In acute toxicity study, the two plants extracts did not show any sign of toxicity up to 2000 mg/kg. In sub-acute toxicity study, both plants did not exhibit any hematological change and mortality throughout the observation period up to the highest dose of 1000 mg/kg given daily. Extracts of the leaves of both plants significantly ( $P < 0.05$ ) suppressed parasitaemia in dose dependent manner at all dose levels.

**CONCLUSIONS:** The findings may support the traditional use of the plants to treat malaria. Further pharmacological, toxicological and phytochemical studies are, however, required to evaluate the potential of the plants towards the development of new antimalarial agent.

**312.**Kiros G, Erko B, Giday M, Mekonnen Y. **Laboratory assessment of molluscicidal and cercariacidal effects of *Glinus lotoides* fruits.***BMC Res Notes*. 2014 Apr 8;7:220. doi: 10.1186/1756-0500-7-220.

Abstract

**BACKGROUND:** The negative impact of synthetic molluscicides on the environment and their high cost necessitated search for an alternative approach of using plant extracts for the control of schistosomiasis. The objective of this study was, therefore, to evaluate aqueous and ethyl acetate

crude extracts of *Glinus lotoides* fruits for their cercariacidal activity and molluscicidal effect against schistosome snail intermediate hosts.

**METHODS:** Assessment of the molluscicidal activity against *Biomphalaria pfeifferi* was made by immersion method in accordance with WHO guideline. The results of mortality were statistically analyzed using probit analysis. The attenuating effect of the plant on *Schistosoma mansoni* cercariae was determined using establishment of adult worms as a parasitological parameter post exposure.

**RESULTS:** The 24 and 48 hour-LC50 values for the aqueous extract of *G. lotoides* fruits were 47.1 and 44.1 mg/L, respectively, whereas that of ethyl acetate were 66.1 and 59.6 mg/L, respectively. The 24 and 48 hour LC90 values for the aqueous extract of *G. lotoides* fruits were 56.96 and 51.0 mg/L, respectively, while that of ethyl acetate were 77.2 and 70.0 mg/L, respectively. The in vitro cercariacidal activity was determined after 2 hrs of exposure to the aqueous plant extract. It was found out that the LC50 and LC90 values were 18.7 and 41.7 mg/L, respectively. Besides, infectivity of *Schistosoma mansoni* cercariae to mice was determined by exposing mice to cercariae pre-treated with the sub-lethal concentrations (3.7, 11.6 and 18.7 mg/L) of the aqueous extract. A significant reduction in worm burden in mice was obtained at 11.6 mg/L ( $p < 0.05$ ). Moreover, the reduction in number of worms recovered was highly significant at 18.7 mg/L ( $p < 0.001$ ).

**CONCLUSIONS:** The results showed that *G. lotoides* has molluscicidal activity against *B. pfeifferi* snails and cercariacidal activity against *S. mansoni*. Yet, further comprehensive evaluation is recommended for the possible use of *G. lotoides* against *B. pfeifferi* and the schistosome parasite.

**313.**Kifleyohannes T, Terefe G, Tolossa YH, Giday M, Kebede N. **Effect of crude extracts of *Moringa stenopetala* and *Artemisia absinthium* on parasitaemia of mice infected with *Trypanosoma congolense*.***BMC Res Notes*. 2014 Jun 24;7:390. doi: 10.1186/1756-0500-7-390.

Abstract

**BACKGROUND:** Treatment of trypanosomosis is currently facing a number of problems including toxicity of trypanocidal drugs and development of resistance by the parasites. These limitations have prompted the search for alternative active substances (such as of natural origin). The purpose of the study was to investigate the effect of extracts of *Moringa stenopetala* and *Artemisia absinthium* on *Trypanosoma congolense* in mice.

**METHODS:** Swiss white male mice aged 8-12 weeks were divided into six experimental groups of six animals. Water and methanol extracts of the two plants were prepared. *T. congolense* was isolated from cattle at Ghibe valley (Ethiopia). All experimental mice received approximately  $1 \times 10^5$  trypanosomes in 0.2 ml of blood. Plant extracts were given orally to four groups (2 plant species and two extraction methods) at 400 mg/kg body weight for seven consecutive days. One group remained as distilled water treated control and the other as diminazene aceturate treated control. The effect of the extracts on levels of parasitaemia, body weight, packed cell volume (PCV) and mice survival was monitored for 25 days.

**RESULTS:** All treatments have significantly reduced parasitaemia and helped improve body weight, PCV and survival of mice compared to the water-treated control ( $P < 0.01$  in all cases). These effects were comparable to that with diminazene aceturate. No significant difference was observed in the reduction of parasitaemia between plant extract treatment groups. However, mice with extracts of *A. absinthium* had significantly higher body weight than those with extracts of *M. stenopetala* ( $P < 0.05$ ).

**CONCLUSIONS:** The two plants have antitrypanosomal potential against *T. congolense* by reducing the levels of parasitaemia, maintaining good PCV and body weight, and prolonging the lives of infected animals.

**314.** Wo Gemechu, D Bisrat, K Asres. **Antimalarial Anthrone and Chromone from the Leaf Latex of *Aloe debrana* Chrstian** Ethiopian Pharmaceutical Journal, 2014; 30(1):

***Abstract***

In Ethiopian traditional medicine, the leaf latex of *Aloe debranan* Chrstian is used for the treatment of several diseases including malaria. In an ongoing search for effective, safe and cheap

antimalarial agents from plants, the leaf latex of *A. debrana* was tested for its in vivo antimalarial activity, in a 4-day suppressive assay against *Plasmodium berghei*. Activity-guided fractionation of this latex which showed good antiplasmodial activity resulted in the isolation of two compounds identified as 10-C- $\beta$ -D-glucopyranosyl-1,8-dihydroxy-3-(hydroxymethyl)-9(10H)-anthracenone, commonly known as aloin, and (E)-2-(1-hydroxy-2-methylpropyl)-8-(6'-O-cinnamoyl)- $\beta$ -D-glucopyranosyl-7-methoxy-5-methylchromone (HCGMM). Aloin displayed a significant ( $p < 0.05$ ) antimalarial activity at doses of 25, 50 and 100 mg/kg with chemosuppression values of 48.38, 69.66 and 78.31%, respectively, while the effect of HCGMM was slightly less than that of aloin inhibiting growth of the parasite by 35.49, 47.02 and 63.13%, at the same doses. Acute toxicity studies revealed that the latex possesses no toxicity in mice up to a maximum dose of 5000 mg/kg suggesting the relative safety of the plant when administered orally. The results of the present study indicate that aloin and HCGMM are among the antimalarial principles in this medicinal plant, and further support claims for the traditional medicinal use of the plant for the treatment of malaria.

**Keywords:** leaf latex, *Aloe debrana*, antimalarial, aloin, (E)-2-(1-hydroxy-2-methylpropyl)-8-(6'-O-cinnamoyl)- $\beta$ -D-glucopyranosyl-7-methoxy-5-methylchromone

**315.A** Ejigu, E Engidawork **Screening of the Antidepressant-like Activity of Two *Hypericum* Species Found in Ethiopia** *Ethiopian Pharmaceutical Journal*, 2014; 30:1

### **Abstract**

The widespread use of *Hypericum perforatum* for the treatment of mild to moderate depression has prompted screening of the antidepressant-like effect of other species of the genus. The present study was designed to assess the antidepressant-like activity of the 80% methanol extract of *Hypericum quartianum* and *Hypericum revolutum* in behavioral despair model. Eighty percent methanol extract of *H. quartianum* and *H. revolutum* was investigated using learned helplessness models of depression such as tail suspension test (TST), forced swimming tests (FST) and avoidance tests. In addition, locomotor activity was investigated with open field test (OFT). Mice (for TST, avoidance test and OFT) and rats (for FST) were randomly assigned into different groups and treated with distilled water (control), imipramine 64 mg/kg (standard) and extract (200 mg/kg

and 400 mg/kg). At 200 and 400 mg/kg, *H. revolutum* was effective in reducing immobility time in the TST (43.84%,  $p < 0.01$  and 49.08%,  $p < 0.01$ , respectively) and FST (33.7%,  $p < 0.05$  and 38.4%,  $p < 0.01$ , respectively). Similarly, *H. quartinianum* also showed anti-immobility effect at 200 (30.67%,  $p < 0.01$ ) and 400 mg/kg (41.19%,  $p < 0.01$ ) in TST. However, only the larger dose produced significant anti-immobility effect in FST (35.3%,  $p < 0.05$ ). Moreover, both extracts at the doses used significantly decreased the escape failure ( $p < 0.01$ ) and increased the intertrial crossing ( $p < 0.05$  and  $p < 0.01$ ) during the resting periods in the avoidance task in a shuttle box. In OFT, the tested crude extracts did not significantly alter locomotor activity, suggesting that it is very unlikely that the observed antidepressant effects are false positives. These observations together provide evidence that the 80% methanolic extract of leaves of *H. quartinianum* and *H. revolutum* display antidepressant-like actions in established models of behavioral despair without affecting locomotion.

**Keywords:** *Hypericum quartinianum*, *Hypericum revolutum*, depression, antidepressant-like activity

**316.D** Bisrat, A Mazumder, K Asres *In vitro* Antimicrobial Activity of a Semi-synthetic Derivative of Embelin Ethiopian Pharmaceutical Journal, 2014; 30(1):

### **Abstract**

One of the strategies for the development of new drugs involves semi-synthesis of natural products. In the present study, the antimicrobial activity of embelin (1) and its semi-synthetic derivative 5-(p-tolylamino)-2-hydroxy-3-undecylcyclohexa-2,5-diene-1,4-dione (2) were evaluated against 21 bacterial and 4 fungal pathogens using the disc diffusion method. Embelin (1) was isolated from the fruits of *Embelia schimperi* Vatke by column chromatography over silica gel while its derivative (2) was synthesized in good yield (98.3%; w/w) by using a one-step condensation reaction after treating embelin with p-toluidine. The structures of these compounds were determined on the basis of  $^1\text{H}$ ,  $^{13}\text{C}$  NMR, DEPT-135 and ESI-mass spectral data. Both 1 and 2 showed broad spectrum antibacterial activity against Gram-positive and Gram-negative bacteria at a concentration of 200  $\mu\text{g/ml}$ . Among the tested bacteria, some strains of *Escherichia coli*, *Salmonella typhi*, *Staphylococcus aureus* and *Vibrio cholera* were found to be highly susceptible

to the tested compounds with activity ranging between 75 and 94% of that of the standard drug ciprofloxacin. Similarly the tested compounds displayed good activity against four pathogenic fungal strains when with their effects were compared with that of griseofuvin.

**Keywords:** *Embelia schimperi*, embelin, 5-(p-tolylamino)-2-hydroxy-3-undecylcyclohexa-2,5-diene-1,4-dione, antimicrobial, disk diffusion.

**317.M Mohammed, D Bisrat, A Debella, T Birhanu Standardization of the roots of *Gnidia stenophylla* Gilg: A potential medicinal plant of South Eastern Ethiopia traditionally used as an antimalarial *Planta Med* 2014; 80 - P11 DOI: 10.1055/s-0034-1382624**

Lack of quality control standards for medicinal plants and their preparations is considered major barrier to their integration in to effective primary health care in Ethiopia. Poor quality herbal preparations led to countless adverse reactions extending to death. Denial of penetration for the Ethiopian medicinal plants in to the world's booming herbal market is also another significant loss resulting from absence of herbal quality control system. Thus in the present study, *Gnidia stenophylla* Gilg (popular antimalarial plant of south eastern Ethiopia), is standardized and a full monograph is produced that can serve as a guideline in quality control of the crude drug.

Morphologically, the roots are found to be cylindrical and tapering towards the end. It has hard, corky and friable touch with saddle brown color externally and relatively smooth and pale brown internally. It has got characteristic pungent odor and very bitter taste. Microscopically it has showed lignified xylem vessels, wider medullary rays with some calcium oxalate crystals, reddish brown 2<sup>ndary</sup> metabolite contents and slender shaped long fibres. Physicochemical standards quantified and resulted: foreign matter (5.25%), moisture content (6.69%), total ash (40.80%), acid insoluble ash (8.00%), water soluble ash (2.30%), alcohol soluble extractive (15.27%), water soluble extractive (10.98%), foaming index (100.01 ml/g), swelling index (7.60 ml/g). Phytochemically: Phenols, flavonoids, steroids, tannins and saponins were detected in the root extract; TLC and HPLC fingerprints were produced and an analytical marker was also tentatively characterized as 3-(3,4-dihydro-3,5-dihydroxy-2-(4-hydroxy-5-methylhex-1-en-2-yl)-7-methoxy-4-oxo-2 H-chromen-8-yl)-5-hydroxy-2-(4-hydroxyphenyl)-7-methoxy-4 H-chromen-4-one. Residue wise pesticides (i.e DDT, DDE, g-BHC) and radiochemical levels fall below the WHO

limit while Heavy metals (i.e Co, Ni, Cr, Pb, and Cu), total aerobic count and fungal load lie way above the WHO limit.

In conclusion the result can be taken as signal that employing non standardized medicinal plants could cause many health risks of the Ethiopian people and Africans' at large (as 80% of inhabitants in the continent depends on it for primary health care). Therefore to follow a more universal approach to herbal quality by adopting the WHO guidelines and developing monographs using the various quality parameters is inevitable to minimize quality breach and promote effective herbal drug usage.

Keywords: *Gnidia stenophylla* Gilg, Standardization/Monograph, Pharmacognostic, Residue/impurity, Quality

**318.**Tamene Yohannes Overview on Ethnobotany of *Moringa stenopetala* and Access and Benefit sharing (ABS)Editor: Ashenif Tadele, Asfaw Debella Proceeding of Consultative Workshop on *Moringa stenopetala* to Maximize Its Potential uses Bishoftu, Ethiopia; May 22-23, 2014

### **Abstract**

The relationship between human beings and plants has a long history. Since antiquity human uses plants for several purposes. Ethnobotanical study of traditional plant knowledge has resulted in many valuable discoveries, ranging from new methods for cultivating crops on arid lands to new medicines for the treatment of disease. Ethnobotanical research has led to the development of many commercial plant-derived drugs. *Moringastenopetala* (**Bak. f.)Cuf. (1957)** belongs to family Moringaceae and to the genus *Moringa*. The genus is the only genus in the family which is represented by 14 species. Northeast tropical Africa is a center of endemism and diversity to the genus *Moringa*. Among these 14 species, six species including *M. stenopetala* and *M. oleifera***Lam.** absolutely recorded with 2 others expected to be found in Ethiopia. Though, *Moringa* tree (*M. stenopetala* and *M. oleifera*) is known by their common names Cabbage tree and Horse Radish tree respectively; based on the multipurpose behavior of the trees several impressive bynames has been given to them such as “**The Tree of Life**”, “**The Never Die Tree**”, “**The Magic Tree**”, “**The Tree of Paradise**”, “**The Miracle Tree**” and “**Mothers' Best Friend**”. In Ethiopia,

Moringa is known by different vernacular names such as Shferaw (Amharinya), Aleko, Aluko, Halaco, Halako (Gamonya), Kallanki (Benninya), Telahu (Tsemay), Haleko, Shelchada (Konsonya), Wuame, Mawe (Somalinya) and others. The Genus Moringa follows the distribution pathway from Rajasthan to south West Africa (Africa, Madagascar and parts of Asia, including Arabia and India), whereas *M. stenopetalan* native to Ethiopia and Kenya, historically originated from Ethiopia. In Ethiopia it is cultivated in terraced fields, gardens and small towns, also growing naturally in riverine and *Acacia-Commiphora* woodland and on rocky ground (though it is now either extinct if not diminished from time to time in the wild) from 1200-1650 m. in Kafa, Gamogofa and Sidamo floristic regions, also in the northern part of Kenya. It is a multi-purpose tree producing edible leaves which are boiled and eaten like cabbage. In Ethiopia the fresh or processed leaves are sold in local markets which are used as food supplement with high nutritional value and for its impressive range of medicinal uses. The seeds can be used to purify water. Different parts of this plant contain a profile of important minerals, and are a good source of protein, vitamins, beta-carotene, amino acids and various phenolics. Much research was not done on *M. stenopetala* as that of its close relative *M. oleifera* which provides a rich and rare combination of zeatin, quercetin, beta-sitosterol, caffeoylquinic acid and kaempferol. It is also very important for its medicinal value. Various parts of this plant act as cardiac and circulatory stimulants, possess antitumor, antipyretic, antiepileptic, anti-inflammatory, antiulcer, antispasmodic, diuretic, antihypertensive, cholesterol lowering, antioxidant, antidiabetic, hepatoprotective, antibacterial and antifungal activities, and are being employed for the treatment of different ailments in the indigenous system of medicine. Since the two species are closely related it is believed that (and also ascertained by experiment for some of them), *M. stenopetala* may also have such properties and more others. These important ethnobotanical knowledge are mostly based on the indigenous (traditional) knowledge (IK) which is transferred from generation to generation orally and is seldom documented. Scientists are often adapting IK and reapplying it in projects of contemporary contexts. Therefore, it can be considered that IK and modern science can be seen as two systems of knowledge that complement each other. However, the fact that indigenous people have seldom shared in the profits gained from ethnobotanically derived drugs has made them to be suspicious or distrustful of sharing information with researchers. Protecting the intellectual property rights (IPR) of indigenous people, as well as determining how they can and should be compensated, is

of growing concern. This and other related reasons has led to the development of international threats, conventions and protocols which deal with the access of genetic resources and equitable sharing of the benefits from the commercial utilization of the resource, such as Convention on Biological Diversity (CBD), International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), the Nagoya Protocol on Access and Benefit-Sharing, the Bonn Guideline on Access and Benefit-Sharing and the African Model Law for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resource in Relation to International Law and Institutions. Based on such conventions Ethiopia has also developed her own proclamations and regulations such as Access to Genetic Resources and Community Knowledge, and Community Rights Proclamation (No. 482/2006) and Regulation (No. 169/2009) which should be implemented to access genetic resources and traditional (community) knowledge and ensures the access giving community or country to have an equitable share of the benefit from the utilization of the resources and knowledge. Therefore, local communities, scientific community and other stakeholders working on the IK and genetic resources should be aware of such proclamations and regulations and obey to them before accessing the resources and knowledge in order to benefit the community who has conserved the resources and the knowledge for many centuries.

**319.**Dechasa Jiru Agroforestry aspect and its influence for sustainable higher yield and quality of *Moringa stenopetala* Editor: Ashenif Tadele, Asfaw Debella Proceeding of Consultative Workshop on *Moringa stenopetala* to Maximize Its Potential uses Bishoftu, Ethiopia; May 22-23, 2014

## **Abstract**

Ethiopia has a land cover mass of 6, 28 and 66 percent high, mid and low land cover. The highland is characterized by cold temperature predominantly a mixed farming agri-silvo-pastoral system that further expands to mid land. The farming system predominantly produce annual crops of shallow rooted cereals that depleted soil nutrient and remain in bare prior to sowing the exposes

top fertile soil so wind and water physical erosion. To the contrary perennial common traditional on farm plant such croton in the north, *Acacia albida* in the central Rift Valley and adjacent lands, *Albizia species* in coffee growing area in the West last but the most important *Moringa stenopetala* the most important multipurpose food, feed and environmental conserver grows even in harsh sites which is characterized by repeated drought. In the South where *M stenopetala* is originated and expanded as a cultivar by farmers. Moisture deficient the majority of the low land and part of mid land except the western part and riparian strips, which is a moringa growing potential area has low rain thus the farmers are predominantly pastoralists. This area ranges from the periphery on one hand and the Rift Valley to elevating to 1900m. With the exclusion of frost pockets and termite prone site the remaining 75 per cent of the land cover is a moringa growing potential area both under rain fed and irrigation. Being perennial it sustains carbon sequestration, food and feed supply where most perennial plant becomes leafless and fail to do so. Currently under research finding high yielding of better quality improved local species is on the virtue of realizing to farmers. Current research finding compares different cereals, vegetables and pulses comparative study with moringa mixed cropping and *Acatiaalbida/Faiderbiaalbida* (currently accepted as a number one on farm tree by the World Agroforestry scientists) tree intercrop with a hedge row of moringa in which all other crops both light demanding and shed tolerant are mixed and produced. The research compared with the worldwide popular Indian origin improved *Moringa oleifera* and has shown superiority in most character such as nutrient content, yield, drought and salinity tolerance. The ultimate result is in which options are a farmer better of in small area of home garden size of land is a result. So far moringa in mix and in sole proved to be superior over other crops however evaluated at research level.

**320.** Prof. Yalemtehay Mekonnen **Overview on the studies undertaken on the medicinal values of *Moringa stenopetala* and future directions** Editor: Ashenif Tadele, Asfaw Debella Proceeding of Consultative Workshop on *Moringa stenopetala* to Maximize Its Potential uses Bishoftu, Ethiopia; May 22-23, 2014

### **Abstract**

The Genus *Moringa* Forsk. Belongs to Family Moringaceae with 14 species. All varieties contain strong, mustard-like taste. The stems produce gum and the seeds are rich in oil. *Moringa*

*stenopetala*(Baker f.) Cufodontis(Aleko, Shelkata) is the dominant species in Ethiopia with multipurpose use. The medicinal values of *M. stenopetala* can be summarized as follows.

**Anti-microbial effects:** *M.stenopetala* was also proved to have antibacterial effects (Eilert et al. 1981; Mekonnen & Draeger 2003). **Antiparasitic Property:** the ethanolic extract of fresh root wood ethanol and the acetone extract of the dried leaves showed activity against *Trypanosoma brucei* (Mekonnen et al. 1999). The ethanol extract of fresh *M.stenopetala* leaves showed some **antifertility property** in laboratory albino mice (Mekonnen & Gessesse 1998). In vitro, leaf ethanol extract showed some oxytocic-like activity in guinea pigs and mouse uteri (Mekonnen 1999). **Hypotensive, hypocholesterolemic and hypoglycemic effects:** The water extracts of the leaves in guinea pigs demonstrated hypotensive property (Mengistu et al. 2012). Serum glucose level and serum cholesterol level were significantly decreased after six weeks of treatment of mice with the aqueous extract of the leaves of *M. stenopetala* (G/Selassie et al. 2011). Its hypoglycemic effect in guinea pigs was also reported (Nardos et al., 2011). **Water flocculating property:** *Moringa* seeds are used to clear dirty and muddy water thus having aseptic property in combating disease causing organisms.

In light of the wide use of *M. stenopetala* in particular in southern parts of Ethiopia, it can be properly exploited as a food supplement with good manufacturing practice (GMP). Furthermore, after formulation of the active constituents and stepwise clinical trials, the *Moringa* product could be made available as traditional medicine complementing modern drug supplies. To realize these benefits concerted effort of different entities has a paramount importance.

**Key words** *Moringa stenopetala*, antimicrobial, hypotensive, hypoglycaemic, hypocholesterolemic

**321.**Bekesho Geleta, Asfaw Debella, Mekoya Mengistu, Mebrhatu Eyasu **Review on the effects of *Moringa stenopetala* leaves on Hypertension** Editor: Ashenif Tadele, Asfaw Debella Proceeding of Consultative Workshop on *Moringa stenopetala* to Maximize Its Potential uses Bishoftu, Ethiopia; May 22-23, 2014

## Abstract

**Background:** Non-communicable diseases caused two thirds of all deaths globally; about 36million deaths in 2008. Nearly 80% of deaths are occurred in low-and middle-income countries. Cardiovascular disease is leading cause mortality in non- communicable diseases, contributes 17million deaths (48% of NCD deaths) a year. Hypertension affects around one billion people worldwide and 10% of the global disease burden. In Ethiopia, hypertension is 12<sup>th</sup> top killing disease. Several modern antihypertensive medications are available thus far, but expensive, side effects and unpalatable due to polypharmacy. Various herbal preparations have been used and claimed to have benefit for hypertension in the folk medicine such as *M stenopetala*.

**Objective:** Review on the effects of *Moringa stenopetala* leaves on Hypertension

**Methods and materials:** The plants used in this study were collected from wild and authenticated, dried under shade and crushed to powder and the aqueous; hydroalcoholic and solvent fractions were prepared for subsequent laboratory experiments. The diuretic, hypotensive and vasodilatory activities were conducted using different model. Experimental animals were randomly allocated to the treatment group, the control and reference group. After administration of the sample, the experimental animals were placed on a metabolic cage. The urine were collected in measuring cylinder up to 5hrs after dosing and compared with standard diuretic agent, Furosemide (10mg/kg body weight). The saluretic potential of the different extract was measured based on Na<sup>+</sup>, K<sup>+</sup>, Cl<sup>-</sup>, Na<sup>+</sup>/K<sup>+</sup>. Hypotensive activity was evaluated by IV infusion of *M stenopetala* on normotensive rats using BP analyzer. Vasorelaxant effects of the different extracts were conducted on guinea pigs thoracic aorta by reversing the vasoconstriction activity of KCl using Organ bath and Polygraph. Results were expressed as means ± standard errors of means.

**Results:** The aqueous extract of *M stenopetala* showed lowering the SBP, MABP and DBP at 5, 10, 20, 30 and 40mg/kg IV infusion on anesthetized normotensive guinea pigs. The same extract also showed an increase in vaso-relaxant effect to 95.56% by cumulative addition of the extracts to a dose of 7 mg/kg after vasoconstriction induction using KCl (80mM). Diuretic activity of different fractions of *M stenopetala* in swiss albino mice showed that 50mg/kg of 70% ethanol extract (1.33), 50mg/kg of the n-butanol fraction (1.44), and 150 mg/kg of the aqueous fraction

(1.17) showed more diuretic activity than Furosemide (10mg/kg). In the meantime, the saluretic potential of the different extract and doses of *M stenopetala* on Na<sup>+</sup>, K<sup>+</sup>, Cl<sup>-</sup>, Na<sup>+</sup>/K<sup>+</sup> is very significant. Diuretic evaluation of the tea simulation of fine and coarse powder of the *M stenopetala* done in 2, 4 and 6 tea spoon showed better diuretic activity than the standard drug Furosemide (10 mg/kg).

**Conclusions and Recommendation:** The study validates the claimed antihypertensive uses of this medicinal plant in folk medicine. *Moringa stenopetala* showed a promising efficacy (*in-vitro* and *in-vivo*) against hypertension on the experimental animals. The herbal tea preparation requires standardization of the tea preparation. Further in depth pharmacodynamic and pharmacokinetic studies using different models and techniques are mandatory to have a data complete that helps to promote a rational community use of *Moringa stenopetala*.

322. Alemayehu Toma, Eyasu Makonnen, Yalemtehay Mekonnen, Asfaw Debella, Sirichai Addiskwattaana **A review on the effects of *Moringa stenopetala* leaves on diabetes**  
Editor: Ashenif Tadele, Asfaw Debella Proceeding of Consultative Workshop on *Moringa stenopetala* to Maximize Its Potential uses Bishoftu, Ethiopia; May 22-23, 2014

### Abstract

**Background:** Worldwide, the number of people with diabetes and pre-diabetes is exponentially increasing mainly due to aging, urbanization, unhealthy eating habits, increasing prevalence of obesity and lack of physical activity. Diabetes mellitus is a leading cause of morbidity and mortality worldwide, with an estimated 382 million adults being affected and 5.1 million people killed in the year 2013. The prevalence is expected to be 592 million in the year 2035, with the greatest increases expected in low- and middle-income developing countries of the African, Asian, and South American regions. At present, 80% of the world's populations with diabetes live in low- and middle-income countries.

**Review:** *M stenopetala* (*Baker f*) *Cufodontis* belongs to family Moringaceae is commonly grown in Southern parts of Ethiopia. The leaves of *M stenopetala* are cooked and eaten as vegetables and

the leaves and roots are used to treat malaria, diabetes, asthma, repelled placenta, hypertension and gastrointestinal problems. The crude aqueous extract of the leaves demonstrated hypoglycemic activity. The crude aqueous/ethanol extract and fractions of the leaves of *M stenopetala* have been reported to have both hypoglycemic and antihyperglycemic effect. Moreover, chronic administration of the n-butanol fraction of ethanol extract of *M stenopetala* leaves in alloxan-induced diabetic mice showed antihyperglycemic and antihyperlipidemic effects with wide margins of safety, indicating its potential for long term management of diabetes. The chromatographic fractions of ethanol extract of *M stenopetala* leaves also showed antihyperglycemic effect.

**Conclusions:** *Moringa stenopetala* has hypoglycemic, antihyperglycemic and antihyperlipidemic effects with wider safety margins. Antihyperglycemic and antihyperlipidemic effects could be associated with inhibition of intestinal and pancreatic enzymes.

323. Hirut lemma, Christina Haile, Redwon Muzain, Negero Gemedo, Getachew Addis, Mulugeta Guta, Frehiwot Teka, Kirubel Tesfaye, Aynalem Lakew, Kidist Yirsaw, Asfaw Debella; **The Antibacterial activity and water clarifying property of *Moringa stenopetala* seed extracts** Editor: Ashenif Tadele, Asfaw Debella Proceeding of Consultative Workshop on *Moringa stenopetala* to Maximize Its Potential uses Bishoftu, Ethiopia; May 22-23, 2014

## **Abstract**

**Background:** *Moringa stenopetala* – A branched tree that grows 6-10m tall. It grows abundantly in south western Ethiopia. It is known by different vernacular names such as shiferaw, Aleko and cabbage tree. *M. stenopetala* is known in folk medicine as having value in treating a wide variety of ailments. Among 14 species of moringa tree, *M. oleifera* is well studied with regard to potential medicinal uses and the identification of compounds of potential therapeutic importance which is native to India.

**Objective:** To investigate the Antibacterial activity of extracts and Evaluate the efficacy of optimum concentration of *M. stenopetala* for water clarifying activity and to develop appropriate dosage form for water clarifying agent from *Moringa stenopetala* seeds.

**Methodology:** The seeds of the plant were collected from Arbaminch where it is widely cultivated. A voucher specimen was identified by taxonomists and deposited at TMDRD in EPHI. The seeds were air dried and then powdered for extraction. Powdered seeds were defatted with petroleum ether. Defatted marc was then extracted with 70% ethanol. The aqueous extract was macerated with distilled water, filtered and freeze dried using lyophilizes. The Anti-bacterial activity was determined by using both Agar well diffusion and Agar dilution method. The Optimum concentration of *M. stenopetala* for water clarifying activity was also conducted and the comprehensive physico-chemical and microbiological analysis moringa treated water was studied

**Results:** Both the petroleum (5, 10, 20, 40%) and ethanol (5, 10, 25, 50 and 100 mg/ml) and aqueous (5, 10, 25, 50 and 100 mg/ml) extract of the plant did not show any zone of inhibition against standard and clinical strains of E coli, Salmonella, and shigella. Serial agar dilution of pet ether (0.5-8%), both ethanol and aqueous extract (0.25-4mg/ml) of the seeds didn't show activity against the above test organisms. More over the contaminated water treated with the optimum concentration of extract (62.5mg/ml) didn't show any effect on physicochemical and microbiological quality of the water

**Conclusions and Recommendations:** From this study the result of different extracts of *M. stenopetalla* seed didn't show antibacterial activities. The optimized concentration of extract (62.5mg/250ml) didn't have any effect on physicochemical and microbiological analysis of treated water .The aqueous extract of seeds works as a flocculent by binding the bacteria to the solids in water and causing them to sink to the bottom but additional treatment of filtering and boiling of water is needed to render it completely safe to drink. So, there is a need to study other dosage forms.

**324.**Aweke kebede, Nigussie Retta, Cherinet Abuye, Marian Malde, Melkitu Kassaw, Tefaye Zeru, Meseret W/ Yohannes **Effect of *Moringa stenopetala* powdered leaves in mitigating ingested fluoride** Editor: Ashenif Tadele, Asfaw Debella Proceeding of Consultative Workshop on *Moringa stenopetala* to Maximize Its Potential uses Bishoftu, Ethiopia; May 22-23, 2014

## **Abstract**

Excessive intake of fluoride is accompanied by a characteristic sequence of changes in teeth, bone and periarticular tissues. These changes lead to a variable degree of locomotor disability, ranging from simple mechanical back pain to severe, crippling and neurological impairment. Fluorosis is an important clinical and public health problem in several parts of the world. Fluoride is mainly absorbed in the stomach and small intestine. Over 75% of ingested fluoride is absorbed. Fluoride absorption can be altered by dietary calcium which forms insoluble complex. The objective of this study is to assess the effect of Calcium or calcium rich food (moringa dry leaf) supplementation to reduce amount of absorbed fluoride. The level of mitigation of ingested fluoride is monitored using urinary and fecal fluoride level. The trial is conducted on rats (albuinowistar) and willing women. The results show that supplementation of calcium or moringa in daily ration will reduce urinary fluoride and increases fecal fluoride level. There is no significant difference between moringa, calcium tablet or milk in reducing urinary fluoride level. Using moringa to mitigate ingested fluoride has additional benefit of vitamins and minerals.

**Key words:** *Moringa Stenopetala*, Fluoride, Fluorosis

**325. Abdu Hassen Toxicological studies of butanol fraction of *Moringa stenopetala* leaves**

**in rats** Editor: Ashenif Tadele, Asfaw Debella Proceeding of Consultative Workshop on

*Moringa stenopetala* to Maximize Its Potential uses Bishoftu, Ethiopia; May 22-23, 2014

**Abstract**

**Background:** Medicinal plants are used to prevent and treat a great variety of human diseases due to their constituent of alkaloids, glycosides, polyphenols etc. *Moringa stenopetala*, which is found in the Southern parts of Ethiopia, contains the primary metabolites such as carbohydrates, proteins, fats, vitamins, and minerals and secondary metabolites/phytomolecules: alkaloids, flavonoids, glycosides, polyphenols, saponins, sugars, steroids, and others. The leaves of *M. stenopetala* are eaten as vegetable and traditionally for the treatment of various ailments such as Malaria, hypertension, asthma, diabetes, stomach pain, and other diseases. Despite their therapeutic values, toxicity studies of the leaves were limited. The aim of the study was to investigate the acute and sub-chronic toxic effects of butanol fraction of the leaves on Behavior and body weight, Hematological and biochemical parameters, Gross and histopathology of the liver and kidneys in rats.

**Materials and Methods:** The plant leaves were collected from Arbaminch. After drying under shade the hydroalcoholic extract was prepared followed by butanol fraction. The acute toxicity at four different doses (500, 1000, 2000 and 5000 mg/kg) and sub-chronic toxicity at two different doses (500 and 1000 mg/kg) were conducted on both sexes of the albino rats according to OECD guidelines. Blood samples were collected by cardiac puncture for analysing haematological and biochemical parameters. Gross pathological observation was conducted on the Liver and the kidneys after sacrificing the rat at the end of the experiment. Data analysis was performed using the SPSS version 20 program, with One-way analysis of variance (ANOVA) followed by Dunnett's *t*-test. Values were expressed as Mean  $\pm$  SEM.  $P < 0.05$  were considered statistically significant.

**Results:** The acute toxicity study indicated that no significant ( $p > 0.05$ ) body weight changes, no death and apparent behavioral changes and no gross pathological lesions up to a dose of 5000 mg/kg of the fraction. The sub-chronic toxicity study also showed that no significant changes

were observed in both test groups as compared with the controls on the hematology and biochemical parameters. However, the blood glucose level decreases significantly by 23 and 21% at the dose of 500 and 1000 mg/kg; respectively ( $p < 0.05$ ). Histology of the liver and kidney showed that the fraction was non-toxic to the cellular structures of the liver and kidneys.

**Conclusion and Recommendations:** The fraction was well tolerated up to an oral dose of 5000mg/kg and does not produce have undue effects on the behavior, body weight, blood parameters and on the gross and histopathology of the liver and kidneys. Further sub-chronic and chronic toxicity studies should be carried out in other animal species such as guinea pigs, rabbits, and dogs. Furthermore, detailed sub-chronic and chronic toxicity studies should be carried out on other organs such as the stomach, intestine, pancreas, and thyroid gland.

**326. Wondwossen Girmay Developing Moringa value chain for food security and improved livelihoods of small holder farmers in Central Rift Valley (CRV) and South Omo: opportunities, constraints and prospects** Editor: Ashenif Tadele, Asfaw Debella  
Proceeding of Consultative Workshop on *Moringa stenopetala* to Maximize Its Potential uses Bishoftu, Ethiopia; May 22-23, 2014

### **Abstract**

The multipurpose tree, *Moringa stenopetala* (Bak.f.)Cufod, has been restricted until recently to a few areas of the Southern Nations, Nationalities and Peoples Regional State (SNNPRS). However, it has become one of the vastly growing and traded commodities in other parts of the country. Owing to the perceived medicinal and nutritional benefits the plant provides, the consumption of its leaves both in powder or dried form has been mounting; production is expanding and new business are flourishing. The private sector including the small and informal businesses is likely to dominate the emerging markets. Many investors have shown interest in establishing value chains for the tree produce. However, lack of organized market chain, proper promotion and public awareness on the use and benefits of the tree have constrained the market potential. Added to this, the absence or weak regulatory and monitoring systems have made the market vulnerable to fraud, escalating the potential risks associated with the use of the tree produce for medicinal purposes. There is inadequate research on its nutritional and medicinal values, potential environmental and

economic benefits. It is on this backdrop that HoA-REC&N took this initiative with the principal objective of developing Moringa value chain that can contribute to food security and improved livelihoods of small holder farmers in potential areas of CRV and South Omo Zone. It is assumed that small scale farmers could better be integrated in the emerging and restructured markets through gender sensitive value chain development strategy. This approach can help unlock the adaptation potential of smallholder farmers. Professionalizing informal activities in which rural women are traditionally involved could be a good entry point for intervention. When equipped with adequate information, finances, low-cost technologies and networks, smallholders could take actions that have an influence across the value chain while enhancing market-based adaptation. In this presentation, an overview of the proposed Moringa value chain project will be presented. The strategies sought, current trends and achievements in terms of addressing the gaps mainly in awareness creation and promotion will be highlighted. Finally, opportunities, constraints and potential risks associated with the emerging Moringa business as well as future prospective will be discussed based on the value chain context and in line with organizational and national priorities.

**327.** Yihunie Ayele, Negussie Retta, Gulelat Desse Haki, Kwangoh Koh, Kung-Woo Nam, Hee Seon Kim **Nutritional and health benefits of *Moringa stenopetala* edible parts** Editor: Ashenif Tadele, Asfaw Debella Proceeding of Consultative Workshop on *Moringa stenopetala* to Maximize Its Potential uses Bishoftu, Ethiopia; May 22-23, 2014

### **Abstract**

The search for plant species with high nutritional and medicinal potential has to be intensified to improve the nutritional and health status of the population. Ethiopia is endowed with great biodiversity and the population has access to potentially many underutilized plant species with both nutritional and medicinal benefits. *Moringa stenopetala* is one of most valuable and all-purpose underutilized plants. The plant yields at least five different edibles: leaves, pods, seeds, flower and roots. Besides to the food values, all the edibles provide their own remarkable health benefits. Stimulating utilization of this food plants could open new windows of opportunity beyond increasing food supply and diversity. It might be supposed that a country with pressing food problem would exploit all its available food sources to the fullest, but in Ethiopia's case that is not so. The plant is not utilized to its potential because of lack of scientific support, official promotion, or inclusion in extension program. Therefore, this study attempted to show the nutrient composition and health benefits of different parts of *M stenopetala*. The protein content of the leaf, pod, flower, seed and root were 28.36, 25.19, 29.93, 40.46 and 4.79% on dry weight basis respectively. In crude fat content the seed was found to be superior (37.9%) while the root was the lowest (0.96%). In the crude fiber content the pod was the highest (20.80%) while the seed kernel was the lowest (5.73%). Ash contents also vary greatly from 4.54% for seed kernel to 18.41% for the leaf. In mineral contents, the leaf was found to be better than other parts with 2869, 54.62, 1.22 and 0.72 mg/100 g, dw, for Ca, Fe, Zn and Cu respectively. The pod and the seed contained 10.64 and 5.64 mg/100 g dw of Fe respectively. The pod and the leaf contained comparable amounts of Zn and Cu to that of the leaf. Essential amino acids of the leaf and the seed were also found in appreciable quantities. The leaf contained from the lowest (17 mg/g protein) sulfur containing amino acids to the highest (80.48 mg/g protein) aromatic amino acids. While the seed contained 14.48 mg/g protein lysine to 60.96 mg/g protein leucine. *In vivo* test of methanol

extract of moringa leaves on abdominal tissue fat weight management and lipid profile of blood plasma on mice model have indicated that epididymal and peri-kidney fats have reduced by 41.09 % ( $p < 0.01$ ) and 47.83% ( $p < 0.05$ ), respectively. The high induction of total cholesterol in the blood plasma were also significantly reduced by 12.27 % ( $p < 0.01$ ). Subsequent studies with humans are necessary to confirm the findings of this study. As the nutrient composition of moringa edible parts are higher than other leafy vegetables, they can be good sources of nutrients in dry seasons when other vegetables are scarce.

**328. Abinet Tekle, Temesgen Awoke Nutritional profile of *Moringa Stenopetala* species samples collected in different places in Ethiopia and their comparison with *Moringa Oleifera* species** Editor: Ashenif Tadele, Asfaw Debella Proceeding of Consultative Workshop on *Moringa stenopetala* to Maximize Its Potential uses Bishoftu, Ethiopia; May 22-23, 2014

### **Abstract**

Among various types of *Moringa* species, *Moringa stenopetala* (*M. stenopetala*) is native to Ethiopia, Northern Kenya and Eastern Somali and is the most economically important species after *M. oleifera*. *Moringa* tree, well known as Shiferaw or Aleko in Ethiopia, is getting a great popularity although little is studied to understand its nutritional composition. Hence, this study has collected *M. stenopetala* samples from 19 locations in Ethiopia to generate a national data on its nutritional profile. The fresh green leafy vegetables obtained from farming area in different provinces in Ethiopia were dried and physicochemical analysis was carried out employing standard methods of analysis. The samples collected had a mean value of 8.09%, 28.44%, 0.7%, 11.62%, 12.63%, 38.49%, 274Kcal of moisture, protein, fat, crude fiber, ash, carbohydrate and energy, respectively. Moreover, the samples had a mean value of 54.85 mg/100gm, 1,918 mg/100gm, 2.16 mg/100gm, 0.78 mg/100gm, 38.19 mg/100gm, 2,094 mg/100gm and 214.10 mg/100gm of Fe, Ca, Zn, Cu, P, K and Na respectively. The mean value of the anti-nutritional factors analyzed – phytate and tannin – was 378.44 mg/100gm and 358.89 mg/100gm, respectively. There has been a statistically significant difference in the mean values of all nutrition composition parameters

between study regions– Tigray, Amhara, Oromia, SNNPR and Dire Dawa – except for tannin content of the samples. These finding reveals that *M. stenopetala* species of Moringa tree in Ethiopia has appreciable nutritional profile which can be of a great input to fight the long overdue malnutrition problem in Ethiopia.

**329.**Tadesse WT, Hailu AE, Gurmu AE, Mechesso AF. **Experimental assessment of antidiarrheal and antisecretory activity of 80% methanolic leaf extract of *Zehneria scabra* in mice.** BMC Complement Altern Med. 2014 Dec 2;14:460. doi: 10.1186/1472-6882-14-460.

Abstract

***BACKGROUND:***

The leaf of *Zehneria scabra* is traditionally used for the management of diarrhea in Ethiopia. Its use, however, has not been scientifically validated for safety and efficacy. The aim of this study was to investigate antidiarrheal and antisecretory effects of hydroalcolic leaf extract of *Z. scabra* in mice models.

***METHODS:***

For each of antidiarrheal, gastrointestinal motility and antisecretory activity study Swiss albino mice were divided in to five groups. Group I was treated as control group and received 10 ml/kg of 2% Tween-80 orally; Group II served as a positive control and took standard drug in each of the experiments orally; Group III, IV and V were test groups which received the methanolic extract orally at 100, 200 and 400 mg/kg, respectively. Depending on the model total weight of fecal output, total weight of wet feces, total number of fecal output, number of wet faeces, length of intestinal transit and intestinal weight were collected. Finally, data were analyzed using one-way ANOVA followed by Tukey's post test.

***RESULT:***

In castor oil induced diarrhea model, the extract dose produced a significant reduction in mean stool score ( $1.94 \pm 0.102$ ) at 200 mg/kg. Moreover, the 100, 200, and 400 mg/kg doses inhibited

stool frequency by 40, 45 and 55%, respectively. All test doses of extract and loperamide (3mg/kg) reduced fecal fluid content significantly ( $p < 0.01$ ). The 100 mg/kg dose of extract produced 25.74% reduction of fluid content ( $p < 0.001$ ) while both 200 and 400 mg/kg showed 29.70 % ( $p < 0.001$ ) compared to negative control group.

### **CONCLUSION:**

The extract of *Zehineria scabra* showed antidiarrheal and antisecretory activity in mice model. Moreover, the extract found to be safe at dose of 2000mg/kg in mice model. The findings suggest the validity of the acclaimed effect of *Zehineria scabra* as antidiarrheal agent in Ethiopian traditional herbal medicine.

**330.E Tadesse, A Belete, T Gebre-Mariam Evaluation of the Binding Effect of Local Gum of *Boswellia papyrifera* in Paracetamol Granules and Tablet Formulations** Ethiopian Pharmaceutical Journal - Vol 30, No 1 (2014) Vol 30, No 1 (2014) > 10-20

### Abstract

*Boswellia papyrifera* is one of the chief gum resin producing tree species in Ethiopia. Frankincense harvested from it is the most widely traded one. Frankincense is used for a variety of purposes from traditional medicine to industries such as pharmaceutical, perfume and food industries. In this work, *B. papyrifera* gum has been evaluated for its binding effect in paracetamol granules and tablet formulations in comparison with the commonly used binders, Acacia BP and PVP K-30. Some physicochemical properties of the extracted gum indicated that the gum exhibited solubility in water, absence of tannin and slightly acidic pH. The loss on drying and ash value were well within the official limits. Paracetamol granules were prepared using different proportions of *B. papyrifera* gum (BPA), Acacia BP (ACA) and PVP K-30 by wet granulation method. The granules prepared with the binders exhibited optimum moisture content, good flow properties and compressibility. Percent of fines decreased with increasing binder concentration. Increase in

binder concentration led to an increase in crushing strength, decrease in friability and increase in disintegration time of the tablets which were observed in all the three binders. Paracetamol tablets prepared with 2% w/w of BPA and ACA failed to comply with the specification for the friability test (> 1%). All concentrations of PVP and 2 to 6% w/w concentrations of ACA and BPA met the BP specification for disintegration. At 2% w/w to 6% w/w binder levels, there were no significant differences in the extent of drug release among the binders in 30 min. All the batches of ACA, BPA and PVP, except at 8% of BPA, complied with the specification which states that the quantity of drug released should not be less than 80% of the labeled amount of paracetamol in 30 min. From the foregoing, it can be concluded that the gum extract of *B. papyrifera* oleo-gum resin could be explored as an alternative excipient for its binder effect in granule and tablet formulations.

Keywords: *Boswellia papyrifera*, natural gum, paracetamol, wet granulation, tablet binder

**331.A** Ejigu, E Engidawork **Screening of the Antidepressant-like Activity of Two Hypericum Species Found in Ethiopia** Ethiopian Pharmaceutical Journal - Vol 30, No 1 (2014) 21-32

#### *Abstract*

The widespread use of *Hypericum perforatum* for the treatment of mild to moderate depression has prompted screening of the antidepressant-like effect of other species of the genus. The present study was designed to assess the antidepressant-like activity of the 80% methanol extract of *Hypericum quartinianum* and *Hypericum revolutum* in behavioral despair model. Eighty percent methanol extract of *H. quartinianum* and *H. revolutum* was investigated using learned helplessness models of depression such as tail suspension test (TST), forced swimming tests (FST) and avoidance tests. In addition, locomotor activity was investigated with open field test (OFT). Mice (for TST, avoidance test and OFT) and rats (for FST) were randomly assigned into different groups and treated with distilled water (control), imipramine 64 mg/kg (standard) and extract (200 mg/kg and 400 mg/kg). At 200 and 400 mg/kg, *H. revolutum* was effective in reducing immobility

time in the TST (43.84%,  $p < 0.01$  and 49.08%,  $p < 0.01$ , respectively) and FST (33.7%,  $p < 0.05$  and 38.4%,  $p < 0.01$ , respectively). Similarly, *H. quartinianum* also showed anti-immobility effect at 200 (30.67%,  $p < 0.01$ ) and 400 mg/kg (41.19%,  $p < 0.01$ ) in TST. However, only the larger dose produced significant anti-immobility effect in FST (35.3%,  $p < 0.05$ ). Moreover, both extracts at the doses used significantly decreased the escape failure ( $p < 0.01$ ) and increased the intertrial crossing ( $p < 0.05$  and  $p < 0.01$ ) during the resting periods in the avoidance task in a shuttle box. In OFT, the tested crude extracts did not significantly alter locomotor activity, suggesting that it is very unlikely that the observed antidepressant effects are false positives. These observations together provide evidence that the 80% methanolic extract of leaves of *H. quartinianum* and *H. revolutum* display antidepressant-like actions in established models of behavioral despair without affecting locomotion.

**Keywords:** *Hypericum quartinianum*, *Hypericum revolutum*, depression, antidepressant-like activity

**332.Y Brhane, A Belete, T Gebre-Mariam Evaluation of Local Gum of Acacia polyacantha as a Suspending Agent in Metronidazole Benzoate Suspension Formulations** Ethiopian Pharmaceutical Journal - Vol 30, No 1 (2014) 33-49

*Abstract*

The local gum of *Acacia polyacantha* was evaluated as a suspending agent in metronidazole benzoate suspensions in comparison with *Acacia senegal* and NaCMC at concentration range of 1-4% (w/v). The resulting suspensions were evaluated for their sedimentation volume (%), degree of flocculation, rheology, redispersibility, and dissolution rate. Stability studies were performed for 3 months. The apparent viscosities were in the order of NaCMC > *A. polyacantha* > *A. senegal*. The redispersibilities of *A. polyacantha* and *A. senegal* were comparable but better than those of NaCMC. The sedimentation volumes (%) of the suspensions were higher for NaCMC followed by *A. polyacantha* and then *A. senegal*. KH<sub>2</sub>PO<sub>4</sub> employed as a flocculating agent increased the sedimentation volume of the suspensions prepared with *A. polyacantha* whereas formulations with *A. senegal* and NaCMC were unaffected. All suspensions showed a release of greater than 85% of drug within 1 h. The results of stability

studies showed that all suspension formulations were stable. From the foregoing, it can be concluded that *A. polyacantha* could be used as an alternative suspending agent.

**Keywords:** *Acacia polyacantha*, *Acacia senegal*, suspending agent, rheology, metronidazole benzoate

**333.D** Bisrat, A Mazumder, K Asres **In vitro Antimicrobial Activity of a Semi-synthetic Derivative of Embelin** *Ethiopian Pharmaceutical Journal* - Vol 30, No 1 (2014) 50-56

*Abstract*

One of the strategies for the development of new drugs involves semi-synthesis of natural products. In the present study, the antimicrobial activity of embelin (1) and its semi-synthetic derivative 5-(p-tolylamino)-2-hydroxy-3-undecylcyclohexa-2,5-diene-1,4-dione (2) were evaluated against 21 bacterial and 4 fungal pathogens using the disc diffusion method. Embelin (1) was isolated from the fruits of *Embelia schimperi* Vatke by column chromatography over silica gel while its derivative (2) was synthesized in good yield (98.3%; w/w) by using a one-step condensation reaction after treating embelin with p-toluidine. The structures of these compounds were determined on the basis of <sup>1</sup>H, <sup>13</sup>C NMR, DEPT-135 and ESI-mass spectral data. Both 1 and 2 showed broad spectrum antibacterial activity against Gram-positive and Gram-negative bacteria at a concentration of 200 µg/ml. Among the tested bacteria, some strains of *Escherichia coli*, *Salmonella typhi*, *Staphylococcus aureus* and *Vibrio cholera* were found to be highly susceptible to the tested compounds with activity ranging between 75 and 94% of that of the standard drug ciprofloxacin. Similarly the tested compounds displayed good activity against four pathogenic fungal strains when with their effects were compared with that of griseofuvin.

**Keywords:** *Embelia schimperi*, embelin, 5-(p-tolylamino)-2-hydroxy-3-undecylcyclohexa-2,5-diene-1,4-dione, antimicrobial, disk diffusion.

**334.J** Abdela, W Shibeshi **In Vivo Antimalarial Activity of Solvent Fractions of the Leaves of *Justicia schimperiana* Hochst. Ex Nees Against *Plasmodium berghei* in Mice** *Ethiopian Pharmaceutical Journal* - Vol 30, No 2 (2014) 65-76

*Abstract*

Increasing resistance of *Plasmodium falciparum* to almost all the available antimalarial drugs urges a search for newer antimalarial drugs. *Justicia schimperiana* Hochst. Ex Nees is traditionally used for the treatment of malaria and a study conducted previously on the crude leaf extract confirmed that the plant is endowed with antimalarial activity. The present study was therefore aimed to evaluate antimalarial activities of chloroform, methanol and aqueous fractions of the leaves of *J. schimperiana* against *Plasmodium berghei* in mice. A rodent malaria parasite, *P. berghei*, was used to inoculate healthy male Swiss Albino mice. The extraction was conducted following successive soxhlet extraction and maceration. The resulting fractions were evaluated at doses of 200, 400 and 600 mg/kg. Parameters, such as parasitaemia, survival time, body weight, temperature, and packed cell volume were determined using the 4-day suppressive, curative and prophylactic tests. All the three fractions had shown significant suppression of parasitaemia in the 4-day suppressive test, of which the methanol fraction exerted the highest chemosuppression (65.2%,  $p < 0.001$ ) at 600 mg/kg followed by the aqueous fraction (40.93%,  $p < 0.001$ ) at the same dose. The methanol fraction also showed significant suppression of parasitaemia in both curative (67.44%,  $p < 0.001$ ) and prophylactic (35.02%,  $p < 0.01$ ) tests at 600 mg/kg dose. All doses of the methanol fraction significantly ( $p < 0.05$ ) prevented the reduction in rectal temperature in the 4-day suppressive and curative tests. In conclusion, the results of the studies demonstrated high antimalarial activities of methanol and aqueous fractions against *P. berghei* in mice. These findings substantiated the previous activity of crude extract and traditional use of the plant. Therefore, the plant could be potentially utilized as a source of templates for the development of new antimalarial agent.

**Keywords:** *Justicia schimperiana*, *in vivo*, anti-malarial activity, *Plasmodium berghei*, solvent fractions

335.F Mohammed, A Gerbi, A Teffera, G Seyoum, T Nedi, E Engidawork **Subchronic Crude Khat (*Catha edulis* F.) Extract Administration Produces Short-term Memory Impairment in Behavioral Tasks without Morphological Toxicity to the Dentate Gyrus in Mice** *Ethiopian Pharmaceutical Journal* - Vol 30, No 2 (2014) 77-94

*Abstract*

People chew khat (*Catha edulis* F.), believing that it improves memory, alertness and clear thinking. Although such belief are widely held, there are little or no reports assessing the effect of khat on learning and memory as well as neural processes involved in these activities. The aim of the present study was therefore to evaluate the effect of acute, subacute, and subchronic exposure to crude khat extract on learning and memory using a host of behavioral paradigms followed by morphometric analysis in mice. To this effect, mice were orally administered with either vehicle (2% Tween 80 in water) or various doses of khat extract (100 mg/kg, 200 mg/kg, 300 mg/kg) and subjected to learning and memory tasks in Morris water maze (MWM), Multiple-T-maze (MTM) and/or active avoidance. In parallel, mice were administered with khat at doses of 100, 200 and 400 mg/kg for two months and subjected to morphometric analysis to determine different parameters. Acute and subacute exposure to khat had no effect on learning and memory in all behavioral tasks. Subchronic exposure, however, produced a significant impairment in short-term memory, without altering learning and long-term memory in MTM and MWM tasks. Morphometric analysis revealed a significant reduction in weight of brain as well as prosencephalon of khat treated animals compared to controls. This loss in weight, however, was not accompanied by any changes in the geometric properties of the dentate granule cells, including volume of the granular layer of the dentate gyrus as well as numerical density, total number, and diameter of the granular cells. The data collectively indicate that subchronic exposure to khat differentially alters short-term memory without any apparent morphological toxicity in neural processes underlying learning and memory. The weight loss observed could be attributed to other effects, such as anorexic and vasoconstrictive effects of khat.

**Keywords:** *Catha edulis*, dentate granular cells, active avoidance, water maze, multiple-T-maze

**336.J Abdela, W Shibeshi In Vivo Antimalarial Activity of Solvent Fractions of the Leaves of *Justicia schimperiana* Hochst. Ex Nees Against *Plasmodium berghei* in Mice**  
Ethiopian Pharmaceutical Journal - Vol 30, No 2 (2014) 95-108

*Abstract*

Increasing resistance of *Plasmodium falciparum* to almost all the available antimalarial drugs urges a search for newer antimalarial drugs. *Justicia schimperiana* Hochst. Ex Nees is traditionally used for the treatment of malaria and a study conducted previously on the crude leaf extract confirmed that the plant is endowed with antimalarial activity. The present study was therefore aimed to evaluate antimalarial activities of chloroform, methanol and aqueous fractions of the leaves of *J. schimperiana* against *Plasmodium berghei* in mice. A rodent malaria parasite, *P. berghei*, was used to inoculate healthy male Swiss Albino mice. The extraction was conducted following successive soxhlet extraction and maceration. The resulting fractions were evaluated at doses of 200, 400 and 600 mg/kg. Parameters, such as parasitaemia, survival time, body weight, temperature, and packed cell volume were determined using the 4-day suppressive, curative and prophylactic tests. All the three fractions had shown significant suppression of parasitaemia in the 4-day suppressive test, of which the methanol fraction exerted the highest chemosuppression (65.2%,  $p < 0.001$ ) at 600 mg/kg followed by the aqueous fraction (40.93%,  $p < 0.001$ ) at the same dose. The methanol fraction also showed significant suppression of parasitaemia in both curative (67.44%,  $p < 0.001$ ) and prophylactic (35.02%,  $p < 0.01$ ) tests at 600 mg/kg dose. All doses of the methanol fraction significantly ( $p < 0.05$ ) prevented the reduction in rectal temperature in the 4-day suppressive and curative tests. In conclusion, the results of the studies demonstrated high antimalarial activities of methanol and aqueous fractions against *P. berghei* in mice. These findings substantiated the previous activity of crude extract and traditional use of the plant. Therefore, the plant could be potentially utilized as a source of templates for the development of new antimalarial agent.

**Keywords:** *Justicia schimperiana*, *in vivo*, anti-malarial activity, *Plasmodium berghei*, solvent fractions

**337.A Seleshi, A Belete, T Gebre-Mariam Evaluation of Native and Cross-Linked Acacia Senegal Gums as Sustained Release Agents in Tablet Formulations** Pharmaceutical Journal - Vol 30, No 2 (2014) 109-123

*Abstract*

*Acacia senegal* var. *senegal* and *Acacia senegal* var. *karensis* gums were modified using microwave irradiation and subsequently evaluated for their sustained release effects in pharmaceutical tablet formulations. Microwave-induced cross-linking resulted in cross linked gum to the extent of 34.95% and 27.39% for var. *senegal* (AH) and var.*karensis* (AS), respectively, at different irradiation powers and reaction times. Fourier transform infrared spectroscopy (FTIR) studies indicated the compatibility of the gums with the model drug, theophylline. Dissolution studies showed AS, Cross-linked var. *karensis* (CAS) and var. *senegal* (CAH) can sustain the release of the drug beyond 12 h at higher gum concentrations ( $p < 0.05$ ) indicating the drug retarding ability of the gums. Higher drug release was obtained when var. *senegal* was used as matrix former, while the rest showed slower release rate ( $p < 0.05$ ). Cumulative drug release was slower from the matrix tablets made by wet granulation compared to tablets prepared by direct compression ( $p < 0.05$ ). Among 24 formulations, three were found to have comparable release profiles with that of the commercial theophylline sustained release matrix tablet (Pliva-482®). Theophylline release predominately followed first order kinetics and the mechanism was found to be diffusion coupled with erosion. Hence, native and cross-linked var. *karensis* and cross-linked var. *senegal* gums can be utilized as sustained release excipients.

**Keywords:** acacia gums, cross-linking, microwave irradiation, sustained release, theophylline

338. Minale G, Bisrat D, Asres K, Mazumder A. ***In vitro* antimicrobial activities of anthrones from the leaf latex of *Aloe sinana* Reynolds.** Int J Green Pharm 2014;8:7-12

**Background:** *Aloe sinana* Reynolds is endemic to Ethiopia where its leaf latex is traditionally used in and around the town of Debre Sina and other central highlands of the country for the treatment of various illnesses, including wound, snake bite and malaria. However, despite its use in traditional medicine, to date, there appears to have been no chemical or biological studies published on this plant. **Aim:** The aim of this study was to investigate the leaf latex of *A. sinana* for its antibacterial and antifungal activities, and to isolate and characterise the compounds that are responsible for the antimicrobial effect of the latex. **Materials and Methods:** The latex was extracted with methanol. Isolation of compounds was achieved by repeated preparative TLC, and

spectroscopic techniques including  $^1\text{H}$ ,  $^{13}\text{C}$ -NMR and MS were used for characterisation of the isolated compounds. Antimicrobial activity tests were performed against 21 bacterial and 4 fungal pathogens using the disc diffusion method. **Results and Conclusion:** Three compounds isolated from the leaf latex were identified as the anthrones, aloin, aloinoside and microdontin. Among the isolated compounds, aloinoside and microdontin were found to possess comparable activity (MIC 5  $\mu\text{g/ml}$ ) with that of ciprofloxacin against several Gram-negative bacterial strains and *Staphylococcus aureus*. Additionally, microdontin showed potent and comparable activity with the standard antifungal drug griseofulvin against *Penicillium* spp. These findings support the traditional uses of the plant for the treatment of various infections and wound.

**Keywords:** *Aloe sinana* , anthrones, antibacterial, antifungal, disc diffusion, latex

**339.**Binyam Adugna, GetachewTerefe, Nigatu Kebede, Wondu Mamo and Simenew Keskes  
**Potential In vitro Anti-Bacterial Action of Selected Medicinal Plants Against Escherichia coli and Three Salmonella Species** International Journal of Microbiological Research 5 (2): 85-89, 2014

Abstract:

A case control experimental study design was conducted to determine in vitro antibacterial activity of selected plants in Akilu Lemma Institute of Pathobiology, Addis Ababa University, Ethiopia. Methanol extract of traditionally used plants collected from different parts of the country to treat diarrhea in animals and human were considered. *Calpurnia aurea*, *Salvia schimperi*, *Verbascum sinaticum*, *Hypericum revolutum* and *Petrolobium stelatum* at a concentration of 250mg/ml were evaluated for their antibacterial activity using agar well diffusion test method. The results obtained show that methanol extract of *Calpurnia aurea* and *Salvia schimperi* are the most active plants against all the bacteria species tested. The highest zone of inhibition (15.6 mm) was recorded for *Petrolobium stelatum* against *E. coli*, *Verbascum sinaticum* and *Hypericum revolutum* against *S. typhmuri* and *S. paratyphi* while, *Petrolobium stelatum* did not induce inhibition zones against *S. typhmuri*. Generally, most of the extracts have shown considerable activities against *E. coli* and *Salmonella* species but further study is required to dissect the active ingredients responsible for this effect at in vitro and in vivo levels.

Key words: Antibacterial Activity E. coli Medicinal Plant Salmonella

**340.**Desalegn Amenu **Antimicrobial Activity of Medicinal Plant Extracts and Their Synergistic Effect on Some Selected Pathogens** American Journal of Ethnomedicine, 2014, Vol. 1, No. 1, 018-029

#### ABSTRACT

Antibiotics provide the main basis for the therapy of microbial (bacterial and fungal) infections. Since the discovery of these antibiotics and their uses as chemotherapeutic agents there was a belief in the medical fraternity that this would lead to the eventual eradication of infectious diseases. There is a continuous and urgent need to discover new antimicrobial compounds with diverse chemical structures and novel mechanisms of action because there has been an alarming increase in the incidence of new and re-emerging infectious diseases. Another big concern is the development of resistance to the antibiotics in current clinical use. In recent years, drug resistance to human pathogenic bacteria has been commonly reported from all over the world. In the present scenario of emergence of multiple drug resistance to human pathogenic organisms, this has necessitated a search for new antimicrobial substances from other sources including plants. Higher plants produce hundreds to thousands of diverse chemical compounds with different biological activities. The antimicrobial compounds produced by plants are active against plant and human pathogenic microorganisms. It is expected that plant extracts showing target sites other than those used by antibiotics will be active against drug-resistant microbial pathogens.

Keywords- Herbal extracts, Antimicrobial agent, Multi-drug resistant

**341.**Bizuneh Adinew **GC-MS Analysis of Essential Oil from Long Pepper Growing in Tepi, South-west Ethiopia** Sci. Technol. Arts Res. J., Jan-March 2014, 3(1): 31-38

#### Abstract

The objectives of the study were to extract and identify essential oils present in Long pepper by using gas chromatography-mass spectrometry (GC-MS). The essential oil of Long pepper growing in Tepi, Ethiopia, was obtained by hydro distillation and gas chromatography-mass spectrometry was used to identify the component. Five components were identified and eugenol was the major constituent (98.979%) while trans-caryophyllene, (0.643%), Preg-4-ene-3-one (0.149%), Phenol, 2-methoxy-4-(2-propenyl)-, acetate (0.145%), and 1, 3, 6-Octatriene, 3, 7-dimethyl (0.084%) were minor constituents. Eugenol comprises 98.979% of the essential oil extracted from Long pepper, and is the compound most responsible for the Long pepper s' aroma and therapeutic effect.

**342.**Kidane B1, van Andel T, van der Maesen LJ, Asfaw Z. **Use and management of traditional medicinal plants by Maale and Ari ethnic communities in southern Ethiopia.** J Ethnobiol Ethnomed. 2014 Jun 4;10:46. doi: 10.1186/1746-4269-10-46.

Abstract

***BACKGROUND:***

Around 80% of the people of Ethiopia are estimated to be relying on medicinal plants for the treatment of different types of human health problems. The purpose of this study was to describe and analyse the use and management of medicinal plants used for the treatment of human health problems by the Maale and Ari communities in southern Ethiopia.

***METHODS:***

Quantitative and qualitative ethnobotanical field inquiries and analytical methods including individual and focus group discussions (18), observations, individual interviews (n = 74), preference ranking and paired comparison were used. Data were collected in three study sites and from two markets; the latter surveyed every 15 days from February 2011 to February 2012.

***RESULTS:***

A total of 128 medicinal plant species, belonging to 111 genera and 49 families, used as herbal medicine by Maale and Ari communities were documented. Predominantly harvested plant

parts were leaves, which are known to have relatively low impact on medicinal plant resources. Species with high familiarity indices included *Solanum dasyphyllum*, *Indigofera spicata*, *Ruta chalepensis*, *Plumbago zeylanica* and *Meyna tetraphylla*. Low Jaccards similarity indices ( $\leq 0.33$ ) indicated little correspondence in medicinal plant use among sites and between ethnic communities. The dominant ways of medicinal plant knowledge acquisition and transfer is vertical: from parents to children through oral means. Gender and site significantly influenced the number of human medicinal plants known currently in the study sites. Age was only a factor of significance in Maale. Marketing of medicinal plants harvested from wild and semi-wild stands is not common. Expansion of agricultural land and lack of cultivation efforts by local communities are mentioned by locals to affect the availability of medicinal plant resources.

**CONCLUSION:**

*S. dasyphyllum*, *I. spicata*, *P. zeylanica*, *M. tetraphylla*, and *Oxalis radicata* need to be considered for phytochemical and pharmacological testing to verify their efficacy and determine their dosages. Land use planning and development initiatives in the area and beyond need to sharply focus on strategies that could alleviate the major threats affecting medicinal plant resources in the landscape and encourage their cultivation to enhance their availability and complement ex-and in-situ conservation.

**343.** Yigezu Y, Haile DB, Ayen WY. **Ethnoveterinary medicines in four districts of Jimma zone, Ethiopia: cross sectional survey for plant species and mode of use.** BMC Vet Res. 2014 Mar 28;10:76. doi: 10.1186/1746-6148-10-76.

Abstract

**BACKGROUND:**

Traditional medicines have been used for nearly 90% of livestock populations in Ethiopia where complimentary remedies are required to the modern health care system. All plants with pharmacological activity complementarily prescribed as best choice against livestock diseases. A

community based cross - sectional survey was conducted to investigate ethno-veterinary knowledge and practices of study area by purposive sampling techniques. The data from respondents were collected through face-to face interview using pre-tested semi-structured questionnaires, which was further accompanied by field observations of the medicinal plants. The vast majority of the statistics were analyzed descriptively by SPSS 16 Windows version to extrapolate our findings in ethno-botanical knowledge.

### ***RESULTS:***

In the study, a total of 74 species of ethnoveterinary medicinal plant species from 31 families have been identified for treating 22 different livestock ailments. The three families: Asteraceae, Cucurbitaceae and Solanaceae make up larger proportion of reported medicinal plants which accounted for 10.41%, 8.33% and 6.25%, respectively. Of reported medicinal plants, 16.7% informant consensus was recorded for the species *Croton macrostachyus* Del., 10.7% for *Nicotiana tabacum* L. and 9.5% for *Olea capensis* L. Subsp. *macrocarpa* (C.H. Wright) I. Verd. in treatment of one or more veterinary ailments. The greater varieties of medicinal plant species that accounted for 28.2% were used against management of blackleg which was common livestock diseases in the study area. The findings showed, trees accounted for 43.24%, followed by shrubs (33.78%) and herbs (14.86%). Eighty one percent of medicinal plants reported by respondents were collected from wild habitats, and leaves reported to be used by 68% of the informants for ethnoveterinary medicines preparations. The preparations were applied through different routes of administration; oral administration accounted for (76.2%), followed by application of topical (9.53%) and nasal (5.19%).

### ***CONCLUSIONS:***

Ethnoveterinary practices significantly suggested to play greater roles in livestock health care as an alternative or integral part of modern veterinary practices. The traditional knowledge in treatment of livestock diseases of the study districts needs further scientific evaluations by phytochemical and antimicrobial experimentation to determine safety, efficacy, mode of delivery, drug development and dosage in pharmacological laboratory.

- 344.** Kidane B, van der Maesen LJ, van Andel T, Asfaw Z. **Ethnoveterinary medicinal plants used by the Maale and Ari ethnic communities in southern Ethiopia.** *J Ethnopharmacol.* 2014 Apr 11;153(1):274-82. doi: 10.1016/j.jep.2014.02.031. Epub 2014 Feb 25.

Abstract

***ETHNOPHARMACOLOGICAL RELEVANCE:***

Livestock production is an integral part of the agricultural system in Ethiopia. Medicinal plants are used and are important for rural communities for the treatment of livestock diseases. We studied and analysed the traditional medicinal plants used for the treatment of livestock diseases by the Maale and Ari ethnic communities in southern Ethiopia.

***MATERIALS AND METHODS:***

We used quantitative and qualitative ethobotanical methods, including individual and focus group discussions (n=18), field observations, and individual interviews (n=74) at three study sites.

***RESULTS:***

In total, 46 plant species (28 families) were used for the treatment of livestock diseases. Leaves with succulent stems were the most used part of the plant. The most frequently cited cattle disease was blackleg, for which 21 plant species were used. Our study showed variation in ethnoveterinary plant species used among sites (Jaccard's similarity indices <0.25). The number of medicinal plant species used was significantly influenced by gender and site. Knowledge on ethnoveterinary plants was predominantly held by males, who cited more plant uses than females. The most widely used species were *Lepidium sativum*, *Allium sativum*, *Clausena anisata*, *Croton macrostachyus*, *Ozoroa insignis*, *Sida rhombifolia*, *Centella asiatica*, *Cissampelos mucronata*, *Vernonia theophrastifolia* and *Vernonia amygdalina*.

**CONCLUSIONS:**

The study indicated that ethnoveterinary medicinal plants are important for the Maale and Ari ethnic communities. Phytochemical and pharmacological studies should focus on widely used and multi-use species.

345.Lulekal E, Asfaw Z, Kelbessa E, Van Damme P. **Ethnoveterinary plants of Ankober District, North Shewa Zone, Amhara Region, Ethiopia.** J Ethnobiol Ethnomed. 2014 Feb 11;10:21. doi: 10.1186/1746-4269-10-21.

Abstract

**BACKGROUND:**

Traditional herbal preparations for addressing veterinary problems have been applied in Ankober District, Ethiopia, for generations. However, the millennia-old ethnoveterinary knowledge of the community, and the plants are subjected to loss without being scientifically documented due to anthropogenic and environmental threats. Hence, this study aims at providing a comprehensive documentation on ethnoveterinary plant knowledge of the people in order to preserve the fast-eroding knowledge and resources of the area.

**METHODS:**

Semi-structured interviews, focus group discussions, participant observation and walk-in-the-woods methods were used to gather ethnoveterinary data. Informant Consensus Factor (ICF) and Fidelity level (FL) values were calculated using quantitative approaches so as to check the level of informants' agreement on plant use and healing potential of ethnoveterinary medicinal plant species, respectively. Indigenous knowledge on use of medicinal plants for ethnoveterinary purposes among different informant groups was compared using One-way ANOVA and t-tests.

**RESULTS:**

A total of 51 plant species representing 50 genera and 35 botanical families used in the treatment of 33 different ailments were identified. Medicinal plant species belonging to families Asteraceae,

Asclepiadaceae, Euphorbiaceae and Ranunculaceae were reported to be of frequent use in the local ethnoveterinary medical system. Roots (65%, 33 species) were most often utilized for remedy preparation. Highest ICF values were recorded for gastro-intestinal (0.71) ailments depicting best agreement on knowledge of medicinal plants used to treat ailments in this category. *Embelia schimperi* Vatke showed highest fidelity level value (90%) to treat gastro-intestinal diseases showing conformity of knowledge on this species' healing potential. Significant difference ( $P < 0.05$ ) was observed in average number of therapeutic plants reported by senior members of the community than younger groups. *Embelia schimperi* Vatke and *Rubus steudnerii* Schweinf. were the most-preferred species to treat diarrhoea.

### **CONCLUSION:**

The study indicated that indigenous knowledge on ethnoveterinary medicinal plant use is still rich and active in the District. Species with recorded highest consensus for curative role are a useful pool for further phytochemical and pharmacological validation for better utilization. Declining wild medicinal flora of the area calls for implementation of a coordinated complementary in situ and ex situ conservation strategy.

- 346.** Admasu P, Deressa A, Mengistu A, Gebrewold G, Fayera T. (2014) In Vivo Antirabies Activity Evaluation of Hydroethanolic Extract of Roots and Leaves of *Phytolacca dodecandra*. *Global Veterinaria* 12: 12-18.
- 347.** Admasu P, Mekonnen Y (2014) Rabies and its Folk Drugs Remedies in Ethiopia: A Review. *International Journal of Basic and Applied Virology* 3: 22-27
- 348.**

**2015**

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**349.**Gari A, Yarlagadda R, Wolde-Mariam M. **Knowledge, attitude, practice, and management of traditional medicine among people of Burka Jato Kebele, WestEthiopia.** J Pharm Bioallied Sci. 2015 Apr-Jun;7(2):136-44. doi: 10.4103/0975-7406.148782.

Abstract

***BACKGROUND:***

Traditional medicine (TM) has maintained its popularity in all regions of the developing world. Even though, the wide acceptance of TM is a well-established fact, its status in a population with access to modern health is not well clear in the whole country. This study was carried out to assess the knowledge, attitudes, practice and management of TM among the community of Burka Jato Kebele, West Ethiopia.

***METHODOLOGY:***

A descriptive cross-sectional study was conducted on a total of 282 sampled individuals' selected using systematic random sampling from January 28, 2013 to February 8, 2013 in Burka Jato Kebele, Nekemte town, East Wollega Zone, West of Ethiopia.

***RESULTS:***

The majority (94.22%) of people in the study area relied on TM. Most of them were aware of medicinal herbs (55.7%). About half (40.79%) of the respondents were aware of the major side-effects of TM such as diarrhea (36.64%). About 31.85% of them prefer traditional medical practices (TMP) because they are cheap. Most (50%) of the species were harvested for their leaves to prepare remedies, followed by seed (21.15%) and root (13.46%) and the methods of preparation were pounding (27.54%), crushing (18.84%), a concoction (15.95%) and squeezing (13.04%). About 53.84% of them were used as fresh preparations. Remedies were reported to be administered through oral (53.85%), dermal or topical (36.54%), buccal (3.85%) and anal (5.77%).

**CONCLUSION:**

The study revealed that the use of TMs were quite popular among the population and a large proportion of the respondents not only preferred, but also used TMs notwithstanding that they lived in the urban communities with better access to modern medical care and medical practitioners. To use TM as a valuable alternative to conventional western medicine, further investigation must be undertaken to determine the validity, efficacy of the plants to make it available as an alternative medicine to human beings.

**KEYWORDS:**

Attitude; knowledge; management; practice; traditional medicine

**350.** Toma A, Makonnen E, Mekonnen Y, Debella A, Adisakwattana S. **Antidiabetic activities of aqueous ethanol and n-butanol fraction of Moringa stenopetala leaves in streptozotocin-induced diabetic rats.** BMC Complement Altern Med. 2015 Jul 18;15:242. doi: 10.1186/s12906-015-0779-0.

Abstract

**BACKGROUND:**

Moringa stenopetala has been used in traditional health systems to treat diabetes mellitus. The aim of this study was to investigate the antidiabetic activity of aqueous ethanol and n-butanol fraction of Moringa stenopetala leaves in streptozotocin (STZ) induced diabetic rats.

**METHODS:**

The aqueous ethanol extract and n-butanol fraction of Moringa stenopetala leaves hydroalcoholic (500 mg/kg body weight) and metformin (150 mg/kg body weight) were administered to diabetic rats. Blood glucose, lipid profiles, liver and kidney function were examined after 14 days of experiment. Histopathological profile of the pancreas was also observed in diabetic rats at the end

of study. An oral sucrose challenge test was also carried out to assess the post prandial effect of the extract.

**RESULTS:**

Oral administration of the aqueous ethanol and n-butanol extracts of *Moringa stenopetala* leaves (500 mg/kg body weight) and metformin (150 mg/kg) significantly reduced blood glucose level ( $P<0.05$ ), improved serum lipid profiles, liver enzymes and kidney functions in diabetic rats after 14 days. The extracts also improved damage of islet of Langerhan's in diabetic rats. The plant material reduced the post-prandial glucose level ( $P<0.001$ ) at the dose of 750 mg/kg.

**CONCLUSION:**

These findings revealed that both the aqueous ethanol and n-butanol extracts of *Moringa stenopetala* leaves possess antihyperglycemic and antihyperlipidemic properties, and alleviate STZ-induced pancreatic damage in diabetic rats. The beneficial effects of plant material in inhibition of diabetes-induced complications are being investigated.

351. Debebe Y, Tefera M, Mekonnen W, Abebe D, Woldekidan S, Abebe A, Belete Y, Menberu T, Belayneh B, Tesfaye B, Nasir I, Yirsaw K, Basha H, Dawit A, Debella A. **Evaluation of anthelmintic potential of the Ethiopian medicinal plant *Embelia schimperi* Vatke in vivo and in vitro against some intestinal parasites.** BMC Complement Altern Med. 2015 Jun 18;15:187. doi: 10.1186/s12906-015-0711-7.

Abstract

**BACKGROUND:**

*Embelia schimperi* has been used for the treatment of intestinal parasites especially tapeworm infestations for centuries in Ethiopia. However, there is lack of scientific based evidences regarding the efficacy, safety and phytochemical analysis of this plant despite its frequent use as

an anthelmintic. This study has therefore evaluated the efficacy and acute toxicity of *E. schimperi* thereby generating relevant preclinical information.

***METHODS:***

The anthelmintic activities of the crude hydroalcoholic extract of *E. schimperi* and the isolated compound, embelin, were conducted using in vivo and in vitro models against the dwarf tapeworm, *Hymenolepis nana*, and the hookworm, *Necator americanus*, respectively. LD50 of the crude hydroalcoholic extract was determined using Swiss albino mice following the OECD guidelines. Chemical characterization of the isolated embelin was conducted using UV-spectroscopy, HPLC and NMR.

***RESULTS:***

In the acute toxicity study no prominent signs of toxicity and mortality were recorded among the experimental animals at the highest administered dose. Hence the LD50 of the plant was found to be higher than 5000 mg/kg. In vivo cestocidal activity of the crude hydroalcoholic extract of *E. schimperi* showed 100% parasite clearance at 1000 mg/kg, while the diammonium salt of embelin showed 85.3% parasite clearance at 750 mg/kg. The in vitro anthelmintic activity study revealed that the LC50 value of the crude extract and albendazole were 228.7 and 51.33 µg/mL, respectively.

***CONCLUSION:***

The results clearly indicated that the hydroalcoholic extract of *E. schimperi* and the diammonium salt of the isolated compound embelin had anthelmintic activity against hookworm larva in vitro and *H. nana* in vivo. Hence the findings of this study showed *Embelia schimperi* appears to possess some anthelmintic activity that may support the usage of these plants by local traditional healers to treat helminthic infestations.

**352.** Toma A, Deyno S, Fikru A, Eyado A, Beale A. **In vivo antiplasmodial and toxicological effect of crude ethanol extract of Echinops kebericho traditionally used in treatment of malaria in Ethiopia.** Malar J. 2015 May 10;14:196. doi: 10.1186/s12936-015-0716-1.

Abstract

***BACKGROUND:***

Medicinal plants have contributed significantly to current malaria treatment. Emergence of resistance to currently available drugs has necessitated the search for new plant-based anti-malarial agents and several plant-based, pharmacologically active anti-malarial compounds have been isolated. This study was conducted to validate the traditional usage of Echinops kebericho for treating malaria in the traditional health care system of Ethiopia.

***METHODS:***

The roots of E. kebericho were collected from Masha Woreda, Sheka Zone. After collection, the plant materials were identified by a taxonomist, dried under shade and crushed to powder for extraction. The powdered roots were extracted by maceration using 70 % ethanol. Acute toxicity study of the crude extract was carried out in Swiss albino mice. The in vivo anti-malarial activity of plant extract (200, 350 and 500 mg/kg) of E. kebericho roots against a chloroquine (CQ) sensitive strain of Plasmodium berghei strain ANKA was assessed using the four-day suppressive test procedure. Parameters such as parasitaemia, packed cell volume, body weight and survival time were then determined using standard tests.

***RESULTS:***

Oral administration of the ethanol extract showed significant ( $P < 0.001$ ) parasitaemia suppression at dose levels of 350 and 500 mg/kg in dose-related manner compared with the negative control. Five hundred mg/kg showed the highest ( $57.29 \pm 1.76$  %) parasitaemia suppression. The survival times of P. berghei-infected mice were also increased in a dose-dependent manner but the test material did not prevent weight loss associated with increased parasitaemia. The result also showed

the plant material prevented the loss in packed cell volume associated with increased parasitaemia. Its oral LD50 was found to be greater than 5,000 mg/kg, indicating its wider safety margin in mice.

**CONCLUSION:**

The result revealed the ethanol extract of *E. kebericho* roots has anti-malarial activity against *P. berghei* in an animal model and lends support to the use of the plant to combat malaria in Ethiopian folk medicine. Further work is necessary to isolate, identify and characterize the active principles from the plant material.

353. Peachey LE, Pinchbeck GL, Matthews JB, Burden FA, Mulugeta G, Scantlebury CE, Hodgkinson JE. **An evidence-based approach to the evaluation of ethnoveterinary medicines against strongyle nematodes of equids.** *Vet Parasitol.* 2015 May 30;210(1-2):40-52. doi: 10.1016/j.vetpar.2015.03.009. Epub 2015 Mar 25.

Abstract

Cyathostomins are the most important gastrointestinal nematode infecting equids. Their effective control is currently under threat due to widespread resistance to the broad spectrum anthelmintics licenced for use in equids. In response to similar resistance issues in other helminths, there has been increasing interest in alternative control strategies, such as bioactive plant compounds derived from traditional ethnoveterinary treatments. This study used an evidence-based approach to evaluate the potential use of plant extracts from the UK and Ethiopia to treat cyathostomins. Plants were shortlisted based on findings from a literature review and additionally, in Ethiopia, the results of a participatory rural appraisal (PRA) in the Oromia region of the country. Systematic selection criteria were applied to both groups to identify five Ethiopian and four UK plants for in vitro screening. These included *Acacia nilotica* (L.) Delile, *Cucumis prophetarum* L., *Rumex abyssinicus* Jacq., *Vernonia amygdalina* Delile. and *Withania somnifera* (L.) Dunal from Ethiopia and *Allium sativum* L. (garlic), *Artemisia absinthium* L., *Chenopodium album* L. and *Zingiber officinale* Roscoe. (ginger) from the UK. Plant material was collected, dried and milled prior to hydro-alcoholic extraction. Crude extracts were dissolved in distilled water (dH<sub>2</sub>O) and dimethyl

sulfoxide (DMSO), serially diluted and screened for anthelmintic activity in the larval migration inhibition test (LMIT) and the egg hatch test (EHT). Repeated measures ANOVA was used to identify extracts that had a significant effect on larval migration and/or egg hatch, compared to non-treated controls. The median effective concentration (EC-50) for each extract was calculated using PROBIT analysis. Of the Ethiopian extracts *A. nilotica*, *R. abyssinicus* and *C. prophetarum* showed significant anthelmintic activity. Their lowest EC-50 values were 0.18 (confidence interval (CI): 0.1-0.3), 1.1 (CI 0.2-2.2) and 1.1 (CI 0.9-1.4)mg/ml, respectively. All four UK extracts, *A. sativum*, *C. album*, *Z. officinale* and *A. absinthium*, showed significant anthelmintic activity. Their lowest EC-50 values were 1.1 (CI 0.9-1.3), 2.3 (CI 1.9-2.7) and 0.3 (CI 0.2-0.4)mg/ml, respectively. Extract of *A. absinthium* had a relatively low efficacy and the data did not accurately fit a PROBIT model for the dose response relationship, thus an EC-50 value was not calculated. Differences in efficacy for each extract were noted, dependent on the assay and solvent used, highlighting the need for a systematic approach to the evaluation of bioactive plant compounds. This study has identified bioactive plant extracts from the UK and Ethiopia which have potential as anthelmintic forages or feed supplements in equids.

**354.H Geremew, W Shibeshi, W Tamiru, E Engdawork Experimental Evaluation of Analgesic and Anti-inflammatory Activity of 80% Methanolic Leaf Extract of *Moringa stenopetala* Bak. F. in Mice** Ethiopian Pharmaceutical journal Vol 31, No 1 (2015) > 15-26

*Abstract*

*Moringa stenopetala* Bak F. is commonly used in folk medicine as a remedy to treat various ailments like hypertension, headache, stomach disorders, asthma, diabetes and malaria. However, the use of the herb for treatment of pain and inflammation has not been scientifically investigated. Thus, in this experiment 80% methanol crude extract of the leaves of *M. stenopetala* was evaluated for its analgesic and antiinflammatory activities using established animal models. Swiss albino mice of either sex were randomly divided into five groups (n = 6). The negative control group was orally given 0.5 ml of distilled water. The positive control received standard drug based on the

respective model (morphine 10 mg/kg, acetyl salicylic acid 81 mg/kg, indomethacin 25 mg/kg). The rest of the groups were treated with 80% methanol extract of *M. stenopetala* leaves at doses of 200, 400 and 600 mg/kg. Animals were then subjected to a battery of tests including hot plate, tail flick, acetic acid induced writhing, and carrageenan induced paw oedema tests. The results indicate that *M. stenopetala* extract showed a dose-dependent significant reduction of pain in analgesia models ( $p < 0.001$ ) with 600 mg/kg dose producing the highest reduction. The extract significantly reduced carrageenan-induced inflammation in a dose independent manner, in which the highest reduction of inflammation was observed at 400 mg/kg. The data collectively indicate that the 80% methanol extract of *M. stenopetala* leaves have potential analgesic and anti-inflammatory activities against stimuli in tested animals and can be recommended for further studies.

**Keywords:** *Moringa stenopetala*, Leaves, Crude Extract, Analgesic Activity, Anti-inflammatory Activity

355.B Girma, D Bisrat, A Mazumder, K Asres **In vitro Antimicrobial Activity of Homonataloin A/B and Homonataloside Against Pathogenic Microorganisms**  
*Ethiopian Pharmaceutical journal Vol 31, No 1 (2015) > 27-34*

*Abstract*

In the past few decades, antimicrobial drugs are losing their effectiveness due to the evolution of pathogen resistance. Thus, there is a continuing search for natural products that have potential to lead to more effective and less toxic alternative antimicrobial drugs. In this context, two anthrones (homonataloin A/B and homonataloside) were isolated from the leaf latex of *Aloe citrina* Carter & Brandham by preparative thin layer chromatography over silica gel. The latex and its two constituents were tested for their antimicrobial activities against 20 bacterial and 4 fungal strains using disc diffusion method. Both the latex and isolated compounds were found to possess a broad spectrum of antimicrobial activity against Gram-positive and Gram-negative bacteria as well as fungal strains. Broth dilution method was used to determine the minimum inhibitory concentration (MIC) of each of the test substances. Homonataloin A/B was found to exhibit good activity against *Staphylococcus aureus* and all *Salmonella* spp. tested with MIC value of 25 µg/ml, whilst

the activity of homonataloside (MIC = 25 µg/ml) was highest against *Vibrio cholerae* strains. Among the fungal strains tested, *Candida albicans* was the most susceptible organism to the latex and the isolated compounds. By and large the activity of the latex was either comparable or better than the isolated compounds against all bacterial strains tested indicating the possible presence of synergy among the isolated compounds or the presence of minor compounds in the latex with strong antibacterial effect. These findings support the traditional uses of the plant for the treatment of various infectious diseases and wound.

**Keywords:** *Aloe citrina*, Homonataloin A/B, Homonataloside, Antimicrobial Activity, Disc Diffusion

**356.M Getahun, E Engidawork Evaluation of the Diuretic Activity and Phytochemical Screening of Different Solvent Fractions of the Rhizomes of *Rumex abyssinicus* Jacq (Polygonaceae) in Rats** Ethiopian Pharmaceutical journal Vol 31, No 1 (2015) > 35-48

*Abstract*

*Rumex abyssinicus* J. (Polygonaceae) is a widely spread medicinal plant used traditionally to treat a variety of diseases, including hypertension. Previous study confirmed the diuretic effect of the aqueous and 80% methanol crude extracts of the plant, of which the 80% methanol extract produced a better diuresis. The aim of this study was to investigate which solvent fraction(s) of the 80% methanol extract would be responsible for the diuretic effect of the plant. Diuretic activity was examined in adult male rats, which were orally administered with aqueous, methanol and ethyl acetate fractions of 80% methanol extract of *R. abyssinicus* at doses of 250, 500 and 750 mg/kg; furosemide (10 mg/kg) or vehicle. Total urine output and electrolyte content of the urine was computed over 24 h period and compared with the standard and negative controls. Phytochemical composition of the fractions was also investigated using standard tests. The methanol ( $p < 0.01$ ) and ethyl acetate ( $p < 0.001$ ) fractions induced a significant diuresis at the lower dose (250 mg/kg) compared to the aqueous fraction, which produced a notable effect only at its higher dose. Both fractions also increased urinary electrolyte excretion significantly ( $p < 0.001$ ) at their highest doses. Whilst the ethyl acetate fraction increased urine output comparably to that of furosemide, the methanol fraction showed the highest saluretic effect. These findings collectively indicate that an

increase in urine volume is observed with decreasing polarity of the fractions. This suggests that the diuretic activity of the plant might be mostly due to active principles contained in the less polar fractions.

**Keywords:** *Rumex abyssinicus*, Furosemide, Diuretic Activity, Electrolytes, Solvent Fractions

357. Biniyam Girma, Getnet Yimer and Eyasu Makonnen **Effect of *Rumex Abyssinicus* on preneoplastic lesions in dimethylhydrazine induced colon carcinogenesis in rats** *BMC Complementary and Alternative Medicine* 2015, **15**:365

Abstract

### ***Background***

Cancer as a multistage process can be reversed or blocked by using chemopreventive agents. Colon cancer chemoprevention has been widely investigated using cyclooxygenase inhibitors and many other chemicals of synthetic or natural origin. This particular study was carried out to assess the colon cancer chemopreventive effect of hydro-methanol extract of *Rumex abyssinicus* rhizome on rats.

### ***Method***

Colon cancer chemopreventive potential of hydro-methanol extract of *Rumex abyssinicus* rhizome was determined based on the number and multiplicity of aberrant crypt foci (ACF). Fifteen DMH (1, 2-dimethylhydrazine) treated and five untreated Wistar female rats were used. DMH was administered subcutaneously 30 mg/kg, after its pH was adjusted to 6.5–7. Treatment groups started receiving extract after six weeks of weekly DMH injections. The rats were divided into four groups: Group 1 received only oral normal saline, Group 2 received DMH and normal saline, Group 3 and 4 received DMH plus 250 mg/kg and 500 mg/kg extract, respectively. Specific phytoconstituents of the plant, which were reviewed from original articles, were virtually evaluated for cyclooxygenase-2 (COX-2) inhibition. The binding energies and interactions of the phytochemicals from *Rumex abyssinicus* against COX-2 were determined by Autodock4.2.

## Results

There was a statistically significant reduction ( $p$ -value  $< 0.05$ ) in the number of aberrant crypt (AC) and aberrant crypt foci (ACF) at both administered doses. However, significant association ( $p$ -value  $> 0.05$ ) was not observed in reducing crypt multiplicity. The docking process resulted in estimated binding energies [ $-6.83$  kcal/mol to  $-7.9$  kcal/mol] which are closer to the positive controls or Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) [ $-4.55$  kcal/mol to  $-10.84$  kcal/mol]. The phytochemical-COX-2 interaction indicated the involvement of key amino acid residues in inhibition of cyclooxygenase like ARG120, TYR355, TYR385, SER530 and GLY526.

## Conclusions

*Rumex abyssinicus* had demonstrated a chemopreventive potential at post-initiation stage. As the virtual screening data suggested, COX-2 inhibition by the anthraquinones in the extract could be one mechanism for the observed chemopreventive effect.

Keywords:

Chemoprevention; Colon cancer; *Rumex abyssinicus*; Aberrant crypt foci; Docking; Virtual screening

358. Abrham Belachew Muluye, Eshetie Melese and Getnet Mequanint Adinew **Antimalarial activity of 80 % methanolic extract of *Brassica nigra* (L.) Koch. (Brassicaceae) seeds against *Plasmodium berghei* infection in mice** *BMC Complementary and Alternative Medicine* 2015, **15**:367 doi:10.1186/s12906-015-0893-z

Abstract

## Background

Resistances to currently available drugs and insecticides, significant drug toxicities and costs and lack of vaccines currently complicated the treatment of malaria. A continued search for safe, effective and affordable plant-based antimalarial agents thus becomes crucial and vital in the face

of these difficulties. The aim of the study was to evaluate the antimalarial activity of 80 % methanolic extract of the seeds of *Brassica nigra* against *Plasmodium berghei* infection in mice.

### **Method**

Chloroquine sensitive *Plasmodium berghei* (ANKA strain) was used to test the antimalarial activity of the extract. In suppressive and prophylactic models, Swiss albino male mice were randomly grouped into five groups of five mice each. Group I mice were treated with the vehicle, group II, III and IV were treated with 100, 200, and 400 mg/kg of the extract, respectively and the last group (V) mice were treated with chloroquine (10 mg/kg). The level of parasitemia, survival time and variation in weight of mice were used to determine the antimalarial activity of the extract.

### **Results**

Chemosuppressive activities produced by the extract of the seeds of *Brassica nigra* were 21.88, 50.00 ( $P < 0.01$ ) and 53.13 % ( $P < 0.01$ ), while the chemoprophylactic activities were 17.42, 21.21 and 53.79 % ( $P < 0.05$ ) at 100, 200 and 400 mg/kg of the extract, respectively as compared to the negative control. Mice treated with 200 and 400 mg/kg extract were significantly ( $P < 0.05$ ) lived longer and gained weight as compared to negative control in 4-day suppressive test.

### **Conclusion**

From this study, it can be concluded that the seed extract of *Brassica nigra* showed good chemosuppressive and moderate chemoprophylactic activities and the plant may contain biologically active principles which are relevant in the treatment and prophylaxis of malaria, thus supporting further studies of the plant for its active components.

Keywords:

Antimalarial activity; *Brassica nigra* ; Malaria; Mice; *Plasmodium berghei*

**359.**Eshetu Mulisa , Kaleab Asres and Ephrem Engidawork **Evaluation of wound healing and antiinflammatory activity of the rhizomes of *Rumex abyssinicus* J. (*Polygonaceae*) in mice** BMC Complementary and Alternative Medicine (2015) 15:341

## Background

*Rumex abyssinicus* Jacq (Polygonaceae) is widely used in Ethiopia for treatment of wound and other diseases. Although reports are available in the literature on some of the claimed activities, nothing has so far been reported about the wound healing activity of *R. abyssinicus*. Thus, this work was initiated to investigate the wound healing and anti-inflammatory activities of 80 % methanol extract of the rhizomes of *R. abyssinicus* in mice.

## Methods

Following extraction of the rhizomes of the plant with 80 % methanol, the extract was formulated as ointment (5 % & 10 % w/w) with simple ointment base B.P. The ointment was then evaluated for wound healing activity using excision and incision wound models. Parameters, including wound contraction, epithelization time and hydroxyproline content were determined using the excision model, whereas tensile strength was measured from the incision model. In parallel, anti-inflammatory activity of the rhizome was evaluated with carrageenan induced hind paw edema model by dissolving the 80 % methanol extract in 1 % carboxyl methyl cellulose and administering orally in various doses (250, 500 and 750 mg/kg).

## Results

Wound treated with 5 % and 10 % (w/w) hydroalcoholic extract ointment exhibited significant wound healing activity in both models, as evidenced by increased wound contraction, shorter epithelization time, higher tissue breaking strength and increased hydroxyproline content. The hydroalcoholic extract also produced dose-related significant reduction ( $p < 0.05$ – $0.001$ ) of inflammation.

## Conclusions

The results of this study demonstrated that the hydroalcoholic extract of the rhizomes of *R. abyssinicus* facilitated wound healing at least in part via its anti-inflammatory activity, supporting its traditional claim as a wound healing agent.

Keywords:

Rumex abyssinicus ; Rhizome; Excision model; Incision model; Anti-inflammation; Wound healing

**360.** Teklit Gebregiorgis Amabye **Antioxidant and Anti-inflammatory Properties of Cultivated Mushrooms Grown in Mekelle City Tigray Ethiopia** International Journal of Nutrition and Food Sciences 2015; 4(5): 578-583

Abstract:

Traditionally mushrooms have been used for the prevention and treatment of a multitude disorders. Macro fungi regarding to the development of novel safe antimicrobials and antioxidants has become attractive source for researchers in the last decades. In the present study quantitative analysis of phytochemical constituents was carried out by using standard methods while 1,1 Diphenyl picryl hydroxyl(DPPH) Nitric oxide, Hydrogen peroxide free radical scavenging assay were used to evaluate the antioxidant properties of selected wild mushrooms. Anti- inflammatory capacity of samples was evaluated by HRBC membrane stabilization method. The results obtained from the study revealed that Agaricus Bosporus showed higher total phenol, mg flavonoid carotenoid, and lycopene and ascorbic acid contents of (617.9±1) mg/g, (62.52±1.13) mg/g, (74.2±0.057) µg / mg, (49.6±0.17) µg / and 28.8±0.34 mg / g. All the species showed antioxidant potential but Russula delica proved to be more active while Agaricus Bosporus. Proved to be least one. Keywords: Wild Mushrooms, Scavenging Effect, Total Phenol, Anti-oxidant, Anti-inflammatory

**361.** Gemechu Ameya Buli, Abdella Gure Duga, Engda Dessalegn. **Antimicrobial Activity of Lippia adoensis var. koseret Against Human Pathogenic Bacteria and Fungi.** *American Journal of Clinical and Experimental Medicine*. Vol. 3, No. 3, 2015, pp. 118-123. doi: 10.11648/j.ajcem.20150303.18

Abstract:

**Background:** *Lippia adoensis* var. *koseret* is a well known medicinal plant endemic to Ethiopia. It has been traditionally used to treat different infectious diseases and also in food preparation as condiment. The aim of the current study was to evaluate antibacterial and antifungal activities of water, ethanol and methanol based crude extracts of *L. adoensis* var. *koseret* against selected human pathogenic bacteria and fungi.

**Methods:** Crude extracts of *L. adoensis* var. *koseret* were extracted by maceration method. Disc diffusion assay of the extracts were carried out in four different concentrations against three different bacteria species (*Staphylococcus aureus*, *Enterococcus faecalis* and *Escherichia coli*) and two clinical isolated fungal species (*Candida albicans* and *Aspergillus flavus*) by using Kirby-Baur disk diffusion method. Agar dilution method was used to determine the minimum inhibitory concentration, the minimum bactericidal and fungicidal concentrations of the extracts against similar microorganisms.

**Results:** Water-based extract of *L. adoensis* var. *koseret* exhibited significantly less antimicrobial activity as compared to ethanol and methanol crude extract against tested isolates of bacteria and fungi ( $P < 0.05$ ); while, there was no significant difference between ethanol and methanol extracts. Among the tested microorganism *S. aureus*, was the most sensitive of all whereas *C. albicans* was the most resistant microorganism to alcohol based extract of *L. adoensis* var. *koseret*. The minimum inhibitory concentration of *L. adoensis* var. *koseret* ranged from 3.12 to 25mg/ml in the alcohol based extracts but it was higher in the water-based extract. The lower bactericidal concentration (5.20 mg/l) and the highest fungicidal concentration (37.50 mg/ml) were observed in methanol based extracts against *S. aureus* and *C. albicans*, respectively.

**Conclusions:** Antimicrobial activity of *L. adoensis* var. *koseret* varies with extraction solvent and tested microorganisms.

**Keywords:** Antibacterial Activity, Antifungal Activity, Crude Extract, *L. adoensis* var. *koseret*

**362.** Mohammed Nasir , Ketema Tafess and Dawit Abate **Antimicrobial potential of the Ethiopian *Thymus schimperi* essential oil in comparison with others against certain**

**fungal and bacterial species** BMC Complementary and Alternative Medicine (2015)  
15:260 DOI 10.1186/s12906-015-0784-3

**Abstract Background:** To evaluate the in vitro activities of Ethiopian *Thymus schimperi* with other three hydro distilled essential oils against Dermatophytes (*Tricophyton* spp. and *Microsporum* spp.) and other pathogenic micro organisms. **Methods:** The studies were carried out using Agar disk diffusion method for screening the most effective essential oils and Agar dilution to determine Minimum Inhibitory Concentration (MIC) of the essential oils. **Results:** Essential oils of *T. schimperi* and *Cinnamomum zeylanicum* were highly active against tested organisms. The MIC were in the range of 0.08 µl/ml to 0.31 µl/ml for *T. schimperi*, 0.31 µl/ml to 0.16 µl/ml for *C. zeylanicum*, 2.5 µl/ml to 1.25 µl/ml for *Citrus limon* and 5 µl/ml to 2.5 µl/ml for *Eucalyptus camaldulensis* against *Tricophyton* spp. and *Microsporum* spp. *T. schimperi* and *C. zeylanicum* oils also showed antimicrobial effect against *Candida albicans*, *Aspergillus niger*, *Rhodotorula rubra*, *Escherichia coli*, *Shigella* spp., *Bacillus* spp. and *Streptococci*. **Conclusions:** The Ethiopian *T. schimperi* oil had pronounced antifungal and antibacterial activities against all the tested microbes. Therefore, it is required further investigation in order to identify the active compounds and their clinical applications for treatment of tested organisms.

**Keywords:** *Thymus schimperi*, *Cinnamomum zeylanicum*, *Tricophyton*, *Escherichia coli*

363. Teka A, Rondevaldova J, Asfaw Z, Demissew S, Van Damme P, Kokoska L, Vanhove W.  
**In vitro antimicrobial activity of plants used in traditional medicine in Gurage and Silti Zones, south central Ethiopia.** BMC Complement Altern Med. 2015 Aug 18;15:286. doi: 10.1186/s12906-015-0822-1.

Abstract

**BACKGROUND:**

To overcome the escalating problems associated with infectious diseases and drug resistance, discovery of new antimicrobials is crucial. The present study aimed to carry out in vitro antimicrobial analysis of 15 medicinal plant species selected according to their traditional medicinal uses in Gurage and Silti Zones, south central Ethiopia.

**METHODS:**

Ethanol extracts of various plant parts were investigated for their antimicrobial activity against 20 bacterial and one yeast strains. The minimum inhibitory concentration (MIC) was determined by broth microdilution method.

**RESULTS:**

*Asparagus africanus*, *Guizotia schimperii*, *Lippia adoensis* var. *adoensis* and *Premna schimperii* were active against *Candida albicans*, *Enterococcus faecalis* and *Staphylococcus aureus* at a concentration of 512 µg/ml or lower. Strong antibacterial activity (MIC ≥ 128 µg/ml) was observed for *G. schimperii* extract against 17 resistant and sensitive *Staphylococcus* strains, at a concentration comparable to standard antibiotics. Moreover, this extract showed higher antibacterial activity for the test against *S. aureus* ATCC 33591, ATCC 33592, SA3 and SA5 strains (128-256 µg/ml) than oxacillin (512 µg/ml).

**CONCLUSIONS:**

The study revealed in vitro antibacterial activity of plants used in folk medicine in south central Ethiopia. The usefulness of these plants, in particular of *G. schimperii*, should be confirmed through further phytochemical and toxicity analyses.

**364.** Feleke Demissie Endalamaw and Bhagwan Singh Chandravanshi **Levels of major and trace elements in fennel (*Foeniculum vulgari* Mill.) fruits cultivated in Ethiopia** *SpringerPlus* 2015, **4**:5 doi:10.1186/2193-1801-4-5

Abstract

### **Background**

Sweet fennel (*Foeniculum vulgare* Mill.) is one of the precious spices. Almost all parts of fennel plant are edible. The herb is used as carminative, digestive, diuretic, cosmetic and medicine.

### **Methods**

A 0.5 g of the oven dried fennel fruit and soil samples were digested by wet-digestion method. The levels of selected elements (Ca, Mg, Fe, Mn, Cu, Cr, Co, Zn, Ni, Cd and Pb) were determined in sweet fennel fruit (*Foeniculum vulgari* Mill.) and soil from Addis Ababa (Central Ethiopia) and Gojjam (Northern West Ethiopia) by flame atomic absorption spectrometry (FAAS).

### **Results**

The elemental concentrations ( $\mu\text{g/g}$ ) in fennel fruit were: Ca (20,500–23,000), Mg (1,310–3,460), Fe (1,140–1,900), Mn (31–51), Cu (24–103), Cr (91–98), Co (26–71), Zn (37–45), Ni (19–24), and Cd (1.6–1.9) while in the soil were: Ca (1,440–1,780), Mg (1,260–3,310), Fe (26,900–28,000), Mn (1,460–1,980), Cu (51–101), Cr (127–141), Co (54–143), Zn (99–104), Ni (98–161), and Cd (1.7–2.9). Pb was below the method detection limit in both the fennel fruit and soil.

### **Conclusion**

The Ethiopian fennel fruits are rich in Ca and Mg and other essential elements (Fe, Cu, Co and Zn) and can be used as good supplement for human being in particularly for children and pregnant women. The toxic element Cd is at trace level and Pb is not detected in the fennel fruit. Thus, Ethiopian fennel fruits are safe for human consumption.

Keywords:

Fennel; *Foeniculum vulgari* Mill.; *Ensilal*; Trace elements; Spice; Ethiopia

365. Alemayehu Toma, Serawit Deyno, Abrham Fikru, Amalework Eyado and Andrew Beale  
***In vivo* antiplasmodial and toxicological effect of crude ethanol extract of *Echinops kebericho* traditionally used in treatment of malaria in Ethiopia** *Malaria Journal* 2015, 14:196 doi:10.1186/s12936-015-0716-1

Abstract

### **Background**

Medicinal plants have contributed significantly to current malaria treatment. Emergence of resistance to currently available drugs has necessitated the search for new plant-based anti-malarial agents and several plant-based, pharmacologically active anti-malarial compounds have been isolated. This study was conducted to validate the traditional usage of *Echinops kebericho* for treating malaria in the traditional health care system of Ethiopia.

### **Methods**

The roots of *E. kebericho* were collected from Masha Woreda, Sheka Zone. After collection, the plant materials were identified by a taxonomist, dried under shade and crushed to powder for extraction. The powdered roots were extracted by maceration using 70 % ethanol. Acute toxicity study of the crude extract was carried out in Swiss albino mice. The *in vivo* anti-malarial activity of plant extract (200, 350 and 500 mg/kg) of *E. kebericho* roots against a chloroquine (CQ) sensitive strain of *Plasmodium berghei* strain ANKA was assessed using the four-day suppressive test procedure. Parameters such as parasitaemia, packed cell volume, body weight and survival time were then determined using standard tests.

### **Results**

Oral administration of the ethanol extract showed significant ( $P < 0.001$ ) parasitaemia suppression at dose levels of 350 and 500 mg/kg in dose-related manner compared with the negative control. Five hundred mg/kg showed the highest ( $57.29 \pm 1.76$  %) parasitaemia suppression. The survival times of *P. berghei*-infected mice were also increased in a dose-dependent manner but the test material did not prevent weight loss associated with increased parasitaemia. The result also showed

the plant material prevented the loss in packed cell volume associated with increased parasitaemia. Its oral LD<sub>50</sub> was found to be greater than 5,000 mg/kg, indicating its wider safety margin in mice.

### ***Conclusion***

The result revealed the ethanol extract of *E. kebericho* roots has anti-malarial activity against *P. berghei* in an animal model and lends support to the use of the plant to combat malaria in Ethiopian folk medicine. Further work is necessary to isolate, identify and characterize the active principles from the plant material.

Keywords:

Anti-malarial activity; *Echinops kebericho* ; Parasitaemia; *Plasmodium berghei*

**366.** Senait Girma, Mirutse Giday, Berhanu Erko and Hassen Mamo **Effect of crude leaf extract of *Osyris quadripartita* on *Plasmodium berghei* in Swiss albino mice** *BMC Complementary and Alternative Medicine* 2015, **15**:184 doi:10.1186/s12906-015-0715-3

Abstract

### ***Background***

Continuous emergence of multi-drug-resistant malaria parasites and their rapid spread across the globe warrant urgent search for new anti-malarial chemotherapeutics. Traditional medicinal plants have been the main sources for screening active phytochemicals against malaria. Accordingly, this study was aimed at evaluating the anti-malarial activity of *Osyris quadripartita* Salzm. Ex Decne., a plant which is used for traditional malaria treatment by local people in different parts of Ethiopia.

### ***Methods***

Aqueous, chloroform and methanol crude leaf extracts of the plant have been prepared and tested for acute toxicity and anti-malarial efficacy in *Plasmodium berghei* (ANKA strain)-infected Swiss albino mice.

## **Results**

At three oral doses of 200, 400 and 600 mg/kg the plant material was safe, chemosuppressive and thus prevented body weight loss, hematological abnormalities and increased mice mean survival time compared to the negative control. The most efficacious extract was that of chloroform which prolonged mean mouse survival past day 11 of infection with all the mice in this group having the highest parasitemia suppression rate (41.3 %, at 600 mg/kg) although parasite clearance was not achieved compared to the standard drug (chloroquine) against the parasite.

## **Conclusion**

The finding supports the traditional use of the plant for the treatment of malaria. However, further confirmatory studies followed by isolation and characterization of the active anti-malarial compound (s) of the plant that is/are responsible for the observed parasite suppression is needed before it is recommended for malaria drug search and discovery.

## **Keywords:**

Antimalarial activity; *Osyris quadripartita* ; in vivo ; *Plasmodium berghei* ; Swiss albino mice; Ethiopia

**367.**Solomon M Abay, Leonardo Lucantoni, Nisha Dahiya, Geme Dori, Edson G Dembo, Fulvio Esposito, Giulio Lupidi, Sonny Ogboi, Robert K Ouédraogo, Annamaria Sinisi, Orazio Tagliatela-Scafati, R Serge Yerbanga, Massimo Bramucci, Luana Quassinti, Jean Bosco Ouédraogo, George Christophides and Annette Habluetzel ***Plasmodium* transmission blocking activities of *Vernonia amygdalina* extracts and isolated compounds** *Malaria Journal* 2015, **14**:288 doi:10.1186/s12936-015-0812-2

## **Abstract**

## **Background**

Medicinal plants are a validated source for discovery of new leads and standardized herbal medicines. The aim of this study was to assess the activity of *Vernonia amygdalina* leaf extracts

and isolated compounds against gametocytes and sporogonic stages of *Plasmodium berghei* and to validate the findings on field isolates of *Plasmodium falciparum*.

### **Methods**

Aqueous (Ver-H<sub>2</sub>O) and ethanolic (Ver-EtOH) leaf extracts were tested in vivo for activity against sexual and asexual blood stage *P. berghei* parasites. In vivo transmission blocking effects of Ver-EtOH and Ver-H<sub>2</sub>O were estimated by assessing *P. berghei* oocyst prevalence and density in *Anopheles stephensi* mosquitoes. Activity targeting early sporogonic stages (ESS), namely gametes, zygotes and ookinetes was assessed in vitro using *P. berghei* CTRP<sub>p</sub>.GFP strain. Bioassay guided fractionation was performed to characterize *V. amygdalina* fractions and molecules for anti-ESS activity. Fractions active against ESS of the murine parasite were tested for ex vivo transmission blocking activity on *P. falciparum* field isolates. Cytotoxic effects of extracts and isolated compounds vernolide and vernodalol were evaluated on the human cell lines HCT116 and EA.hy926.

### **Results**

Ver-H<sub>2</sub>O reduced the *P. berghei* macrogametocyte density in mice by about 50% and Ver-EtOH reduced *P. berghei* oocyst prevalence and density by 27 and 90%, respectively, in *An. stephensi* mosquitoes. Ver-EtOH inhibited almost completely (>90%) ESS development in vitro at 50 µg/mL. At this concentration, four fractions obtained from the ethylacetate phase of the methanol extract displayed inhibitory activity >90% against ESS. Three tested fractions were also found active against field isolates of the human parasite *P. falciparum*, reducing oocyst prevalence in *Anopheles coluzzii* mosquitoes to one-half and oocyst density to one-fourth of controls. The molecules and fractions displayed considerable cytotoxicity on the two tested cell-lines.

### **Conclusions**

*Vernonia amygdalina* leaves contain molecules affecting multiple stages of *Plasmodium*, evidencing its potential for drug discovery. Chemical modification of the identified hit molecules, in particular vernodalol, could generate a library of druggable sesquiterpene lactones. The

development of a multistage phytomedicine designed as preventive treatment to complement existing malaria control tools appears a challenging but feasible goal.

Keywords:

Malaria transmission blocking; Gametocytes; Sporogonic stages; Plasmodium ; Phytomedicine; Vernonia amygdalina ; Sesquiterpene lactone

**368.** Mekdes Megeressa, Daniel Bisrat, Avijit Mazumder and Kaleab Asres **Structural elucidation of some antimicrobial constituents from the leaf latex of *Aloe trigonantha* L.C. Leach** *BMC Complementary and Alternative Medicine* 2015, **15**:270 doi:10.1186/s12906-015-0803-4

Abstract

### ***Background***

The incidents of drug resistant microorganisms and the need of treatments for newly emerging pathogens are of great concern to the global community. Our ability to treat infectious diseases is dependent on the development of new pharmaceuticals, and one potential source being medicinal plants with traditional claims. The leaves of *Aloe trigonantha* L.C. Leach, an endemic Ethiopian plant, are locally used for the treatment of infectious and inflammatory diseases. This study explores the potential of the latex of this plant and compounds isolated thereof for their *in vitro* antibacterial and antifungal properties.

### ***Methods***

Analytical RP-HPLC and silica gel preparative TLC were used for identification and isolation of active constituents, respectively. Characterization of the compounds was based on UV, IR, HR-ESIMS, <sup>1</sup>H and <sup>13</sup>C NMR, and 2D-NMR spectral assignments. Antimicrobial activity studies were carried out against 21 pathogenic bacterial and 4 fungal strains using the disk diffusion

method. Minimum inhibitory concentrations (MICs) were determined by the broth dilution method.

### **Results**

A C-glycosylated chromone identified as aloesin, and three C-glycosylated anthrones characterized as 8-O-methy-7-hydroxyaloin A/B, aloin A/B and aloin-6'-O-acetate A/B were isolated. The latex and isolated compounds exhibited *in vitro* antibacterial activity against the tested pathogens. In some cases the activity of the isolated compounds (MIC = 10 µg/mL) was comparable with that of the standard drug ciprofloxacin, particularly against some of the Gram-negative bacterial strains tested. However, their activity towards the fungal pathogens tested was relatively weaker showing maximum activity against *Candida albicans* with MIC value of 400 µg/mL.

### **Conclusion**

The present findings can be used for further research aimed at the development of new antibacterial agents, and may also justify the ethnomedicinal claim of the plant for the treatment of infectious diseases.

Keywords:

Aloe trigonantha ; Antimicrobial activity; 8-O-methy-7-hydroxyaloin A/B; Aloesin; Aloin A/B; Aloin-6'-O-acetate A/B; Disk diffusion

**369.**Michael Gebrehiwot, Kaleab Asres, Daniel Bisrat, Avijit Mazumder, Peter Lindemann and Franz Bucar **Evaluation of the wound healing property of *Commiphora guidottii* Chiov. ex. Guid.** *BMC Complementary and Alternative Medicine* 2015, **15**:282 doi:10.1186/s12906-015-0813-2

Abstract

### ***Background***

The traditional use of the oleo-gum-resin of *Commiphora guidottii* Chiov. ex. Guid., which is commonly called scented myrrh, for topical treatment of wound is well documented. The major objective of the present study was to investigate the essential oil and resin obtained from *C. guidottii* for their potential wound healing properties. Due to their influence on the wound healing process, the anti-inflammatory and antimicrobial activities of scented myrrh have also been investigated.

### ***Methods***

Powdered oleo-gum-resin of *C. guidottii* was steam-distilled to obtain essential oil, and the resin was extracted from the marc with MeOH and filtered. The TLC fingerprint profile of the resin has been recorded by using silica gel GF<sub>254</sub> as stationary phase. The essential oil components were identified and quantified by GC-MS. Ointments prepared from the essential oil (4 % v/w) and the resin (5 % w/w) were used for wound healing activity tests. Toxicity of the formulated ointments was investigated according to Draize skin irritation test. Acute anti-inflammatory effect in mice was evaluated using carrageenan induced mouse hind paw oedema model. Antimicrobial activity tests were carried out using disk diffusion and broth dilution techniques against 21 pathogenic bacterial and 4 fungal strains.

### ***Results***

Ointment formulations of both the oil and resin were found to be non-irritant at the concentrations used and showed significant ( $p < 0.05-0.001$ ) increase in wound contraction rate, shorter epithelization time and higher skin breaking strength as compared to the negative control. Overall, the antibacterial and antifungal activities of the oil and resin were comparable with the standard antibiotics ciprofloxacin and griseofulvin, respectively.

**370.** Tefera Mekonen, Mirutse Giday and Ensermu Kelbessa **Ethnobotanical study of homegarden plants in Sebeta-Awas District of the Oromia Region of Ethiopia to**

**assess use, species diversity and management practices** *Journal of Ethnobiology and Ethnomedicine* 2015, **11**:64

Abstract

### ***Background***

Homegardens in Ethiopia are currently facing different threats mainly due genetic erosion, loss of traditional knowledge on their use and management and drought. On the other hand, research and documentation works on homegardens in the country are very limited. There is no previous report indicating conduct of ethnobotanical study on homegardens in selected study district. The present study thus attempted to document knowledge on uses and management practices of homegardens by people in study district.

### ***Methods***

The study was conducted in Sebeta-Awas District, Southwestern Shewa Zone of Oromia Region, Ethiopia, between March and September 2009 to assess use, species diversity and conservation status of homegardens in the District. Data were collected using semi-structured interviews as well as through homegarden visits, market surveys and different ranking exercises. For the semi-structured interviews, 42 homegarden owners were selected randomly from seven sampled kebeles (smallest administrative units in Ethiopia), six from each kebele. For different ranking exercises, 14 informants (10 males and 4 females) were sampled using convenient sampling method from among homegarden owners that already participated in semi-structured interviews.

### ***Results***

In total, 113 plant species belonging to 46 families were recorded from the study area, of which 45 (39.8 %) were herbs, 34 (30.1 %) were trees, 26 (23.0 %) were shrubs and 8 (7.1 %) were climbers. Fabaceae had the highest number of species, followed by the families Asteraceae, Lamiaceae and Solanaceae. The cash crops *Catha edulis*, *Rhamnus prinoides* and *Ruta chalepensis* were the most frequently encountered homegarden plants. *Cupressus lusitanica*, *Eucalyptus camaldulensis* and *Faidherbia albida* were the most abundant tree species

that had the highest densities of occurrence. Of the recorded plant species, 25 % were used as sources of food, 13 % as medicine and 10 % as household tools.

### ***Conclusion***

It can be concluded that homegardens in the study area are rich in crops and, therefore, significantly contribute to the agrobiodiversity of the study District, in particular, and Ethiopia, in general.

Keywords:

Homegarden; Agrobiodiversity; Local knowledge; Sebeta-Awas; Ethiopia

**371.**Asnake S, Teklehaymanot T, Hymete A, Erko B, Giday M. **Evaluation of the antiplasmodial properties of selected plants in southern Ethiopia.** BMC Complement Altern Med. 2015 Dec 23;15(1):448. doi: 10.1186/s12906-015-0976-x.

### **Abstract**

#### ***BACKGROUND:***

The majority of the Ethiopian population is at risk of malaria largely caused by Plasmodium falciparum. The resistance of the parasite to existing drugs is the main challenge in the control of the disease and thus new therapeutic drugs are required. In Ethiopia, people use different plant species to treat malaria. However, very few of them have so far been evaluated for their safety level and antimalarial activity. Thus, the aim of this study was to evaluate the safety and antimalarial activity of extracts of *Ajuga integrifolia*, *Clerodendrum myricoides*, *Melia azedarach*, *Peponium vogelii* and *Premna schimperi*, locally used by the Sidama people of Ethiopia to treat malaria.

#### ***METHODS:***

The safety level of 80 % methanol extracts of the plants were evaluated using standard acute toxicity test procedure. The antiplasmodial activity of 80 % methanol extracts of the plants were

assessed in vivo using Swiss albino mice against chloroquine sensitive rodent malaria parasite, *Plasmodium berghei*, using the standard 4-day suppressive test procedure at doses of 200,400 and 800 mg/kg/day. The 80 % methanol extract of *Ajuga integrifolia* that exhibited better antimalarial activity was fractionated using different solvents and screened for its phytochemical constituents and evaluated in vivo for its antimalarial activity at doses of 100, 200 and 400 mg/kg/day.

### **RESULTS:**

All extracts given at the three different doses caused no lethal effect on mice in 24 h and within 10 days of observation. All extracts and fractions exhibited antimalarial activity in a dose dependant manner. The highest inhibition was exhibited by the crude extracts of *A. integrifolia* (35.17 %) at 800 mg/kg/day ( $P < 0.05$ ). Among fractions of *A. integrifolia*, n-butanol fraction demonstrated the highest inhibition (29.80 %) at 400 mg/kg/day ( $P < 0.05$ ). The extracts and fractions prolonged the survival time and prevented weight loss of the mice, but did not prevent PCV reduction. Phytochemical test on *Ajuga integrifolia* indicated the presence of alkaloids, flavonoids, saponins, terpenoids, anthraquinone, steroids, tannins, phenols and fatty acids.

### **CONCLUSIONS:**

Findings show that the plants are non-toxic and demonstrate antimalarial activity in a dose dependant manner supporting claims of their traditional therapeutic value for malaria treatment. However, further in-depth investigation is required to assess the potential of the plants towards the development of new antimalarial agent.

**372.**Tadesse A, Hymete A, Bekhit AA, Mohammed SF. **Quantification of total polyphenols, catechin, caffeine, L-theanine, determination of antioxidant activity and effect on antileishmanial drugs of ethiopian tea leaves extracts.** *Pharmacognosy Res.* 2015 Jun;7(Suppl 1):S7-S14. doi: 10.4103/0974-8490.157991.

### **Abstract**

**OBJECTIVE:**

In this study four tea samples Gumero black, Wushwush black and Wushwush green from Agri-Ceft Plc and East Africa black tea leaves from East African Agribusiness Plc were investigated for total polyphenols, caffeine, catechin and L-theanine content.

**MATERIALS AND METHODS:**

The aqueous extracts were investigated for their antioxidant and antileishmanial property and effect on amphotericin B, miltefocine and sodium stibogluconate, the commonly used antileishmanial drugs. Antileishmanial studies were conducted on *L. aethiopica*.

**RESULTS:**

Wushwush green tea had the highest content of polyphenol ( $19.98 \pm 1.15$  mg gallic acid equivalent /100 g dry leaf weight), catechin (37.06 mg/g) and L-theanine (48.54 mg/g but the lowest caffeine content). It exhibited the highest antioxidant activity. The highest antioxidant effect of Wushwush green tea may be attributed to the highest polyphenol content. East African black tea had the lowest L-theanine (20.72 mg/g) and antioxidant activity but the highest caffeine (16.60 mg/g) content.

**CONCLUSION:**

Wushwush green tea showed slight inhibitory effect on *L. aethiopica* while the black tea extracts (Gumero, East Africa and Wushwush) exhibited no antileishmanial activity. Wushwush green tea did not show any synergistic or antagonistic effect on the antileishmanial drugs used in this study while Gumero, East Africa and Wushwush black tea extracts exhibited dose dependant inhibitory activity to the commonly used antileishmanial drugs included in this study.

**KEYWORDS:**

Caffeine; *Camellia sinensis*; Catechin; L-theanine; Polyphenols

- 373.** Addo EM, Chai HB, Hymete A, Yeshak MY, Slebodnick C, Kingston DG, Rakotondraibe LH. **Antiproliferative Constituents of the Roots of Ethiopian *Podocarpus falcatus* and Structure Revision of 2 $\alpha$ -Hydroxynagilactone F and Nagilactone I.** *J Nat Prod.* 2015 Apr 24;78(4):827-35. doi: 10.1021/np501062f. Epub 2015 Mar 25.

#### **Abstract**

Bioassay-guided fractionation using the human colorectal adenocarcinoma (HT-29) cell line of the methanol extract of dried roots of *Podocarpus falcatus* led to the isolation of two new type C nagilactones, 16-hydroxynagilactone F (1) and 2 $\beta$ ,16-dihydroxynagilactone F (2), and the new totarane-type bisditerpenoid 7 $\beta$ -hydroxymacrophyllic acid (4), along with the seven known compounds 2 $\beta$ -hydroxynagilactone F (3), macrophyllic acid (5), nagilactone D (6), 15-hydroxynagilactone D (7), nagilactone I (8), inumakiol D (9), and ponasterone A (10). The structures of the new compounds were determined by 1D and 2D NMR, HRESIMS, UV, and IR and by comparison with the reported spectroscopic data of their congeners. The orientation of the C-2 hydroxy group of 3 and 8 was revised to be  $\beta$  based on evidence from detailed analysis of 1D and 2D NMR data and single-crystal X-ray diffraction studies. Among the isolated compounds, the nagilactones, including the new dilactones 16-hydroxynagilactone F (1) and 2 $\beta$ ,16-dihydroxynagilactone F (2), were the most active (IC<sub>50</sub> 0.3-5.1  $\mu$ M range) against the HT-29 cell line, whereas the bisditerpenoids (4 and 5) and the other known compounds 9 and 10 were inactive. The presence of the bioactive nagilactones in *P. falcatus* supports its traditional use.

- 374.** Pagadala VK, Tsegaye B, Kebede N, Elias T and Gemachu G **Significance of Traditional Medicinal Plants used for Treatment of Rabies at Ambo Town** *Med Aromat Plants* 2015, 4:4

Abstract Clinical study was conducted on Significance of Traditional Medicinal Plants Used for Treatment of Rabies Disease at Ambo Towna in west Shoa zone, Oromia regional state at the North East part of Ethiopia. The objectives of the study were to assess and document traditional medicinal plants used for curing rabies disease and to assess the traditional knowledge of native healer for curing rabies disease. Case Study was conducted by randomly selecting and interviewing

by questionnaire with the help of translators and native traditional doctor to gather information on the knowledge of medicinal plants used to diagnose rabies. 30 people on average were chosen for statistical analysis of which 50% were male and 50% female. Three species of plants were documented and assessed for the present investigations viz, *Phytolacca dodecandra* (Endod), *Croton macrostachyus* (Bisana) and *Amaranthus spinosus* (Dalile). We were able to show the significant values for Traditional Medicine (Plants) when we compared the cure/ treatment with Allopathic Medicine. Statistical analyses (ANOVA) gave a positive value for Traditional Medicine ( $F=3.0205$ -Homogeneous) and Allopathic Medicine ( $F=4.9692$  a non Homogeneous) at F-table value at 5% level with (2, 27) degrees of freedom showing that these are potential medicine for curing Rabies. Based on our clinical investigations we recommend Traditional Medicine from Plants which has greater potency to diagnose can be helpful to common/ Natives who cannot afford to go to Allopathic Medicine

**375.** Asmare` Amuamuta, Zewdie Mekonnen, and Endalew Gebeyehu **Traditional therapeutic uses and phytochemical screening of some selected indigenous medicinal plants from Northwest Ethiopia** African Journal of Pharmacology and Therapeutics Vol. 4 No. 3 Pages 80-85, 2015

Background: Medicinal plants including *Achyranthes aspera*, *Brucea antidysentrica* and *Croton macrostachyus* in the Zegie and Lake Tana area are among the main herbal agents traditionally used to treat various illnesses. However, scientific investigations including their phytochemical screening have not been conducted. Objective: To survey the use of these selected medicinal plants by traditional healers and/or herbal medicine users in the Zegie and Lake Tana areas, and conduct phytochemical screening of such commonly used herbal agents. Methodology: Detailed interviews about the therapeutic uses of *Achyranthes aspera*, *Brucea antidysentrica* and *Croton macrostachyus* were conducted among the traditional healers and users in the study area. The plants were collected and separately extracted using water and ethanol and the crude extracts screened for phytochemical components by using standard procedures. Results: The interview results from the traditional healers and users in the study area on the selected medicinal plants pointed to the therapeutic usage of these herbal agents for a variety of disease conditions, including infectious and non-

communicable diseases. Plant extracts from *Achyranthes aspera* and *Brucea antidysentrica* showed the presence of flavonoids, carbohydrates and vitamin C but the absence of saponins and proteins (peptides). *Croton macrostachyus* was found to have most of the screened phytochemical constituents (including saponins, flavonoids, carbohydrates, free amino acids and vitamin C) except proteins. Discussion: The herbal agents were found to have a variety of therapeutic uses for various illnesses in the area. The presence of the above mentioned phytoconstituents detected may be responsible for the therapeutic activities of these herbal agents. Key words: Traditional medicines, phytochemicals, *Achyranthes aspera*, *Brucea antidysentrica*, *Croton macrostachyus*

**376.**Gari A, Yarlagadda R, Wolde-Mariam M. **Knowledge, attitude, practice, and management of traditional medicine among people of Burka Jato Kebele, West Ethiopia.** J Pharm Bioall Sci 2015;7:136-44

#### Abstract

Background: Traditional medicine (TM) has maintained its popularity in all regions of the developing world. Even though, the wide acceptance of TM is a well-established fact, its status in a population with access to modern health is not well clear in the whole country. This study was carried out to assess the knowledge, attitudes, practice and management of TM among the community of Burka Jato Kebele, West Ethiopia. Methodology: A descriptive cross-sectional study was conducted on a total of 282 sampled individuals' selected using systematic random sampling from January 28, 2013 to February 8, 2013 in Burka Jato Kebele, Nekemte town, East Wollega Zone, West of Ethiopia. Results: The majority (94.22%) of people in the study area relied on TM. Most of them were aware of medicinal herbs (55.7%). About half (40.79%) of the respondents were aware of the major side-effects of TM such as diarrhea (36.64%). About 31.85% of them prefer traditional medical practices (TMP) because they are cheap. Most (50%) of the species were harvested for their leaves to prepare remedies, followed by seed (21.15%) and root (13.46%) and the methods of preparation were pounding (27.54%), crushing (18.84%), a concoction (15.95%) and squeezing (13.04%). About 53.84% of them were used as fresh preparations. Remedies were reported to be administered through oral (53.85%), dermal or topical (36.54%), buccal (3.85%) and anal (5.77%). Conclusion: The study revealed that the use of TMs were quite popular among the population and a large proportion of the respondents not only preferred, but also used TMs notwithstanding that they

lived in the urban communities with better access to modern medical care and medical practitioners. To use TM as a valuable alternative to conventional western medicine, further investigation must be undertaken to determine the validity, efficacy of the plants to make it available as an alternative medicine to human beings.

Keywords: Attitude, knowledge, management, practice, traditional medicine

**377.**Asnake S, Teklehaymanot T, Hymete A, Erko B, Giday M. Evaluation of the antiplasmodial properties of selected plants in southern Ethiopia. *BMC Complement Altern Med.* 2015 Dec 23;15(1):448. doi: 10.1186/s12906-015-0976-x.

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***METHODS:***

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**RESULTS:**

All extracts given at the three different doses caused no lethal effect on mice in 24 h and within 10 days of observation. All extracts and fractions exhibited antimalarial activity in a dose dependant manner. The highest inhibition was exhibited by the crude extracts of *A. integrifolia* (35.17 %) at 800 mg/kg/day ( $P < 0.05$ ). Among fractions of *A. integrifolia*, n-butanol fraction demonstrated the highest inhibition (29.80 %) at 400 mg/kg/day ( $P < 0.05$ ). The extracts and fractions prolonged the survival time and prevented weight loss of the mice, but did not prevent PCV reduction. Phytochemical test on *Ajuga integrifolia* indicated the presence of alkaloids, flavonoids, saponins, terpenoids, anthraquinone, steroids, tannins, phenols and fatty acids.

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the therapeutic activities of these herbal agents. Key words: Traditional medicines, phytochemicals, *Achyranthes aspera*, *Brucea antidysentrica*, *Croton macrostachyus*

382. Gari A, Yarlagadda R, Wolde-Mariam M. Knowledge, attitude, practice, and management of traditional medicine among people of Burka Jato Kebele, West Ethiopia. *J Pharm Bioall Sci* 2015;7:136-44

**Background:** Traditional medicine (TM) has maintained its popularity in all regions of the developing world. Even though, the wide acceptance of TM is a well-established fact, its status in a population with access to modern health is not well clear in the whole country. This study was carried out to assess the knowledge, attitudes, practice and management of TM among the community of Burka Jato Kebele, West Ethiopia. **Methodology:** A descriptive cross-sectional study was conducted on a total of 282 sampled individuals' selected using systematic random sampling from January 28, 2013 to February 8, 2013 in Burka Jato Kebele, Nekemte town, East Wollega Zone, West of Ethiopia. **Results:** The majority (94.22%) of people in the study area relied on TM. Most of them were aware of medicinal herbs (55.7%). About half (40.79%) of the respondents were aware of the major side-effects of TM such as diarrhea (36.64%). About 31.85% of them prefer traditional medical practices (TMP) because they are cheap. Most (50%) of the species were harvested for their leaves to prepare remedies, followed by seed (21.15%) and root (13.46%) and the methods of preparation were pounding (27.54%), crushing (18.84%), a concoction (15.95%) and squeezing (13.04%). About 53.84% of them were used as fresh preparations. Remedies were reported to be administered through oral (53.85%), dermal or topical (36.54%), buccal (3.85%) and anal (5.77%). **Conclusion:** The study revealed that the use of TMs were quite popular among the population and a large proportion of the respondents not only preferred, but also used TMs notwithstanding that they lived in the urban communities with better access to modern medical care and medical practitioners. To use TM as a valuable alternative to conventional western medicine, further investigation must be undertaken to determine the validity, efficacy of the plants to make it available as an alternative medicine to human beings.

Keywords: Attitude, knowledge, management, practice, traditional medicine

- 383.** Mulisa E, Asres K, Engidawork E. Evaluation of wound healing and anti-inflammatory activity of the rhizomes of *Rumex abyssinicus* J. (Polygonaceae) in mice. *BMC Complement Altern Med.* 2015 Sep 30;15:341. doi: 10.1186/s12906-015-0878-y.

***BACKGROUND:***

*Rumex abyssinicus* Jacq (Polygonaceae) is widely used in Ethiopia for treatment of wound and other diseases. Although reports are available in the literature on some of the claimed activities, nothing has so far been reported about the wound healing activity of *R. abyssinicus*. Thus, this work was initiated to investigate the wound healing and anti-inflammatory activities of 80% methanol extract of the rhizomes of *R. abyssinicus* in mice.

***METHODS:***

Following extraction of the rhizomes of the plant with 80% methanol, the extract was formulated as ointment (5% & 10% w/w) with simple ointment base B.P. The ointment was then evaluated for wound healing activity using excision and incision wound models. Parameters, including wound contraction, epithelization time and hydroxyproline content were determined using the excision model, whereas tensile strength was measured from the incision model. In parallel, anti-inflammatory activity of the rhizome was evaluated with carrageenan induced hind paw edema model by dissolving the 80% methanol extract in 1% carboxyl methyl cellulose and administering orally in various doses (250, 500 and 750 mg/kg).

***RESULTS:***

Wound treated with 5% and 10% (w/w) hydroalcoholic extract ointment exhibited significant wound healing activity in both models, as evidenced by increased wound contraction, shorter epithelization time, higher tissue breaking strength and increased hydroxyproline content. The hydroalcoholic extract also produced dose-related significant reduction ( $p < 0.05-0.001$ ) of inflammation.

**CONCLUSIONS:**

The results of this study demonstrated that the hydroalcoholic extract of the rhizomes of *R. abyssinicus* facilitated wound healing at least in part via its anti-inflammatory activity, supporting its traditional claim as a wound healing agent.

384. Gebrehiwot M, Asres K, Bisrat D, Mazumder A, Lindemann P, Bucar F. Evaluation of the wound healing property of *Commiphora guidottii* Chiov. ex. Guid. BMC Complement Altern Med. 2015 Aug 18;15:282. doi: 10.1186/s12906-015-0813-2.

**BACKGROUND:**

The traditional use of the oleo-gum-resin of *Commiphora guidottii* Chiov. ex. Guid., which is commonly called scented myrrh, for topical treatment of wound is well documented. The major objective of the present study was to investigate the essential oil and resin obtained from *C. guidottii* for their potential wound healing properties. Due to their influence on the wound healing process, the anti-inflammatory and antimicrobial activities of scented myrrh have also been investigated.

**METHODS:**

Powdered oleo-gum-resin of *C. guidottii* was steam-distilled to obtain essential oil, and the resin was extracted from the marc with MeOH and filtered. The TLC fingerprint profile of the resin has been recorded by using silica gel GF254 as stationary phase. The essential oil components were identified and quantified by GC-MS. Ointments prepared from the essential oil (4% v/w) and the resin (5% w/w) were used for wound healing activity tests. Toxicity of the formulated ointments was investigated according to Draize skin irritation test. Acute anti-inflammatory effect in mice was evaluated using carrageenan induced mouse hind paw oedema model. Antimicrobial activity tests were carried out using disk diffusion and broth dilution techniques against 21 pathogenic bacterial and 4 fungal strains.

**RESULTS:**

Ointment formulations of both the oil and resin were found to be non-irritant at the concentrations used and showed significant ( $p < 0.05-0.001$ ) increase in wound contraction rate, shorter epithelization time and higher skin breaking strength as compared to the negative control. Overall, the antibacterial and antifungal activities of the oil and resin were comparable with the standard antibiotics ciprofloxacin and griseofulvin, respectively.

**CONCLUSION:**

The results confirm that scented myrrh possesses genuine wound healing activity supporting the traditional use of the plant.

**385.** Pagadala VK, Tsegaye B, Kebede N, Elias T and Gemachu G Significance of Traditional Medicinal Plants used for Treatment of Rabies at Ambo Town Med Aromat Plants 2015, 4:4

Annex I Researched Medicinal Plants

Researched Medicinal Plants	
Pharmacological Activity	Medicinal Plants
Analgesic	<i>Ajugaremota</i>
	<i>Cheilanthesfarinosa</i>
	<i>Clematis simensis</i>
	<i>Lippiaadoensis</i>
	<i>Moringastenopetala</i>
	<i>Ocimumlamiifolium</i>
	<i>Ocimum suave</i>
	<i>Rosa abyssinica</i>
	<i>Rumexabyssinicus</i>
	<i>Salvia nilotica</i>
Anthelmintic	<i>Albiziaschimperiana</i>
	<i>Coriandrumsativum</i>
	<i>Echinops</i>
	<i>Embeliaschimperi</i>
	<i>Embeliaschimperi</i>
	<i>Glinuslotoides</i>
	<i>Hedera helix</i>
	<i>Leonotisocymifolia</i>
	<i>Leucasmartinicensis</i>
	<i>Maesalanceolata</i>
	<i>Myrsine africana</i>
	<i>Pycnostachysabyssinica</i>
	<i>Pycnostachyseminii</i>
	<i>Pycnostachyseminii</i>
	<i>Rumexabyssinicus</i>
<i>Sennaoccidentalis</i>	
<i>Tavernieraabyssinica</i>	
Antidiarrheal	<i>Albizziaagummifera</i>
	<i>Syzygeumguineense</i>
Antibacterial	<i>Acacia nilotica</i>
	<i>Achyranthesaspera</i>
	<i>Acokantheraschimperi</i>
	<i>Allium sativum</i>
	<i>Bruceaantidysenterica</i>
<i>Calpurnia aurea</i>	

	<i>Carica papaya</i>
	<i>Cissusquadrangularis</i>
	<i>Commphoratennisvollese</i>
	<i>Croton macrostachyus</i>
	<i>Daturastramonium</i>
	<i>Dodonaeangustifolia</i>
	<i>Embeliaschimperi</i>
	<i>Galium spurium</i>
	<i>Hypericumrevolutum</i>
	<i>Hypericumrevolutum</i>
	<i>Measalanceolata</i>
	<i>Menthaaquatica</i>
	<i>Millettiaferruginea</i>
	<i>Moringastenopetala</i>
	<i>Myrtuscommunis</i>
	<i>Ocimumbasilicum</i>
	<i>Petrolobiumstelatum</i>
	<i>Phytolaccadodecandra</i>
	<i>Plumbagozeylanca</i>
	<i>Plumbagozylenica</i>
	<i>Salivaschimperi</i>
	<i>Solanumincanum</i>
	<i>Verbasicumsinaticum</i>
Anticancer	<i>Euclearacemosa</i>
	<i>Rumexabyssinicus</i>
Antidepressant	<i>Hypericumquartinianum</i>
	<i>Hypericumrevolutum</i>
Antidiabetic	<i>Andrographispaniculata</i>
	<i>Moringastenopetala</i>
	<i>Cayluseabyssinica</i>
	<i>Moringastenopetala</i>
	<i>Pentasschimperiana</i>
	<i>Urticasimensis</i>
Antidiarrheal	<i>Zehneriascabra</i>
Antifertility	<i>Ricinuscommunis</i>
	<i>Achyranthesaspera</i>
	<i>Rumexsteudelii</i>
Antifungal	<i>C citratus</i>
	<i>Cymbopogonmartinii</i>

	<i>Foeniculumvulgare</i>
	Garlic
	<i>T ammi</i>
	<i>Trachyspermumammi</i>
	<i>Trachyspermumammi</i>
Antigonorrheal	<i>Withaniasomnifera</i>
	<i>Acacia nilotica</i>
	<i>Cucumisputulatus</i>
	<i>Foeniculumvulgare</i>
	<i>Croton macrostachyus</i>
Antihypertensive	<i>M stenopetala</i>
	<i>S guineense</i>
	<i>T schimperi</i>
	<i>T serrulatus</i>
	<i>Thymus schimperi</i>
	<i>Syzygiumguineense</i>
	<i>Moringastenopetala</i>
Antiinflammatory	<i>Adhatodaschimperiana</i>
	<i>Allophylusabyssinicus</i>
	<i>Bidenspilosa</i>
	<i>Cheilanthesfarinosa</i>
	<i>Clematis simensis</i>
	<i>Commiphoraguidottii</i>
	<i>Dodonaeviscosa</i>
	<i>Ferula communis</i>
	<i>Kniphofiafoliosa</i>
	<i>Malvaverticillata</i>
	<i>Melilotuselegans</i>
	<i>Moringastenopetala</i>
	<i>Ocimumlamiifolium</i>
	<i>Ocimum suave</i>
	<i>Ranunculus multifidus</i>
	<i>Rosa abyssinica</i>
	<i>Rumexabyssinicus</i>
	<i>Rumexnervosus</i>
	<i>Salvia nilotica</i>
	<i>Syzygiumguineense</i>
Antileishmanial	<i>Albiziagummifera</i>
	<i>Aloe calidophila</i>

	<i>Artemisia absinthium</i>
	<i>Balanitesaegyptica</i>
	<i>Combretummolle</i>
	<i>Croton macrostachyus</i>
	<i>Echinopskebericho</i>
	<i>Millettiaferruginea</i>
	<i>Moringastenopetala</i>
	<i>Verbascumsinaiticum</i>
	<i>Vernoniaamygdalina</i>
Antimalarial	<i>Acokantheraschimperi</i>
	<i>Adansoniadigitata</i>
	<i>Ajugaintegrifolia</i>
	<i>Ajugaremota</i>
	<i>Aloe debrana</i>
	<i>Aloe otallensis</i>
	<i>Artemisia afra</i>
	<i>Artemisia rehan</i>
	<i>Asparagus africanus</i>
	<i>Bersamaabyssinica</i>
	<i>Bersamaabyssinica and the</i>
	<i>Brassica nigra</i>
	<i>Cissampelosmucronata</i>
	<i>Clerodendrummyricoides</i>
	<i>Combretummolle</i>
	<i>Croton macrostachyus</i>
	<i>Cymbopogoncitratus</i>
	<i>Eucleascimperi</i>
	<i>Gnidiastenophylla</i>
	<i>Justiciaschimperiana</i>
	<i>Kalanchoepetitiana</i>
	<i>Kniphofiafoliosa</i>
	<i>Meliaazedarach</i>
	<i>Ocimumgratissimum</i>
	<i>Osyrisquadripartita</i>
	<i>Ostostegiaintegrifolia</i>
	<i>Peponiumvogelii</i>
	<i>Plumbagozylanica</i>
<i>Premnaschimperi</i>	
<i>Solanumincanum</i>	

	<i>Vernoniaamygdalina</i>
	<i>Vernoniabipontiti</i>
	<i>Warburigaugandensis</i>
	<i>Withaniasomnifera</i>
Antimicrobial	<i>Acokantheraschimperi</i>
	<i>Aloe citrina</i>
	<i>Aloe harlana</i>
	<i>Aloe sinana</i>
	<i>Aloe trigonantha</i>
	<i>Asparagus africanus</i>
	<i>B. Nigra</i>
	<i>C. Zeylanicum</i>
	<i>Calotropisprocera</i>
	<i>Calpurnia aurea</i>
	<i>Citrus limon</i>
	<i>Clematis simensis</i>
	<i>Clerodendrummyricoides</i>
	<i>Combretummolle</i>
	<i>Commiphoraguidottii</i>
	<i>Dodonaeviscosa</i>
	<i>E. Cardamom</i>
	<i>Eucalyptus camaldulensis</i>
	<i>Ficusplamata</i>
	<i>Grewiaferruginea</i>
	<i>Guizotiaschimperi</i>
	<i>Inulaconfertiflora</i>
	<i>Jasminumabyssinicum</i>
	<i>Kalanchoepetitiana</i>
	<i>Lagenariasiceraria</i>
	<i>Lippiaadoensis</i>
	<i>Malvaparviflora</i>
	<i>Meliaazedarach</i>
	<i>O. Basilicum</i>
	<i>Oliniarochetiana</i>
	<i>Ostostegiaintegrifolia</i>
	<i>Periplocalinearifolia</i>
	<i>Phytolaccadodecandra</i>
	<i>Plectranthusmarrubatus</i>
	<i>Plumbagozeylanica</i>

	<i>Premnaschimperi</i>
	<i>Psidiumguajuva</i>
	<i>Pycnostachysabyssinica</i>
	<i>Pycnostachyseminii</i>
	<i>Rumexabyssinicus</i>
	<i>Rumexnervosus</i>
	<i>S. Aromaticum</i>
	<i>Salvia nilotica</i>
	<i>Salvia schimperi</i>
	<i>Solaneciogigas</i>
	<i>T. Schimperi</i>
	<i>Tavernieraabyssinica</i>
	<i>Thymus vulgaris</i>
	<i>Verbascumsinaiticum</i>
	<i>Zehneriascabra</i>
Antimycobacterial	<i>Artemisia abyssinica</i>
	<i>Calpurnia aurea</i>
	<i>Clausenaantisata and</i>
	<i>Combretummolle</i>
	<i>Croton macrostachyus</i>
	<i>Eucalyptus camaldulensis</i>
	<i>Myrsineafricana</i>
	<i>Ocimumbasilicum</i>
	<i>Ocimumlamiifolium</i>
	<i>Warburgiaugandensis</i>
Antioxidant	<i>Aloe harlana</i>
	<i>Aloe otallensis</i>
	<i>Artemisia abyssinica</i>
	<i>Artemisia afra</i>
	<i>Bersamaabyssinica</i>
	<i>Cheilanthes farinose</i>
	<i>Euclearacemosa</i>
	<i>Framomumcorrorima</i>
	<i>Juniperusprocera</i>
	<i>Lippiaadoensis</i>
	<i>Menthaaquatica</i>
	<i>Nigella sativa</i>
	<i>Ocimumbasilicum</i>
	<i>Otostegiaintegrifolia</i>

	<i>Plectranthusmarrubatus</i>
	<i>R. Niveus</i>
	<i>R. Steudneri</i>
	<i>Rubusapetalus</i>
	<i>Salvia nilotica</i>
	<i>Salvia schimperi</i>
	<i>Zingiber</i>
Antipeptic ulcer activity	<i>Plantagolanceolata</i>
Antiplasmodial	<i>Ajugaintegrifolia</i>
	<i>Clerodendrummyricoides</i>
	<i>Echinopskebericho</i>
	<i>Meliaazedarach</i>
	<i>Peponiumvogelii and</i>
	<i>Premnaschimperi</i>
	<i>Warburgiaugandensis</i>
Antipyretic	<i>Ajugaremota</i>
	<i>Lippia adoensis</i>
	<i>Ocimumlamiifolium</i>
	<i>Ocimum suave</i>
Antirabies	<i>Phytolaccadodecandra</i>
Antitrypanosomal	<i>A. Abyssinica</i>
	<i>Aloe gilbertii</i>
	<i>Artemisia absinthium</i>
	<i>Artemisia abyssinica</i>
	<i>Artemisia afra</i>
	<i>Artemisia annua</i>
	<i>Combretummolle</i>
	<i>Moringastenopetala</i>
	<i>Solanecioangulatus</i>
	<i>Warburgiaugandensis</i>
Antiviral	<i>Bersamaabyssinica fresen</i>
	<i>Combretumpaniculatum</i>
	<i>Dodonaeaangustifolia</i>
	<i>Ximeniaamericana</i>
	<i>Cassia abbreviata</i>
	<i>Cassia sieberiana</i>
Anxiolytic effect	<i>Foeniculumvulgare</i>
	<i>Carica papaya</i>
	<i>Myrtuscommunis</i>

Bronchodilator	<i>Adhatodaschimperiana</i>
Chemical isolation	<i>Albiziagummifera</i>
	<i>Aloe species</i>
	<i>Artemisia rehan</i>
	<i>Asparagus africanus</i>
	<i>Calpurnia aurea</i>
	<i>Colocasiaesculenta</i>
	<i>Commiphoratenuis</i>
	<i>Echinopskebericho</i>
	<i>Entadaabssinica</i>
	<i>Glinuslotoides</i>
	<i>Hageniaabyssinica</i>
	<i>Menthaaquatica</i>
	<i>Moringastenopetala</i>
	<i>Ostostegiaintegrifolia</i>
	<i>Pycnostachysabyssinica</i>
	<i>Pycnostachyseminii</i>
<i>Securidacalongiped</i>	
<i>Warburgiaugandensis</i>	
Cytotoxic	<i>Artemisia absinthium</i>
	<i>Artemisia afra</i>
	<i>Artemisia annua</i>
	<i>Solanecioangulatus</i>
Diuretic	<i>Rumexabyssinicus</i>
	<i>Ajugaremotabenth</i>
	<i>Carissa edulis</i>
	<i>Rumexabyssinicus</i>
	<i>Thymus schimperi</i>
Genotoxicity	<i>Glinuslotoides</i>
	<i>Plumbagozeylanica</i>
	<i>Rumexsteudeli</i>
	<i>Thymus schimperi</i>
Hepatoprotective	<i>Justiciaschimperiana</i>
	<i>Saturejapunctata</i>
	<i>Solanecioangulatus</i>
	<i>Solaneciogigas</i>
	<i>Verbascumsinaiticum</i>
Insect repellent	<i>Azadiractaindica</i>
	<i>Chrysanthemum cinerariae</i>

	<i>Cliniaspp</i>
	<i>Corymbiacitriodora</i>
	<i>Eucalyptus camaldulensis</i>
	<i>Eucalyptus maculata</i>
	<i>Ocimumbasilicum</i>
	<i>Ocimum suave</i>
	<i>Rutachalepensis</i>
Mosquito larvicidal	<i>Albiziagummifera</i>
	<i>Balanitesaegyptiaca</i>
	<i>Glinuslotoides</i>
	<i>Hedera helix</i>
	<i>Jatrophacurcas</i>
	<i>Maesalanceolata</i>
	<i>Milletiaferruginea</i>
	<i>Pholaccadodecandra</i>
	<i>Plectranthuspunctatus</i>
	<i>Warburgiaugandensis</i>
Schistosome larval	<i>Phytolaccadodecandra</i>
Sexual behavior	<i>Catha edulis</i>
Spasmolytic	<i>Artemisia afra</i>
	<i>Artemisia rehan</i>
	<i>Solanumincanum</i>
Stomach pain	<i>Moringastenopetala</i>
Tooth paste	<i>Agave sisalana</i>
Toxicological	<i>Dodonaeviscosa</i>
	<i>Echinopskebericho</i>
	<i>Glinuslotoides</i>
	<i>Hygeniaabysinica</i>
	<i>Moringastenopetala</i>
	<i>Tavernieraabyssinica</i>
Wound healing	<i>Achyranthesaspera</i>
	<i>Allophylusabyssinicus</i>
	<i>Commiphoraguidottii</i>
	<i>Kalanchoepetitiana</i>
	<i>Rumexabyssinicus</i>