ORIGINAL ARTICLE

USE OF TRADITIONAL MEDICINAL PLANTS BY PEOPLE OF 'BOOSAT' SUB DISTRICT, CENTRAL EASTERN ETHIOPIA

**[**]Debela Hunde MSc, [*]Zemede Asfaw, Ph.D[*], Ensermu Kelbessa, Ph.D

ABSTRACT

Background*: Indigenous knowledge develops by indigenous people in the processes of their interaction with their environment and the science Ethinomedicine developed gradually having its origin in the indigenous medicinal practices. The main purpose of the study was to make survey of plants that have ethnomedicinal value and investigate the uses and management practices employed by local people of 'Boosat', Welinchiti area.*

Methods*: Five study sites were systematically established to include areas inhabited by settled farmers and transhumance pastoralists. Eighty informants were randomly selected. Ethnobotanical information of medicinal plants was obtained from informants by semi-structured interview, observations, group discussions, and guided field walks.*

RESULTS*: Fifty-two medicinal plant species were documented, which are used to treat 43 human diseases. The category of medicinal plant species includes shrubs (46%), herbs (25%), trees (19%), climbers (8%) and hemi parasites (2%). Roots (38%) and leaves (23%) are the most frequently used plant parts. The method of preparation is by crushing, pounding and mixing with cold water to serve as a drink and chewing to swallow the juice, which accounted for (17%) each.*

Conclusions*: People of 'Boosat' are knowledgeable about the plants, their distribution, medicinal use and management. Indigenous practices somehow contributed to the sustained use, management and conservation of medicinal plants. Knowledge of medicinal plants is wider among elderly women and men while the young are comparatively less knowledgeable. The results of this study indicated significant contribution in efforts directed towards conservation of the remaining medicinal plant resources, provided that the necessary mechanisms are put in place before it is too late.*

KEYWORDS: *Ethnobotany, Ethnomedicine, Indigenous Knowledge and Traditional*

** Jimma University, College of Agriculture & Veterinary Medicine, Po.Box 583, Tel.047 1110102

* The National Herbarium, Addis Ababa Univerisity, Po.Box 3434, Tel, 112343

INTRODUCTION

Developing countries have continued to rely on the use of traditional medicinal plants as their primary source of healthcare (1). There has been a move towards incorporating traditional medicine within national drug polices and greater professionalism by increased commercialization of pharmaceutical production using traditional medicinal plants with known efficacy (1, 2). The complex knowledge, beliefs and practices generally known as indigenous knowledge (IK) or traditional knowledge develops and changes with time. Indigenous knowledge includes time-tested practices that developed in the processes of interaction of humans with their environment (1). Indigenous knowledge systems, can guide the development of new crop varieties and medicines (1). Some of indigenous plants of Ethiopia (*Phytholaca dodocandra)* can evidence this as source of Mulluscide in control of Shistosomiasis. *Azadircata indica* (Neem) source of many drugs of which Nimbin is used to treat inflammation and fungal infections. Azadirctin is also a drug from the same plant used as insect repellent. Therefore, ethnobotany is an appropriate field to study indigenous knowledge and deals with direct interrelations between humans and plants used as medicines and for other application (2,3). Ethnomedicine refers to the use of plants by humans as medicines and traditional medicine is the sum total of all nonmainstream medical practices (2).

Much of the knowledge on traditional medicinal plants in most cases is available in rural communities and mostly perpetuated by word of mouth within families and small communities in Ethiopia, which is general truth in all-rural Africa (4). These are fragile traditional skills that are likely to be lost when communities emigrate to towns or regions with a different flora, or if the local ecology is drastically altered. Moreover, indigenous people have not only been utilizing medicinal plants but also have developed a system of managing them. This has been achieved through many generations age old and time tested practices and a consequent accumulation of knowledge through a series of observations, practices, interactions and innovations (5). These knowledge and practice is dynamic as the practitioners make every effort to widen their scope by reciprocal exchange of limited information with each other.

Modern health care has never been and probably never will provide adequate and equitable health service anywhere in Africa, and Ethiopia in particular, due to financial limitations related to rapid population growth and poor economic performance (6). Thus, medicinal plants continue to be in high demand in the health care system as compared to the modern medicine (5). This indicates the need for in-depth investigation and documentation of plants of traditional medicinal value to rationally use and conserve the plant resources and indigenous knowledge. This is an emerging truth through developing world including Ethiopia. The formal sector has a lot to learn from indigenous people (7). There is an enormous gap in knowledge and it is from this very fact that the present study on the use and management of traditional medicinal plants by indigenous people in the study area has been initiated.

This study area was selected because its native vegetation cover and it is known that the indigenous people in the area heavily rely on traditional medicines obtained from plants. Therefore, this study attempted at investigating and documenting ethno medicinal knowledge on uses and

management of traditional medicinal plants in 'Boosat' sub district, Welinciti area.

MATERIALS AND METHODS

The Study Area: The study was carried out in Oromia National Regional State East Shewa Zone in 'Boosat' sub-district. The subdistrict is located in East Shewa Zone, Oromia National Regional State. It lies between $8^0$25' and $8^0$50'N and $39^0$16' and $39^0$50'E with a total population of 126,886. Boosat falls between 1100 and 1800 of altitudinal range.

Vegetation of 'Boosat" lies in the *Acaca-Commiphora* woodland in the Somalia-Maasi Regional centre of endemism (11; 12; 13). It is a mixture of cultivated land, open wooded grassland with trees like *Acacias seyal*, *A.tortili*s, A. *albida, Balanites aegyptiaca*, *Commiphora africana* and *Ziziphus spina-christi.* The first 10 major diseases identified and reported by (14) are: malaria, pneumonia, intestinal parasite, diarrhea, acute respiratory disease, gastritis, tonsillitis, acute febrile illness, anemia and conjunctivitis in order of their prevalence. These diseases mostly affect children and mothers.

Study design: Convenience sampling was made to include sites inhabited by settled farmers and trans-human pastoralists. Eighty informants (73 men and 7 women) between the ages of 15 and 75 were involved, by randomly selecting 16 individuals each from the five sample sites. Thirty-one key informants were selected; 5-6 persons from each study site.

The vegetation of the study area was described by information gathered from informants following the emic categorization technique i.e., categorization by indigenous people based on their own indigenous perspectives. On the other hand, it was described and classified by visual observation following the etic classification technique of ethno botany (3). In the latter case morphological characteristics or general appearance of vegetation such as growth and life forms of the dominant or co dominant plants were focused upon as denoted by (3,15) and supported by collection, identification and documentation of dominant and co-dominant species of the vegetation.

Ethno botanical data was collected between August 2000 and March 2001 on four field trips made to the sites (3,16,17,18). Accordingly, semi-structured interviews, observation, group discussion and guided field walks with key informants were employed. Ethno botanical/ ethno medicinal information was also gathered from knowledgeable elders and other individuals from local community. The interviews and discussions were based on and around a checklist of topics or questions prepared before hand.

Information on names of medicinal plants, part(s) used, methods and conditions of gathering and preparation, disease treated, dosage used, route of application, adverse effect, use other than medicinal uses, their management by indigenous people, and distribution in local vegetation was collected. Repeated inquiries were made at different times with same informants so as to check the accuracy of information obtained. Literature review and field notes on herbarium sheets with plant specimens housed at the National Herbarium (ETH), Addis Ababa University, substantiated the information obtained from local people. Specimens of the plants cited for their medicinal use and other plants found to be major components of the vegetation of the study area were collected, dried, identified and described.

After identifying the five most effective plants based on their use values as perceived by the whole range of informants, paired comparisons were done

(3,18). The paired comparisons of the five most effective plants in treating malaria were made using random number table and flipping coins. Ten informants were randomly selected from the key informants and allowed to show their responses independently for pairs of traditional medicinal plants noted for treating snake poison. Accordingly, preference-ranking technique was employed following (3) on the selected medicinal plants based on the degree of their effectiveness in treating snake poison. Each rank is given an integer value 1, 2, 3, 4 and 5, the most effective one being given the highest value (five), while the least important is assigned a value of one. Finally, these numbers were summed for all respondents, giving an overall rank for the species. By ordering according to choice, it can be found that the most favoured species are usually the most efficacious, at least in the context of the people who use them.

The data sets collected were analyzed by summarizing into appropriate tables, percentiles and graphs. Explanations were given for the summarized data. Some medicinal uses were subjected to preference ranking for the most effective medicinal plant species used to treat the health problems faced by the people as perceived by local people of the study area.

RESULTS

Fifty-two species of traditional medicinal plants distributed in 27 angiosperm families and 43 genera were identified. Informants reported that, most of the plant remedies are collected from the wild when needed and used as fresh preparations. Medicinal preparations for treating snakebite, cobra and python's attack are preserved and made available for immediate application. Some of the major species used in this method are *Senna occidentalis, Bidens pilosa* and *Andrachne aspera*(Table1).

Table 1. Families of medicinal plants and number of species used for humans ailments by People of Boosat sub district, Central East Ethiopia.

Family	Total No of species	Family	Total No of species
Amaranthaceae	2	Euphorbiaceae	4
Apocynaceae	1	Fabaceae	10
Asclepediaceae	1	Lamiaceae	2
Asteraceae	4	Loranthaceae	1
Boraginaceae	4	Malvaceae	2
Brasicaceae	1	Oleaceae	1
Burseraceae	1	Papaveraceae	1
Capparidaceae	2	Poaceae	1
Celasteraceae	1	Polygonaceae	1
Convolvulaceae	1	Rhamnaceae	1
Cucurbitaceae	2	Rutaceae	1
Sapindaceae	1	Solanaceae	2
Scrophuluraceae	1	Tiliaceae	2
Verbenaceae	1		

Assessment on the habits of the medicinal plants used by the community showed that shrubs accounted for 46% (24 species) followed by herbs 25% (13 species), trees 19% (10 species) climbers 8% (4 species) and hemi parasite 2% (1 species). Analysis of the plant parts used for medicine preparation revealed that in terms of number roots are the most widely used part accounting for 38% (Fig.1).

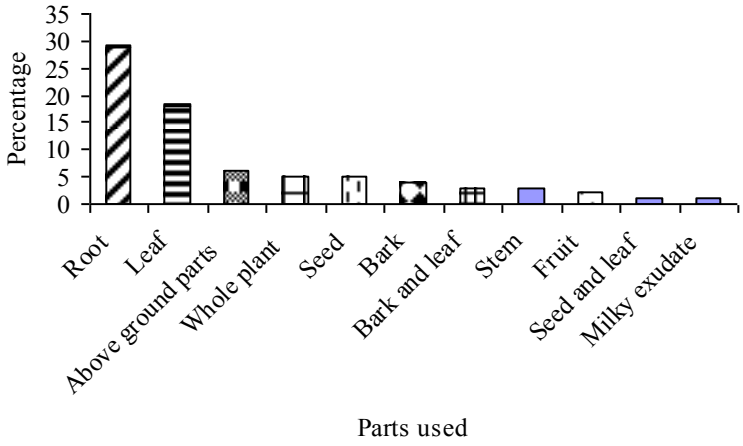

Fig. 1: Parts of plant used in human medicine

Fig. 1: Parts of plants used in human medicine by people of Boosat sub district, Central East Ethiopia.

The plants are used to treat 43 different diseases. Summary of the data analysis as transcribed by the researchers assisted by appropriate professional showed that, 3 species are used to treat infected wound, 11 species for malaria and 4 species for gonorrhea (Table 2).

Table 2. Major human disease types and number of species used by people of Boosat sub district, Central East Ethiopia.

Disease/health problem treated	Total No of Species	% of the total medicinal plants used by humans
Snake poison	10	19.2
Gonorrhoea	4	7.2
Infected wound	3	5.8
Cobra's attack	7	13.5
Malaria	11	21.2
Ulcerated wound	5	9.6
Cancer (nyaqarsa)	3	5.8
Tonsillitis	4	7.2
Febrile illness (mich)	4	7.2
Cough (hazaba)	3	5.8
Evil eye	6	11.5
Toothache	4	7.7
Urine retention (kidney problem)	3	5.8
Lymphatic swelling (gofle, dhula)	4	7.7
Diarrhoea	3	5.8
Tetanus	4	7.7
Measles (guddiftu)	4	7.7
Pain (waransa)	4	7.7
Stomach problem	3	5.8
Ringworm (robbi)	3	5.8
Sexual impotency in men	3	5.8
*Others	21	51.9

Assessment of the preparation of the remedies showed that, crushing, pounding and mixing with cold water and chewing to swallow the juice is the modes of preparation for the majority of the remedies (34%) for details refer (Table 3). Some informants reported that there are directions and restrictions imposed on the collection and application of some remedies which otherwise reduce the efficacy of the remedy or cause danger on the patient and the collector. The application of medicinal preparation of *Kedrostis foetidissima* is possible on Mondays and Thursdays only by restricting sexual activity on both the patient and healer. There is a belief that other persons are not allowed to come in contact with the patient until the completion of the medication (Table 3).

Some of the medicinal preparations are reported to have adverse effects on the patients. Informants reported that, *Solanum somalense, Ziziphus spina-christi, Ajuga integrifolia* and some others are found to have adverse side effect like vomiting and diarrhoea. The informants recommended antidotes for some of these adverse side effects, such as drinking boiled coffee, milk or barley soup immediately.

In most cases the measurements are rough, lack precision and dosage given to the patient has no strict specification. Pregnant women are also not given those medicines with observable adverse effects such as vomiting and diarrhoea. Preparations for malaria, internal

haemorrhoid and gonorrhoea are not applied for pregnant women and physically weak persons due to other health problems (Table3).

Table 3. Methods of preparation of medicines used by people of Boosat sub-district, Central East Ethiopia.

Methods of preparation	Total	%
Crushed, pounded and mixed with cold water	15	17
Crushed and squeezed	4	4
Squashed, pounded and put on affected part or wash (2)	4	4
Chew and swallow the juice	15	17
Rubbed, creamed as an ointment on affected parts	8	9
Dry smoke (smoke bath) inhaling	4	4
Crushed and concoction for drink or swallow	11	12
Crushed and bandaged on wound	3	3
Chewed and spitted on affected parts	7	8
Crushed, boiled and filtered for drink	4	4
Tooth brush	3	3
Crushed, pounded and tied on neck (kudhamu)	2	2
Decoction for drink	3	3
Others	9	10
Total	90	100

The result of the study showed that some medicinal plants are more popular than others. Accordingly, *Andrachne aspera* took the lead having been cited by 80 (100%) of the informants for its medicinal value and, *Lepidium sativum* by 60 (75%) informants. *Premna resinosa* ranked third by 58 (72.5%) further details in (Table 4). Similarly, key informants and interviewees reported that some plants are more familiar to them than others, for being used against a particular ailment or health problem. The case of *Parthenium hysterophorus* is left for further investigation, as it is a newly established exotic plant (Table 4).

Table 4. List of medicinal plants and the corresponding number of informants who cited the medicinal value of each species by people of Boosat sub district, Central East Ethiopia.

Scientific Name	Number of Informants	% of total informants
Acacia albida	2	2.5
Acacia nilotica	18	22.5
Acacia oerfota	3	3.8
Acacia tortilis	18	22.5
Andrachne aspera	80	100.0
Aerva javanica	4	5.0
Ajuga integrifolia	15	18.8
Amaranthus dubius	14	17.5
Berchemia discolor	5	6.3
Bidens pilosa	6	7.5
Carissa edulis	4	5.00
Catha edulis	4	5.0
Cadaba farinosa	3	3.7
Calotropis procera	18	22.5
Cissus quadrangularis	22	27.2
Cleome ramosissima	15	18.8
Commiphora africana	10	12.5
Croton macrostachyus	2	2.5
Cucumis dipsaceus	48	60.0
Cynoglossum caeruleum	32	40.0
Dichrostachys cinerea	4	5.0
Ehretia cymosa	16	20.0
Eleusine africana	37	46.3
Erianthem dregei	15	18.8
Euclea racemosa	25	31.3
Euphorbia nigrispinoides	13	16.3
Grewia ferruginea	2	2.5
Grewia tenax	2	2.5
Heliotropium albohispidum	10	12.5
Heliotropium cinreascens	3	3.7
Hibiscus micranthus	3	3.7
Indigofera oblongifolia	35	43.8
Indigofera vahemarnsis	15	18.8
Jasminium abyssinicum	15	18.8
Lagenaria siceraria	48	60.0
Lens culinaris	12	15.0
Lepidium sativum	60	75.0
Leucas martinicensis	27	33.8
Parthenium hysterophorus	35	43.8
Phyllanthus maderaspatenis	10	12.5
Premna resinosa	58	72.5
Rumex nervosus	4	5.0

Table 4 .Continued.

Ruta chalepensis	3	3.7
Sedera arabica	2	2.5
Senna italica	30	37.0
Senna occidentalis	37	46.8
Sida ovata	16	20.0
Solanum renschi	16	20.0
Solanum somalense	16	20.0
Tamarindus indica	16	20.0
Verbascum sinaiticum	6	7.5
Vernonia amygdalina	41	50.3
Xanthium strumarium	10	12.5
Ziziphus spina -christi	2	2.5

The preference ranking for five medicinal plants species used to treat snake poison / bite showed that *C. quadrangularis* is the most preferred followed by *Senna occidentalis*, *Indigofera amorphoides*, *Senna italica* and *Bidens pilosa* in that order respectively (Fig.2) and the ranks given in (Fig.3).

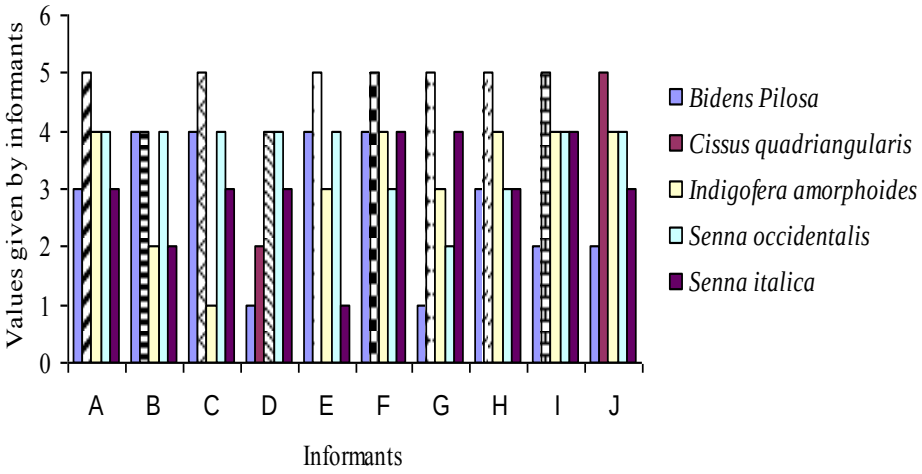

Fig. 2: Preference ranking of plants used to treat snake poison by people of Boosat sub- district, Central East Ethiopia.

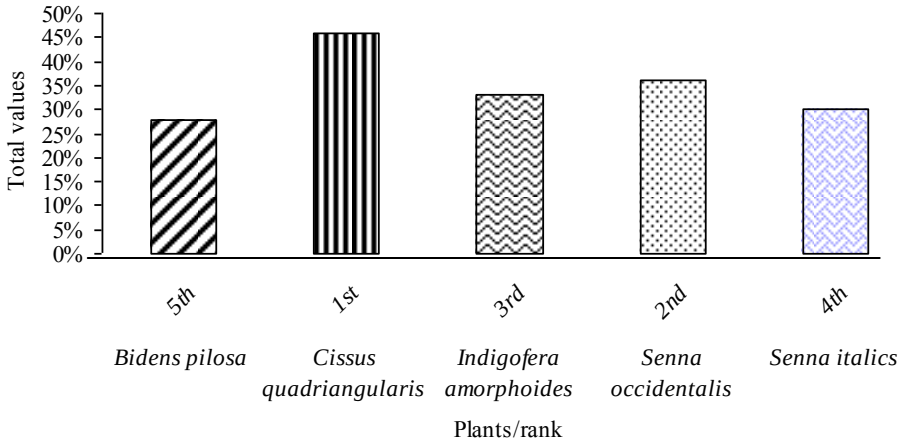

Fig. 3: Preference ranking of five medicinal plant species by people of Boosat sub- district, Central East Ethiopia.

DISCUSSION

Though there is continued natural resources degradation in the area, the study in 'Boosat' has yielded 52 potent plants for treating human health problems. There is also broad indigenous knowledge on the remaining vegetation and the medicinal plants, which also varies with gender, age, and lifestyle of the community. In a study made on people of Chaffa (Wello), 83 species of medicinal plants were reported (19). Medicinal knowledge of the Me'en people in South Western Ethiopia, in an area with better vegetation cover, 52 species of medicinal plants were reported (20). The case of ethno veterinary medicine of the indigenous people of 'Boosat' has yielded 29 species of plants (21). Some of the plants these people use to treat human and livestock health problems are the same but vary in dosage and mode of application.

Elderly men are more knowledgeable about a wide variety of medicinal plant species found in distant areas such as forests, rocky hillsides and faraway farmlands. However, many young people today are not versed about the variety and values of indigenous medicinal plants. This is more pronounced in the case of settled farmers. Medicinal plant knowledge, use and transfer of knowledge to the young generations can be affected by religious beliefs, modernization, acculturation and environmental change (22, 23, 24).

Those who go to school are showing unwillingness to learn from their parents, which is an evidence for the gradually disappearing traditional knowledge. This trend is also observed in other parts of Ethiopia. Ethno medicinal knowledge diminishes with the death of elderly knowledgeable members of society since less and less young people are willing to acquire the knowledge.

The plants used and the methods of preparation are often closely guarded secretly. Another reason for the disappearance of knowledge of medicinal plants is also connected with the fact that most specialized healers in the area do not properly pass it down to the next

generation. The reasons given were: (1) healers show strong tendency of keeping their knowledge secret, (2) when they are willing to pass the knowledge to somebody else, the knowledge is possessed verbally and it includes vernacular names of the plant, mode of preparation, disease(s) treated and habitat of the plant which are very difficult for the learner to properly memorize all theses facts, (3) aged healers passing the knowledge are not considered proper in most cases due to doubtful authenticity of the descriptions they provide to learners and (4) women are not free to practice their knowledge. This has been evidenced by three-interviewed young men whose parents were professional healers. Informants reported that although they have taken the oath they remember only the name of the disease their parents used to treat, but not the plants and the methods of preparation. This was illustrated by an individual who has learned a variety of treatments from experienced healer, whom he had been assisting. The assistant refused to practice the knowledge after the death of the experienced healer because he did not receive permission from the healer.

It was found that the knowledge base of people in the study area is wider in the treatment of common ailments, home remedies and applying preventive methods such as, febrile illness and malaria. However, there are more specialized treatments where the knowledge is more restricted to a specialist practitioner or sometimes to two or more members of the family. For instance, ability to treat hepatitis is restricted to two individuals in the entire study area, one of whom is a female. The treatment of spider's poison was found being restricted to one family, a father and his son, giving services for the community in the area.

Of the several species used against snakebite people showed preference of one over the other. Furthermore, the people have shown their comparative choices of some medicinal plants more than others to treat specific diseases as shown through paired comparison of plants used for treating malaria patients. When presented to them in a pair wise manner, the informants chose *Lepidium sativum* as the best medicine for malaria followed by *Andrachne aspera, Vernonia amygdalina* and *Phyllanthus maderaspatensis* in the order given. From both paired comparison and preference ranking it could be understood that the most favoured species are usually the most efficacious, at least in the context of the people who use them. This shows the credibility and continuity of the ethnomedicinal information obtained from local people.

The finding showed that, the most widely used plant remedies by people of 'Boosat' are obtained from shrubs (46%) followed by herbs (25%) might indicate that, people rely more on shrubs and herbs because they are relatively common in the area as compared to medicinal tree species. This indicates that shrubs and herbs are replacing the forest resources of the area. The fact that roots provide most remedies may hint at the possibility that use as medicine may contribute to the destruction of the natural vegetation and the medicinal plants therein. The popularity of roots and whole plants may have negative consequences on the sustainability of the medicinal plant species in the area. *Croton macrostachyus and Andrachne aspera,* which are harvested in the area for their roots and bark, have already become scarce, perhaps indicating the possibility that medicinal use may have contributed to their reduction. Use of plants by indigenous people is also dynamic as demonstrated by effective local use of newly introduced plants as demonstrated by the use of *Parthenum hysterophorus* for example.

The study showed that most of the medicinal preparations are made from single plant preparations, and concoction (12%) rather than using one plant to cure a particular disease is evident. For instance, the curing potential of *Grewia ferruginea* in the treatment of malaria and intestinal parasites is increased by concocting it with roots of *Hagenia abyssinica* and *Euclea divinorum* in the preparation. Furthermore, *Rumex nervosus* when used in the treatment of measles is potentiated by concocting it with leaves of *Carissa edulis*, and *A. tortilis.* Potentiating effect of one plant on the other in prescription of multiple sources is well recognized in Ethiopian tradition medicinal practice. The study result by (23) has also given similar explanations on synergic effect of medicinal preparation. Lack of precision in specifying the doses have been noted. Informants reported that unless there is proper handling and care, some of the medicinal preparations could be poisonous to humans. Some of the species noted for their poisonous effects are *Parthenium hysterophorus*. *Jatropha curcas*, *Xanthium strumarium* and *Croton macrostachyus*. The milky exudates from *Euphorbia nigrispinoides* is considered to be fatal if taken in larger quantities than prescribed by the healer.

Medicinal plants utilized by indigenous people of 'Boosat' are collected from the wild, few being under cultivation. They are distributed in woodlands, shrub lands, rocky hillsides, degraded woodlands, grazing and browsing lands, roadsides, in farmlands, farm boarders and spiritually protected areas. The fact that most of the remedies are found in the wild poses a big threat to their existence due to destruction of their habitats. Study made in the lower rift valley has resulted with similar result indicating that there is a big threat these plants in the wild (25). Informants reported that medicinal plants such as *Phyllanthus maderaspatensis, Carissa edulis, Croton macrostachyus* and *Senna italica* are rarely encountered in the area.

The people of 'Boosat' are also endowed with knowledge of local management and conservation of these plants. The intermixing of multipurpose indigenous trees by farmers on their farmland is evidence to the practice. This type of management practice benefits the indigenous people and also encourages them to conserve the plants for medicine and other uses. In arid and semi arid countries where people live in scattered communities having medicines within the area or close by is an indispensable necessity (24).

The fruit of *Ziziphus spina-christi*, *Ximenia americana* and *Berchemia discolor* are edible by humans, birds and other animals and these species are also medicinal plant. Hence, the usefulness of such multipurpose plants initiated the local people to conserve the medicinal plants. Abbink reported that people of Cheffa (Wello) conserve plants of both forage and medicinal value at the corner of their farmlands and communal pasture land (19). Biodiversity conservation, cultural survival and the search for new products, which are all inextricably linked (3). Similar studies from different parts Ethiopia and Ugand have given similar conclusion that the presence of diversity of plants and the search for new medicinal plants are part and parcel of each other (5, 25, 26). Studies done on the Sukuma of Tanzania and Mukugodo Masaai of Kenya communities yielded 156 medicinal plant species, which are used to treat 13 human and 11 livestock diseases. These are 40 percent of plants of the area recorded showing that diversity of plants of the area and medicinal plants diversity are linked with livelihoods of the local people (27).

The secrecy behind collecting the medicinal plants from the wild, preparation methods and application are twofold.

Firstly, it is a means of ensuring that the people do not lose the medicinal resources, secondly to keep the knowledge only by the healer or his/ her trainees. Study done in Jimma zone showed people who are 'knowledgeable' refuse ta share information they have due to lack of trust on investigators and restrict the information they have in practice (26). A person can collect medicinal plants known by other knowledgeable person or traditional healer if and only if he/she took an oath. This also restricts the collection of medicinal plants to fewer people and hence less destructive. The conservation measures practiced by indigenous people of 'Boosat' are limited when compared to counter conservation activities. The net effect is losing its natural vegetation at a fast rate. Ethnobotanical study done around Dheera area, Arsi reported 16 traditional medicinal plants which are under treat due to habitat modification as they are part of part natural vegetation of the area (28).

In conclusion, People of 'Boosat' are knowledgeable about the plants, their distribution, medicinal use and management. Indigenous practices somehow contributed to the sustained use, management and conservation of medicinal plants. The knowledge is wider among elderly women and men while the young are comparatively less knowledgeable. The knowledge of medicinal plants is decreasing in its depth and breadth; as less and less medicinal plants are being utilized by the current generation. Therefore, these important medicinal plants are under threat and peoples' indigenous knowledge is also eroding because of environmental degradation, increased needs for land use and change in the peoples' lifestyles. The results of this study would have significant contribution in efforts directed towards conservation of the remaining resources of which there is still a considerable proportion left, provided that the necessary mechanisms are put in place before it is too late.

Conservation measures should be targeted to priority species, which are currently widely used as medicinal plants in the area. The targeted conservation measures can be achieved by encouraging people to grow medicinal plants in their home gardens, live fences and farmlands. Furthermore, instituting measures for conservation of vegetation by employing sustainable utilization of indigenous knowledge is important.

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