

Ethnobotanical Study of Medicinal Plants in and Around Alamata, Southern Tigray, Northern Ethiopia

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Abstract: An ethnobotanical study was conducted to investigate the use of medicinal plants in and around Alamata district, southern Tigray, northern Ethiopia. Information was gathered from 15 traditional healers: 11 females and 4 males, using semistructured questionnaire. The healers were selected randomly and no appointment was made prior to the visits. Twenty-five medicinal plants used as a cure for 18 ailments were documented. Most (64%) of the traditional medicinal plants were found in cultivation. Most of the traditional medicinal plants were used in fresh form (64%) while 36% in dried form. The inhabitants rely on medicinal plants for various purposes such as forage, medicine, firewood, spice, construction and food. The most commonly used plant parts for herbal preparations were leaves (52%) and seeds (24%). The administration routes were oral (20%), dermal (48%), nasal (16%), oral or dermal (8%), chewing (4%) and through the ear (4%). Some (44%) of the remedies are mixed with water, butter, honey, *Citrus limonum* and *Allium sativum* while the remaining do not have any ingredients added. The findings revealed that indigenous practices contributed to the sustained use, management and conservation of medicinal and multiple-use indigenous trees. Our result suggested to carry out similar studies in areas not previously covered in order to get a full picture of the country's medicinal plants potential in the future.

Key words: Alamata, ethnobotany, medicinal plants, traditional healers

INTRODUCTION

Traditional people around the world possess unique knowledge of plant resources on which they depend for food, medicine and general utility including tremendous botanical expertise (Martin, 1995). This implies that humans are dependent on other organisms for their life. Although various animal and mineral products contribute to human welfare, the plant kingdom is most essential to human well being especially in supplying his basic needs. The indispensable dependency of human up on plants for their livelihood was primarily started by domestication and dates back 10,000 years (Martin, 1995). Over centuries, indigenous people have developed their own locality specific knowledge on plant use, management and conservation (Cotton, 1996). Plants have been used as a source of traditional medicine in Ethiopia from time immemorial to combat different ailments and human sufferings (Asfaw *et al.*, 1999). Due to its long period of practice and existence, traditional medicine has become an integral part of the culture of Ethiopian people (Pankhurst, 1965; Mirgissa, 1998). There is a large magnitude of use and interest in medicinal plants in Ethiopia due to acceptability, accessibility and biomedical benefits (Dawit, 2001).

The continued dependency on herbal medicine along with the side of modern medicine is largely conditioned by economic and cultural factors (Aketch, 1992). In

addition to these factors, the fact that modern medical services are inaccessible to the vast majority of the populations due to their costs made herbal medicines more acceptable. Hence, in present-day Africa including Ethiopia, the majority of people lack access to health care and where available the quality is largely below standard (Abbiw, 1996). Indigenous peoples and the local communities' reliance on plant resources account for anything up to 95% of their survival requirements (Archer, 1990; Nijar, 1996). Therefore, herbal remedies are the world's therapeutic means to act against diseases for a large proportion of people both rural and urban centers in developing countries like Ethiopia (Abbiw, 1996).

In Ethiopia, little emphasis has been given to ethnobotanical studies over the past decades (Dawit, 2001; Mirutse, 1999), even if there has been some attempt in investigating medicinal plants and indigenous knowledge on sustainable use and management of plant resources. However, there exists an accelerated devastation of plant resources with loss of indigenous knowledge. Although these measures could be taken, the extent of the knowledge of traditional medicine practice based on medicinal plants should be documented through botanical surveys. Botanical collection and documentation of the associated ethnobotanical knowledge should be carried out before such rich heritages are lost due to various anthropogenic and other natural causes. In

Ethiopia research and documentation on medicinal plants have been started only very recently (Mesfin and Sebsebe, 1992) as this was neglected and considered irrelevant in the past (Dawit and Ahadu, 1993). Only very little effort has so far been made to record and document the medicinal plants used and the associated knowledge. Therefore, the study focuses on gathering and documenting use and management of traditional medicinal plants and the associated ethnomedicinal knowledge in and around the town of Alamata, southern Tigray, Ethiopia. This is believed to add up to the country's database of medicinal plants and in documenting indigenous knowledge of the people.

MATERIALS AND METHODS

The ethnobotanical surveys were carried out from October to December 2009 using semistructured questionnaire with 15 randomly selected traditional healers in and around Alamata town, southern Tigray, northern Ethiopia. Prior to the administration of the questionnaire, conversations with the informants were held with the assistance of local development agent working in the study area to elaborate the objectives of the study and to build on trust with the common goal to document and preserve the knowledge on medicinal plants. Fifteen traditional healers were randomly selected for the study and no appointment was made prior to the visits. The sampled informants were 4 males and 11 females. The female informants' age ranges from 39 to 55 years and the mean age is 47 years, and the male informants' age ranges from 48 to 56 years and the mean age is 52 years. Data on disease treated, plant parts used, method of preparation of the remedy, details of administration, dosage, any noticeable side effects, preservation techniques, etc. were collected. Voucher specimens and pictures of the reported medicinal plants were collected during regular systematic walk in the fields and identified by specialists in Mekelle University and through flora of Ethiopia and Eritrea, useful trees and shrubs for Ethiopia.

Study area: The study was conducted in Alamata district, which is found in Tigray Regional State, Ethiopia. The district is situated 180 Km south of Mekelle, capital city of Tigray Regional State and 600 Km north of Addis Ababa, capital city of Ethiopia. The district has an altitude ranging from 1178 to 3148m.a.s.l. and the mean minimum and maximum annual rain fall is 615 and 927 mm, respectively (Yohannes, 2007). The rainfall of the area is bimodal with the small rain (short rain season) covering 80% of the district and occurs between January to April, and main rain (long rain season) covering the whole area and occurs from June to August. Agro climatically, the area is divided into two, intermediate high land ('Dega'),

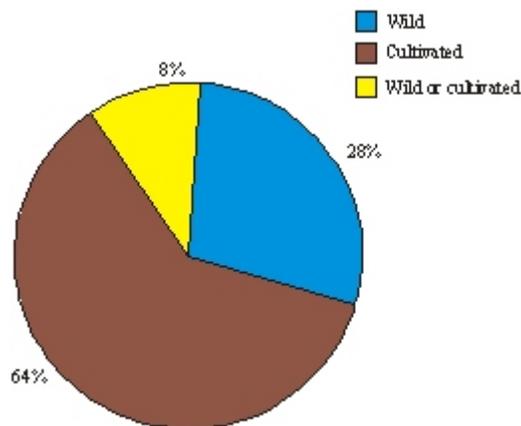


Fig. 1: Source of Medical Plants

which covers 25%, and the low land ('Kola'), which covers 75% of the district. Mixed crop and livestock farming system is the mode of agriculture in the area. The major crops that are grown in the area include sorghum, maize and teff. The small undulating mountains surrounding the low land part of the area are very steep and with low vegetation coverage. Eutric vertisols and lithic letosols (cambic) and Lithic leptosols (Orthic) are the soil types in the district. In the study area crop cultivation is dependant on Livestock. The total agricultural human and livestock population is about 85,000 and 112, 000, respectively (Yohannes, 2007).

RESULTS

A total of 25 species of medicinal plants were collected and identified for treating 18 human ailments (Table 1). Most (64%) of the traditional medicinal plants were found in cultivation (Fig. 1). Most of the traditional medicinal plants were used in fresh form (16, 64%) while dried from (9, 4%).

In the study area the inhabitants rely on medicinal plants for various purposes such as forage, medicine, firewood, spice, construction and food. It was found that 44% of medicinal plants have values other than their medicinal role (Table 1). To assess the relative importance and to check the major impact on such plants priority ranking of factors perceived as threat to medicinal plants based on the level of destructive effects was performed. The result indicated that drought was ranked first followed by grazing, soil erosion and urbanization and agricultural expansion (Table 2), indicating current threats for medicinal plants in the study area. The effort to conserve medicinal plants in the district was observed to be very poor.

The administration routes, as described in Fig. 2, were oral (20%), dermal (48%), nasal (16%), oral or

Table 1: List of medicinal plants, diseases treated and ingredients added

Species name	Diseases treated	Ingredients added	Other uses of the plant
<i>Ricinus communis</i>	Otitis media	none	none
<i>Vicia faba</i>	Skin boils	none	food for humans
<i>Achyranthes aspera</i>	Tonsillitis	<i>Allium sativum</i>	cleaning
<i>Orobancha crenata</i>	Abscess	butter	none
<i>Zehneria scabra</i>	Conjunctivitis	none	food for livestock
<i>Rumex nervosus</i>	Scabies	none	none
<i>Lepidium sativum</i>	Shegree (Leg Distortion).	<i>Citrus limonum</i>	none
<i>Jasminum sambac</i>	Shegree (Leg Distortion)	<i>Citrus limonum</i>	none
<i>Woodsia neomexicana</i>	Mumps	honey	none
<i>Rhamnus prinoides</i>	Uvulitis	none	local beverage(Tela) preparation
<i>Arthemisia afra</i>	Uvulitis	none	pleasant odor
<i>Ziziphus spinachrist</i>	Tinea capitis	none	fire wood
<i>Datura stramonium</i>	Tinea capitis	none	none
<i>Piliostigma thonningii</i>	Infectious dermatitis	none	none
<i>Ocimum lamiifolium</i>	Febrile	water	none
<i>Withania somnifera</i>	Febrile	water	none
<i>Eucalyptus globulus</i>	Febrile	water	construction material
<i>Chenopodium ambrosioides</i>	Bone fracture	none	none
<i>Acacia abyssinica</i>	Bone fracture	none	none
<i>Zingiber officinale</i>	Tooth ach	none	spice
<i>Ruta chalepensis</i>	Migraine headache	butter	spice
<i>Calotropis procera</i>	Wart	none	none
<i>Cucumis dipsaceus</i>	Snake bite	none	none
<i>Nigella sativa</i>	Head ache	water	spice
<i>Aframomum corrorima</i>	Head ache	water	spice

Table 2: Priority ranking of factors perceived as threat to medicinal plants based on the level of destructive effects

Factors	Respondents	Percentage	Rank
Drought	6	40	1
Grazing	4	26.6	2
Soil erosion	3	20	3
Urbanization and agricultural expansion	2	13.3	4
Total	15	100	

Table 3: Plant parts used in preparation of remedies

Used part	No. of plant species	Percentage
Root only	3	12
Leaf only	13	52
Seed only	6	24
Root and leaf	3	12
Total	25	100

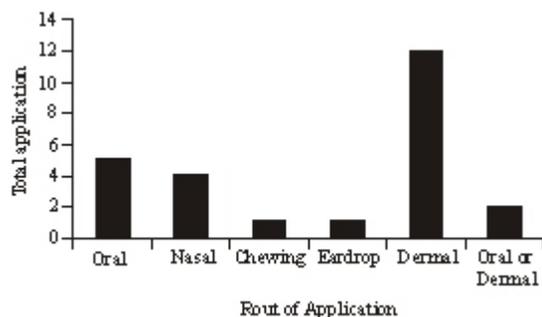


Fig. 2: Rout of administration of traditional medicines

dermal (8%), chewing (4%) and through the ear (4%). Some (44%) of the remedies are mixed with water, butter, honey, *Citrus limonum* and *Allium sativum* while the remaining do not have any ingredients added (Table 1). The units of measurements to determine dosage are not standardized and were coffee cup, finger length and

teaspoon. The quantity of plant part used is measured by number of leaves, seeds and fruits, and length of root.

The plant parts used widely to treat human include roots, leaves and seeds (Table 3). The most commonly used plant parts for herbal preparations in the area were leaves (52%) and seeds (24%). Such wide harvesting of leaves and seeds compared to roots which are important for survival of plants has a less negative influence on the survival and continuity of useful medicinal plants and hence does not affect sustainable utilization of the plants.

There are various methods of preparation and application for different types of ailments and they have various preparation forms like decoction, powdering, chewing, crushing, drooping and homogenized in water. Decoction (24%) constituted the highest type of preparation form, followed by crushing and chewing (20% each) (Fig. 3).

It was found to be different and is only to selected members of the family. Some traditional healers transfer their indigenous knowledge while others kept the knowledge with them for the sake of secrecy (Table 4). Derogatory attitudes towards the traditional medicine practitioners had forced healers to keep their knowledge and practices to themselves. Moreover, it is an income generation activities for the healers. The indigenous

Table 4: Knowledge transfer mechanisms of traditional healers to selected family members in the study area

Knowledge transfer	Number of traditional healers	Percentage
Verbal only	4	26.7
Demonstration	7	46.6
No transfer	4	26.7
Total	15	100

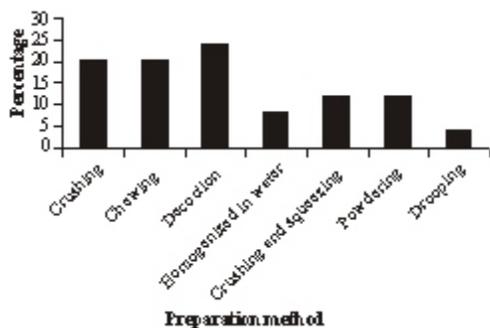


Fig. 3: Methods of traditional medicinal plant preparation

knowledge associated with the conservation and use of medicinal plants is disappearing and hence should be documented.

DISCUSSION

A total of 25 species of medicinal plants were collected and identified for treating 18 human ailments (Table 1). The wide spread use of traditional medicine among both urban and rural population in Ethiopia could be attributed to cultural acceptability, efficacy against certain type of diseases, physical accessibility and economic affordability as compared to modern medicine. The documentation of traditional knowledge, especially on the medicinal uses of plants, has provided many important drugs of modern day. Plant remedies are still the most important and sometimes the only source of therapeutics for nearly 80% of the population in Ethiopia (Dawit, 2001). Documentation of the traditional uses of medicinal plants is an urgent matter and important to preserve the knowledge. The country possesses a particularly wide range of potentially useful medicinal plants, more extensive indeed than available in many other parts of the world. Estimates indicated that 95% of traditional medical preparations in Ethiopia are of plant origin (Dawit, 1986). For more than 80% of the population in Africa traditional medicine is the first, if not the only health care system available in the poor and rural areas. In recognition of this fact, WHO underlined the potential role that traditional medicine may play in reinforcing the health care through the primary health care approach in developing countries (WHO, 1978).

Most of the traditional medicinal plants were used in fresh form (16, 64%) while dried from (9, 36%). Home garden plants were used as medicines to treat human

ailments and a good number of medicinal plants used by people in the study sites are grown in and around home gardens. The results of this study indicated that the largest group is found in cultivation grown close to the house, with an overall representation of about 64% and the wild species accounted for about 28% (Fig. 1). This is consistent with the findings of Belachew *et al.* (2003) that reported 133 plant species grown in the ‘Gamo’ home gardens of which 18 were medicinal plants. In various parts of the world, medicinal plants are mostly harvested from the wild sources either for local use or trade purposes (Lange, 1997).

In the study area the inhabitants also rely on medicinal plants for various purposes such as forage, medicine, firewood, spice, construction and food. This indicates that special focus should be given for conservation of these plants since they are being widely exploited for purposes other than their medicinal value. Availability of medicinal plants has been affected by a dramatic decrease in the area of native vegetation due to agricultural expansion, deforestation, fire, overgrazing, and drought, trading charcoal and firewood and urban associated developments (Cunningham, 1996; Kebu *et al.*, 2004). It is reported that, every year the sum total of humans knowledge about the types, distribution, ecology, methods of management and methods of extraction the useful properties of medicinal plants is decreasing rapidly which is a continuation of a process of loss of cultural diversity including traditional knowledge system that has been under way for hundreds of years (Hamilton, 2003). The current loss of medicinal plants in the country due to natural and anthropogenic factors links with the missing of valuable indigenous knowledge associated with the plants.

Pressure from agricultural expansion, wide spread cutting for fuel wood combined with seasonal drought is reported in Zerhiun and Mesfin (1990), Ensermu *et al.* (1992) and Kebu *et al.* (2004) as main factors for environmental degradation. In addition the increase in population growth rate would result in the intensification of agriculture in marginal areas which would lead to deforestation with decrease in number or loss of medicinal plants in the wild (Pankhurst, 2001).

Some traditional healers transfer their indigenous knowledge while others kept the knowledge with them for the sake of secrecy (Table 4). In Ethiopia, the local indigenous knowledge on medicinal plants is being lost at a faster rate with the increase of modern education, which has made the younger generation to underestimate its traditional values. In Ethiopia, even though the traditional medical practitioners are the best sources of information about the knowledge of the medicinal plants, it was found very difficult to obtain their traditional medicinal information as they considered their indigenous knowledge as professional secret, only to be passed orally

to their older son, at their oldest age (Jansen, 1981). The knowledge on medicinal plants is commonly passed from generation to generation. In this process valuable information can be lost when ever a medicinal plant is lost or when a traditional medical practitioner dies without passing his/her indigenous knowledge to others (Getachew and Shiferaw, 2002). Indigenous knowledge on usage of medicinal plants as folk remedies are getting lost owing to migration from rural to urban areas, industrialization, rapid loss of natural habitats and changes in life style. The knowledge from herbalists is passed secretly from one generation to the next through words of mouths or their descendants inherit the medico-spiritual manuscripts.

The administration routes, as described in Fig. 2, were oral (20%), dermal (48%), nasal (16%), oral and dermal (8%), chewing (4%) and through the ear (4%). This is inconsistent with the result of various ethnobotanical researchers elsewhere in Ethiopia (Mirutse, 1999; Debela, 2001; Getachew *et al.*, 2001; Kebu *et al.*, 2004; Ermias, 2005) that indicates oral as the predominant route of application.

The units of measurements to determine dosage are not standardized and were coffee cup, finger length and teaspoon. The quantity of plant part used is measured by number of leaves, seeds and fruits, and length of root. There were variations in the unit of measurement, duration and time at which remedies are taken and prescribed by healers for the same kind of health problems. Amare (1976), Sofowara (1982) and Dawit (1986) have also discussed lack of precision and standardization as one drawback for the recognition of the traditional health care system. This finding indicates us that there is lack of precision in the determination of doses in the area.

The most commonly used plant parts for herbal preparations in the area were leaves (52%) and seeds (24%). Such wide harvesting of leaves and seeds compared to roots which are important for survival of plants has a less negative influence on the survival and continuity of useful medicinal plants and hence does not affect sustainable utilization of the plants. Sets of work carried out previously elsewhere in Ethiopia revealed that leaves followed by roots were the common plant parts used to treat various health problems (Dawit and Istifanos, 1991; Bayafers, 2000; Mirutse and Gobana, 2003). Herbal preparation that involves roots, rhizomes, bulbs, barks, stems or whole parts have effects on the survival of the mother plants (Dawit and Ahadu, 1993). In the study, the fear of destruction of medicinal plants due to plant parts collected for the purpose of medicine is minimal as leaves were the leading plant parts sought in the area. Moreover, the harvest of whole plants is not often practiced in the area.

The medicinal plants have various methods of preparation and application for different types of ailments

and they have various preparation forms like decoction, powdering, chewing, crushing, drooping and homogenized in water. Decoction (24%) constituted the highest type of preparation form, followed by crushing and chewing (20% each) (Fig. 3). This result is different with the finding of Fisseha (2007), in which 32 (36.4%) preparations were made in the form of powder, 29 (32.9%) followed by crushed and pounded, and 12 (11.3%) in the form of chewing of plant parts used for treatment of human health problems.

In conclusion, traditional medicinal plants are central to the rural cultures and material needs. People are knowledgeable about the plants, their distribution, use and conservation. Indigenous practices some how contributed to the sustained use, management and conservation of medicinal and multiple-use indigenous trees. Drought, grazing, soil erosion, urbanization and agricultural expansion are the major threats to medicinal plants in the study area. Most of the information is still in the hands of traditional healers. We are aware that this study was not exhaustive, but only a first contribution to the ethnobotany of this region. It is also the first field research into medicinal plants conducted in the area with ethnobotanical methodology. Thus there is a need to carry out similar studies in areas not previously covered in order to get a full picture of the country's medicinal plants potential in the future.

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