

Traditional Medicinal Plants Used by People in Libo-Kemkem District, South Gondar, Ethiopia

¹Yalew Addisie, ²Debebe Yared, ¹P. Ashok Kumar, ¹Zewdneh Tomas and ³Assefa Awol

¹Mekelle University, Department of Biology,
Mekelle, Ethiopia

²Ethiopian Health and Nutrition Research Institute, Department of Drug Research,
Addis Ababa, Ethiopia

³Addis Ababa University, Department of Biology, Plant Eco-Physiology,
Addis Ababa, Ethiopia

Abstract: The present study was conducted between June 2010 and September 2010, to document medicinal plant species traditionally used by peoples in Libo-kemekem district, South Gondar, Ethiopia. Ethnobotanical data were collected using semi structured interviews, focused group discussion and field observations. A total of 52 medically important plants belonging to 45 families and 47 genera were identified in the district. Majorities (47.37%) were collected from wild. Most of the plants (94.23%) were reportedly used to treat human diseases. The most frequently used plant parts were leaves (40.38%), followed by fruits (23.08%) and roots (17.31%). Local people depend on both dry and fresh remedies. The administration routes were oral (57.69%), dermal (25.00%), nasal (11.54 %) and anal (5.77%). The preference ranking showed that *Lantana camara* was the most important species in treating diarrhea followed by *Vernonia amygdalin* indicating high utility value of the species in the community. The results revealed existence of diverse medicinal plants and indigenous knowledge in the study area. Therefore, documenting medicinal 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.

Key words: Consensus factor, ethnobotany, habit, libo-kemekem, preference ranking

INTRODUCTION

Plant resources contain and provide materials for survival, with economic, medicinal and forage values, but also possess and preserve cultural heritages, biological information and indigenous knowledge on their utility. As the science of human-plant interaction, ethnobotany has become increasingly valuable in advancing health care systems and conservation programs in different parts of the world (Balick, 1996). Since, traditional medicine has remained as the most affordable and easily accessible source of treatment in the primary healthcare system of resource poor communities. And also the local therapy is the only means of medical treatment for such communities. Despite the use of herbal medicines over many centuries, only relatively small numbers of plant species have been studied for possible medical applications (WHO, 1998). In Ethiopia, detailed descriptions of plants used medicinally are scanty (FAO, 1986); however, few ethnobotanical investigations were conducted in recent past in different parts of the country (Abbink, 1995; Zemedu, 1997; Yiniger *et al.*, 2007;

Teklehaymanot *et al.*, 2007; Teklehaymanot, 2009; Wondimu *et al.*, 2007). These authors have reported the presence of a wealth of indigenous knowledge of the use, management of plant resources among the local people of various parts of the country and ethnic groups. But considering the country's varied flora and socio-cultural diversity, these studies are few as ethnomedicinal healing systems vary across cultures. Moreover, reports have also indicated the reliance of nearly 80% of the population in the country on utilizing plant-based traditional medicines as major health-care system (Dawit, 2001). On the other hand, investigations have also shown the presence of erosion of genetic and indigenous knowledge, which in turn, calls for the need of collection, investigations, and conservation of these resources (Zemedu, 1997). To our knowledge, there are no data regarding the traditional medicinal plant knowledge and use by the local communities in Libo-kemekem district, South Gondar, Ethiopia. Therefore, this study was conducted to assess and document the indigenous knowledge and use of medicinal plant species by local people and healers to treat human ailments in Libo-kemekem district.

MATERIALS AND METHODS

Description of the study area: The study was conducted in six Kebeles (the smallest administrative units in Ethiopia) of Libo-kemkem district, South Gondar, Ethiopia from June 2010 to September 2010. The district has an estimated population of 198,374 of which 88.9% live in rural areas (ECSA, 2007). The six selected Kebeles were Estifanose, Berkutate, Tehara, Godeguadite, Askura and Bera-abo. It extends from a latitude of 37°15'36" E to 38°06'36" E and from a longitude of 11°54'36" N to 12°22'48" N. The area receives a unimodal rainfall of approximately 1300 mm per year, the majority of which falls between June and August. The mean annual temperature in the area is 19.7°C. The rural population is relatively poor, relying on traditional farming and small holder livestock production. Rain-fed subsistence farming of crops (maize, millet, "teff" and sorghum), animal husbandry, and irrigated paddy rice cultivation remain the principal agricultural activities despite poor soil fertility and highly variable rainfall in most areas (information from agriculture office of the district).

Data collection: A reconnaissance survey of the study area was conducted prior to site selection. Subsequently, six Kebeles were selected for ethnobotanical data collection. Forty-two (20 female and 22 male) informants were randomly selected following Martin (1995), which covered both healers and certain social groups. Six key informants one from each of the study sites were preferentially selected with the help of local administrators, elders and other community members. Following this semi-structured interview was made with each traditional healer, elder and other member of the community about the knowledge and use of medicinal plant species used to treat human and livestock ailments in the study area. Moreover, field observation and focused group discussion were employed. Data on human and animal ailments treated, growth form, sources where plants were obtained (wild/cultivated), parts used, methods of preparation and route of administration and application were recorded. The specimens were dried, deep frozen and identified in the National Herbarium (ETH), Addis Ababa University. Identification was done using different volumes of Flora of Ethiopia, by comparing authenticated and labeled dried specimens deposited in ETH and using the knowledge of taxonomic expertise for confirmation.

Data analysis: Ethnobotanical information collected through semi-structured interviews and field observation were analyzed using descriptive statistics for such as percentage and frequency. Computation of preference ranking was done following Alexiades (1996) and Cotton (1996) using Microsoft Excel programme. The Informant

Consensus Factor (FIC) was calculated to estimate user variability of medicinal plants (Canales *et al.*, 2005). FIC values range from 0.00 to 1.00. High FIC values are obtained when only one or a few plant species are reported to be used by a high proportion of informants to treat a particular ailment, whereas low FIC values indicate that informants disagree over which plant to use. High FIC values can thus be used to pinpoint particularly interesting species for the search of bioactive compounds (Canales *et al.*, 2005). FIC is calculated using the following formula (Canales *et al.*, 2005):

$$FIC = Nur - Nt / (Nur - 1)$$

where Nur is the number of individual plant use reports for a particular illness category and Nt is the total number of species used by all informants for this illness category. Graphs were generated using Sigma Plot 8.0 (Systat Software, Inc.).

RESULTS AND DISCUSSION

A total of 52 plant species of ethnopharma cological importance belonging to 52 families and 51 genera were gathered, identified and documented (data not shown). Of these medicinal plants herbs constituted the largest number or proportion with 20 species (38.46%), followed by 18 shrubs (34.62%) and 14 trees (26.92%) (Fig. 1). The high usage of herbs could be an indication of their abundance especially during the rainy season. Hence the informants indicated that most of collection of medicinal plants is usually carried out during rainy season. The common use of herbaceous medicinal plants was also reported in studies carried out elsewhere in Ethiopia (Yineger *et al.*, 2007; Teklehaymanot *et al.*, 2007; Teklehaymanot, 2009; Wondimu *et al.*, 2007; Giday *et al.*, 2003; Giday and Ameni, 2003; Birhanu, 2002; Gebre, 2005; Teklehaymanot and Giday, 2007).

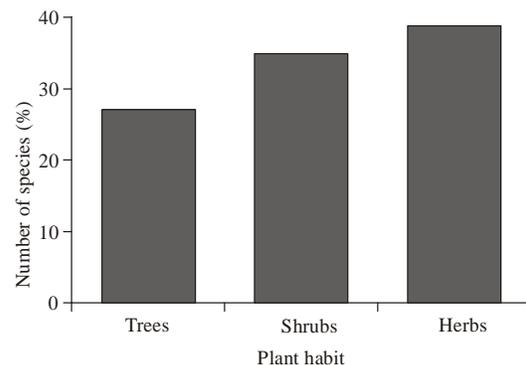


Fig. 1: The growth forms of the studied medicinal plants

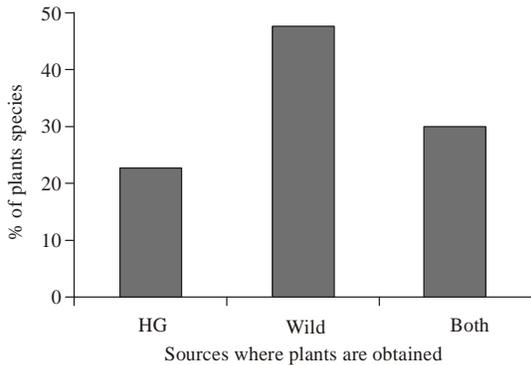


Fig. 2: Sources where medicinally important plants are obtained. Where HG = home garden and both = home garden and wild

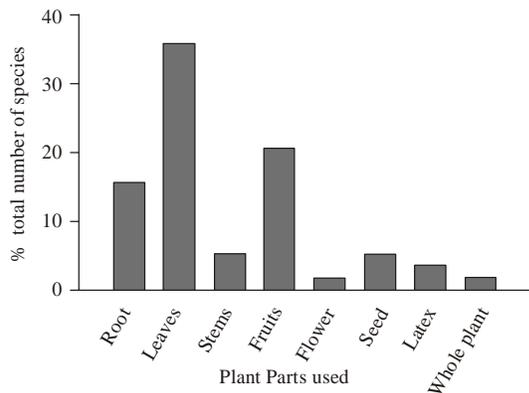


Fig. 3: Medicinal plant parts as used by local people in Libokemem district

Most medicinal plant resources 47.37% were collected from the wild in the near by forest and grassland areas; only a few (22.81%) were obtained from cultivated areas and 29.82 % from both wild and home gardens (Fig. 2). This indicates that people in the district mainly rely on wild sources in the natural environment than home gardens to obtain medicinal plants. This revealed that growing medicinal plants in home gardens is not well exercised. In turn this will have a disadvantage in conservation of resources in their wild environment if the plants are over exploited. The people are mainly involved in medicinal plant collection during rainy seasons since many plants are available at that time than others.

Plant parts used: The results revealed the presence of variation in using different plant part(s) to treat a particular ailment or other types. Leaves were the plant parts most frequently used, constituting 40.38%, followed fruits (23.08%) and roots (17.31%), stem and seeds (5.77%) evenly (Fig. 3). The common use of leaf in the

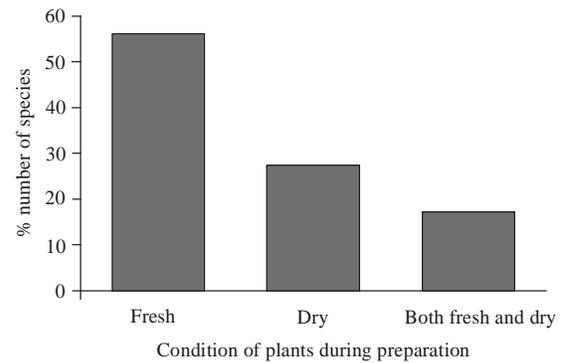


Fig. 4: Condition of remedial preparation in the study area

Table 1: Methods of medicinal plants preparation

Forms of preparation	Total responses	%
Crushing	26	50
Pounding	18	34.62
Decoction	6	11.54
Juice	2	3.84
Total	52	100

Table 2: Route of administration of traditional medicines on the site

Route of administration	Number of species	%
Oral	30	57.69
Dermal	13	25.00
Nasal	6	11.54
Anal	3	5.77

preparation of remedies could partly be due to the relative ease of finding this plant part. The use of leaves in the preparation of remedies is also common elsewhere (Yineger *et al.*, 2008; Kala, 2005; Tadesse *et al.*, 2005; Tabuti *et al.*, 2003; Wassihun *et al.*, 2003). Nonetheless, the present study is not inline with the reports made by (Lulekal *et al.*, 2008), which stated roots as the most sought plant part used. The usage of leaves as the most commonly utilized plant parts than the roots would have less consequence from both ecological point of view and from the survival of the medicinal plant species than the roots (Birhanu, 2002). Since collecting leaves alone could not pose a lasting danger to the continuity of an individual plant.

Condition of medicinal plants during preparation and methods preparation: Most remedies were prepared and used immediately after harvest; 55.77% were used while fresh and 26.92% were prepared after drying (Fig. 4). 17.31 percent of the remedies were reported to be used in both fresh and dry forms. The frequent use of freshly processed remedies could signify the accessibility of abundant plant materials in the vicinity. Other studies conducted in another place also indicated the wider use of fresh materials (Giday *et al.*, 2003; Giday and Ameni, 2003; Tabuti *et al.*, 2003; Yineger *et al.*, 2008; Ignacimuthu *et al.*, 2006). The frequent use of fresh materials might also be an attempt not to lose volatile

Table 3: Values for preference ranking based on their degree of treating diarrhea for five selected medicinal plants in libo-kemekem district as perceived by informants

Plant species	Scores by respondents					Total Score	Percent (%)	Rank
	R1	R2	R3	R4	R5			
<i>Coffea arabica</i>	4	1	1	1	2	9	12.0	5 th
<i>Lantana camara</i>	5	5	5	4	4	23	30.67	1 st
<i>Lepidium sativum</i>	1	2	2	3	5	13	17.33	3 rd
<i>Rumex nepalensis</i>	2	3	3	2	1	11	14.67	4 th
<i>Vernonia amygdalin</i>	3	4	4	5	3	19	25.33	2 nd

R: Respondent

Table 4: Informant consensus factor (FIC) for different ailment categories

Ailment	Number of taxa (Nt)	Number of use reports (Nur)	FIC
Abortion and constipation	5	14	0.69
Fever and headache	3	11	0.80
Malaria	4	3	-0.50
Gastrointestinal parasites	8	18	0.59
Inflammation and infection	2	10	0.89
Bone fracturing	3	9	0.75
Breathing problem	4	7	0.50
Evil eye	4	11	0.70
Cardiovascular problems	3	5	0.50
Snake Bite	3	3	0.00
Cough and cold	3	2	-1.00
Skin infection	4	3	-0.50
Swelling	2	5	0.75
Mental diseases	1	4	1.00
Muscular-skeletal problems	2	2	0.00
Bleeding problem	1	3	1.00

substances, the concentration of which could lessen up on drying. The traditional medicinal plants have prepared in a variety of ways prior to administration for prevention and curing different types of ailments. This includes crushing, pounding, decoction and juicing. Crushing (50%) constituted the highest type of preparation form, followed by pounding (24.14%) (Table 1). This is concurrent with the finding of Abebe and Ayehu (1993) who reported that the leading route of application used in northern Ethiopia is oral, which accounted for 42%.

Route of administration and dosage: The route of application for 57.69% of the remedies was oral while 25.00% were applied on dermal (Table 2). Few remedy preparations were taken nasally (11.54%) and through anal (5.77%). Oral application of remedies is popular as in the finding of Abebe and Ayehu (1993) who reported as the leading route of application used in northern Ethiopia. It is also in agreement with the result of various ethnobotanical studies (Hunde *et al.*, 2004; Awas and Asfaw, 1999; Lulekal *et al.*, 2008; Balemie *et al.*, 2004; Giday and Ameni, 2003; Birhanu, 2002; Giday *et al.*, 2003; Addis *et al.*, 2001) and has indicated oral as the predominant route of application. The informants' responses indicated that there were variations in dosages of remedies, unit of measurement of remedies, duration and time that were prescribed for the same kind of health problems. Most treatments were reported to be completed within two or five days; most of them taken twice a day.

Liquid remedies administered to humans were usually measured by tea or coffee glasses or plastic cups, or number of drops. In this regard Dawit (2001) have also discussed lack of precision and standardization as a drawback of the traditional health care system.

Preference ranking: Diarrhea was the most common disease for which large number of patients visits the traditional medicinal practitioners. *Lantana camara* was the most preferred as effective treatment against diarrhea (Table 3). Following it *Vernonia amygdalin* was preferred among the medicinal plants that were reported by more informants as a remedy to diarrhea.

Informant consensus factor: Table 4 shows the Informant Consensus Factor (FIC) for the different ailments traditionally treated by peoples in Libo-kemekem district. The level of informants' agreement was high for most ailment categories (FIC = 0.7) and total consensus (FIC = 1.00) was even obtained for bleeding and mental diseases. Malaria, cough and cold, as well as skin infection and breathing problems showed relatively low levels of consensus (FIC = 0.50). High FIC values indicating that the species traditionally used to treat these ailments are worth searching for bioactive compounds.

CONCLUSION

The study shows that knowledge and usage of herbal medicine for the treatment of various ailments among peoples in Libo-kemekem district is still a major part of their life and culture. It also provides evidence that medicinal plants continue to play an important role in the healthcare system of the community in the district. The prominent used parts are leaves. Majority of the remedies are taken orally. The majority of plants used for curing ailments were herbs which could be attributed to their abundance. Fresh plant materials are mostly used in the preparation of remedies indicating little practice by people to dry and store medicines for future uses. Traditional medicinal plants were harvested mostly from natural vegetation/wild habitat/ area followed by home gardens. It is therefore, recommended that people need to be encouraged to cultivate medicinal plants in their home garden through training or education. Furthermore, the documented medicinal plants can be used as a basis for

further studies on the regions medicinal plants knowledge and for future phytochemical and pharmacological studies.

ACKNOWLEDGMENT

The authors thank the Erebe Project for its financial and material support partly during the study. The authors also appreciate the local people in the study area for their cooperation during data collection.

REFERENCES

- Abbink, J., 1995. Medicinal and ritual plants of the Ethiopian South-west: An account of recent research. *Indigenous knowl. Dev. Monitor*, 3: 6-8.
- Abebe, D. and A. Ayehu, 1993. Medicinal Plants and Enigmatic Health Practice of North Ethiopia, Berhanina Selam Printing Enterprise, Addis Ababa, pp: 341.
- Addis., G., D. Abebe and K. Urga., 2001. A survey of traditional medicinal plants in Shirka District, Arsi Zone, Ethiopia. *Ethiop. Pharm. J.*, 19: 30-47.
- Alexiades, M., 1996. Collecting ethnobotanical data. An Introduction to Basic Concepts and Techniques. In: Alexiades, M., (Ed.), *Selected Guideline for Ethnobotanical Research: A Field Manual*. The New York Botanical Garden. Shel-don JW, U.S.A., pp: 53-94.
- Awas, T. and Z. Asfaw, 1999. Report on Ethnobotanical Study of Nations Nationalities and People in Gambella and Benishangu Gumuz Regional States. Progress Report to Research and Publication Office, Addis Ababa Univ., Addis Ababa, Ethiopia.
- Balick, M.J., 1996. Medicinal Resources of the Tropical Forest: Biodiversity and its Importance to Human Health. Balick, M.J., E. Elisabetsky and S.A. Laird, (Eds.), *Colombia University Press*, New York, pp: 440.
- Balemie, K., E. Kelbessa and Z. Zemedede, 2004. Indigenous medicinal utilization, management and threats in fentale area, eastern shewa, Ethiopia. *J. Biol. Sci.*, 3: 1-7.
- Birhanu, A., 2002. Use and conservation of human traditional medicinal plants in Jabitehaan Wereda, west Gojam. M.S. Thesis, Addis Ababa Univ., Addis Ababa, Ethiopia.
- Canales, M., T. Hernandez, J. Caballero, A. Romo de Vivar, G. Avila, A. Duran and R. Lira, 2005. Informant consensus factor and antibacterial activity of the medicinal plants used by the people of San Rafael Coxcatlan, Puebla, Mexico. *J. Ethnopharm.*, 97: 429-439.
- Cotton, C.M., 1996. *Ethnobotany: Principles and Applications*. John Wiley and Sons Ltd., Chichester, England, pp: 347.
- Dawit, A., 2001. The Role of Medicinal Plants in Healthcare Coverage of Ethiopia, the Possible Integration. In: Medhin, Z. and D. Abebe (Eds.), *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, 28 April-01 May 1998, IBCR, Addis Ababa, pp: 6-21.
- ECSA, 2007. *Ethiopian Censuses and Statistics Association*, Addis Ababa, Ethiopia.
- Food and Agricultural Organization (FAO), 1986. *Some Medicinal Forest Plants of Africa and Latin America*. Rome, Italy, pp: 253.
- Gebre, G., 2005. Ethnobotanical study of medicinal plants in the konso special woreda (SNNPR). M.S. Thesis, Addis Ababa Univ., Addis Ababa, Ethiopia.
- Giday, M. and G. Ameni, 2003. An ethnobotanical survey on plants of veterinary importance in two woredas of Southern Tigray, Northern Ethiopia. *SINET: Ethiopian. J. Sci.*, 26: 123-136.
- Giday, M., Z. Asfaw, T. Elmqvist and Z. Woldu, 2003. An ethnobotanical study of medicinal plants used by the Zaypeople in Ethiopia. *J. Ethnopharm.*, 85: 43-52.
- Hunde, D., Z. Asfaw and E. Kelbessa, 2004. Use and management of ethnoveterinary medicinal plants by indigenous people in 'Boosat', Welenchiti area. *Ethiopian J. Biol. Sci.*, 3: 113-132.
- Ignacimuthu, S., M. Ayyanar and K. Sivaraman, 2006. Ethnobotanical investigations among Tribes in Madurai District of Tamil Nadu (India). *J. Ethnobiol. Ethnomed.*, 2: 25-30.
- Kala, C.P., 2005. Ethnomedicinal botany of the Apatani in the eastern Himalayan region of India. *J. Ethnobiol. Ethnomed.*, 1: 11-18.
- Lulekal, E., E. Kelbessa, T. Bekele and H. Yineger, 2008. An ethnobotanical study of medicinal plants in Mana Angetu District, southeastern Ethiopia. *J. Ethnobiol. Ethnomed.*, 4: 10-18.
- Martin, G.J., 1995. *Ethnobotany: A method Manual*. Chapman and Hall, London. pp. 265-270.
- Tabuti, J.R.S., K.A. Lye and S.S. Dhillion, 2003. Traditional herbal drugs of Bulamogi, Uganda: plants, use and administration. *J. Ethnopharm.*, 88: 19-44.
- Tadesse, M., D. Hunde and Y. Getachew, 2005. Survey of medicinal plants used to treat human diseases in Seka Cherkosa, Jimma Zone, Ethiopia. *Ethiopian J. Health Sci.*, 15: 89-106.
- Teklehaymanot, T. and M. Giday, 2007. Ethnobotanical study of medicinal plants used by people in Zegie Peninsula, Northwestern Ethiopia. *J. Ethnobiol. Ethnomed.*, 3: 12-17.
- Teklehaymanot, T., M. Giday, G. Medhinand, Y. Mekonnen, 2007. Knowledge and use of medicinal plants by people around Debre-Libanos monastery of Ethiopia. *J. Ethnopharm.*, 111: 271-283.

- Teklehaymanot, T., 2009. Ethnobotanical study of knowledge and medicinal plants use by people in Dek Island in Ethiopia. *J. Ethnopharma.*, 124: 69-78.
- Wondimu, T., Z. Asfaw and E. Kelbessa, 2007. Ethnobotanical study of medicinal plants around 'Dheeraa' town, Arsi Zone, Ethiopia. *J. Ethnopharm.*, 112: 152-161.
- Wassihun, B., Z. Asfaw and S. Demissew, 2003. Ethnobotanical study of useful plants in daniogade (home-gardens) in Southern Ethiopia. *Ethiopian J. Biol. Sci.*, 2: 119-141.
- World Health Organization (WHO), 1998. Regulatory Situation of Herbal Medicines: A Worldwide Review, WHO/TRM/98, Geneva pp: 1-9.
- Yineger. H., E. Kelbessa, T. Bekele and E. Lulekal, 2007. Ethnoveterinary medicinal plants at Bale Mountains National Park, Ethiopia. *J. Ethnopharm.*, 112: 55-70.
- Yineger, H., D. Yewhalaw and D. Teketay, 2008. Ethnomedicinal plant knowledge and practice of the Oromo ethnic group in southwestern Ethiopia. *J. Ethnobiol. Ethnomed.*, 4: 11-21.
- Zemede, A., 1997. Indigenous African Food Crops and Useful Plants: Survey of Indigenous Food Crops, Their Preparations and Home Gardens. ICIPE Science Press, Nairobi, Kenya, pp: 65.