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A survey on medicinal plants used by traditional healers in Harari regional State, East Ethiopia

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Abstract

This study was carried out to collect and document indigenous knowledge on medicinal plants in Harari regional state, East Ethiopia. The ethnobotanical data were collected from 24 traditional healers (14 male and 10 female) using semi-structured questionnaire, observation and guided field walks. The survey identified 54 medicinal plants distributed into 34 families and 50 genera. The Fabaceae family was the most dominant plant family recorded as sources of traditional medicines. The study revealed that 42 species (78%) were used against human ailments, 4 species (7%) were used to treat health problems of livestock and 8 (15%) species were used to treat both human and livestock ailments. The plant parts most frequently used were the Leaf (48%), followed by root (24%), stem (11%), fruit (9) and whole parts (7). Traditional remedies were processed mainly through crushing, followed by squeezing. Oral applications were widely used, followed, in frequency of prescription, by dermal applications. The study showed that Harari area possess wealthy of indigenous knowledge on medicinal plants and their applications. Moreover, this ethnobotanical study can assist scientists for further research on medicinal properties of identified plants species that could contribute to development of new drugs.

Keywords: Indigenous knowledge, medicinal plant, traditional knowledge, Harar, Ethiopia

1. Introduction

About eighty percent of the Ethiopia people and ninety percent of livestock depend on traditional medicine for their health care^[31, 6] and more than 95 percent of traditional medicine preparations are made from plant origin^[23]. So far 887 to 1000 medicinal plant species are reported in the Ethiopian Flora^[22, 23]. Similarly, there has been a continuous growth of demand for herbal medicines globally and in many developing countries health care. According to^[19] traditional medicines already comprise a multi-billion dollar, international industry, and the biomedical sector is increasingly investigating the potential of genetic resources and traditional knowledge.

Ethiopia is home for more than 80 ethnic groups with a diversified culture which reflected in traditional knowledge on use of herbal for medicine and associated knowledge^[16, 24, 25]. According to^[20] traditional medicinal knowledge is dynamic and various across different location, region, linguistic and cultural background with their own specific knowledge about use of plants, way of preparation and conservation. This knowledge exists in indigenous community as secret oral traditions hence, documenting and protecting these medicines is becoming a greater priority. This is true in Ethiopia, even though progress have been made regarding documentation of traditional knowledge over the past decades e.g.,^[11, 9]. Ethiopia is increasingly making efforts to protect their genetic resources and Traditional medicinal knowledge through conservation and national legislation for benefit sharing but, lack of well documented information on community knowledge^[29].

Therefore there is an urgent need to document the medicinal and aromatic plants associated indigenous traditional knowledge, because this knowledge orally passes on from one generation to the next; thus, have vulnerability to wiped out^[21]. Various study indicated that local experiences which have been gained through generation to solve indigenous problems are disappearing due to lack of written documents, death of elders, migration of people due to drought and social problems, urbanization, influence of modern veterinary medicine and exotic cultures. As a result, many plant species have become extinct and some are endangered and many are not yet identified^[16, 22]. Hence, collecting and documentation of indigenous traditional medicine is now important than ever to preserve associated knowledge and medicinal plant biodiversity in order to assist modern drug improvement.

In this regards, there is very little ethno botanical documentation on most medicinal species of the Hareri, Eastern part of the Ethiopia [25]. These areas were known for its historic importance and registered as world heritage site. Therefore, aim of this study was to investigate and document the traditional medicinal plants used by indigenous people, way of practice and mode of delivery for the treatment of human and livestock ailments, as well as to record and document the current status of traditional knowledge and utilization of medicinal plants in the Harari regional state, East Ethiopia.

2. Materials and Methods

2.1 Study Area

The study was conducted in Harari regional state, East Ethiopia (Fig 1.). Harari is one of nine national regional states in Ethiopia having nineteen kebeles (lower administrative level). The study area was located 525km far from Addis Ababa which is the capital city of Ethiopia. Geographically, the area is located between $42^{\circ}03' 30''$ - $42^{\circ}.16' 24''$ E and $9^{\circ}.11-9^{\circ}.24$ E N with an altitude ranging from 1300-1600 m.a.s.l. The mean annual rainfall the area is 636.7mm and the mean annual temperature is 19. °C. The total population of the region is estimated to 238,000 which of 120,000 males 118,000 females. Generally the region has a total area of 334km². The region has diverse biological resources [15]. It also home to diverse ethnic groups. The Oromo, Amhara and Adare are the major ethnic group living in the study area. Each ethnic group has their own composition of with distinctive language (e.g., Oromiffa, Amharic and Harari), and cultural diversity. Islam is the predominant religion with 69% of the population reporting themselves as adherents of the religion, followed by Orthodox Christianity (27%) [26].

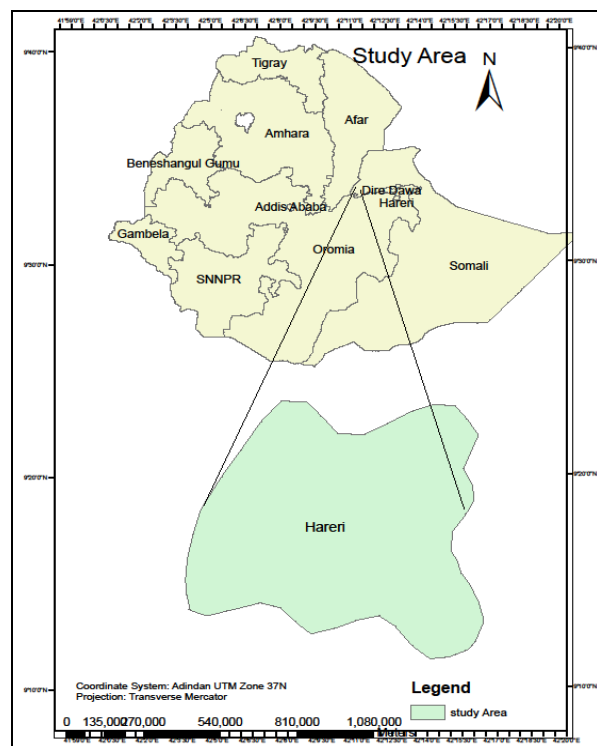


Fig 1: Map of study area, Hareri, Ethiopia

2.2 Data Collection Method

The ethnobotanical data were collected from local community and traditional healer through semi-structure questionnaire,

guided field walks and focus group discussion based methods given by [13, 28]. A total of 24 informants (14 male and 10 female) were selected purposefully with the help of local administrators and community leader from four district (*Sofi, Eerer, Amir nur, and Abader*) found in the region. An ethnobotanical survey was conducted from Aug, 2016 to Nov, 2016 at respondent's house and fields. Every herbalist was asked to list the main diseases he/she treated and the plants used in the treatment, preparation methods, parts used and route of applications. Field walks with traditional healers were employed to collect specimens of each medicinal plant species. Medicinal plant sample was collected from healers own gardens as well as from field. Based on ethno-botanical information provided by informants, specimens have been collected, numbered, pressed and dried for identification.

2.3 Data Analysis and Taxonomic Classification

Specimens collected from various habitats, dried and prepared using standard herbarium specimens techniques, was taken to National Herbarium of Ethiopian Biodiversity Institute (EBI) identified and preserved there. The data were analyzed using descriptive statistics and the percentiles, figures and Graphs were used to summarize the collected medicinal plants. SPSS Statistical Package for Social Science (SPSS) Version20 software was used to produce presented graphs [14].

3. Result and Discussion

The study revealed 54 plant species from 34 families and 50 genera that are used for medicinal purposes by the traditional healers of the Harari region of Ethiopia. The plant family with the largest number of trees and shrubs of the study area used for medicinal purposes were Fabaceae, Asteraceae and Lamiaceae had the highest number of species (4 each), followed by Cucurbitaceae, Apiaceae and Solanaceae each with 3 species of the medicinal trees and shrubs identified (Table 4). Similarly, [9] reported Fabaceae and Lamiaceae family were representing high proportion of documented medicinal plants species in northwest Ethiopia. In Other previous studies Fabaceae family were frequently reported as the highest species e.g., [3] and [12] also reported similar finding from southwestern of the country. Similar studies also reported from other country [7].

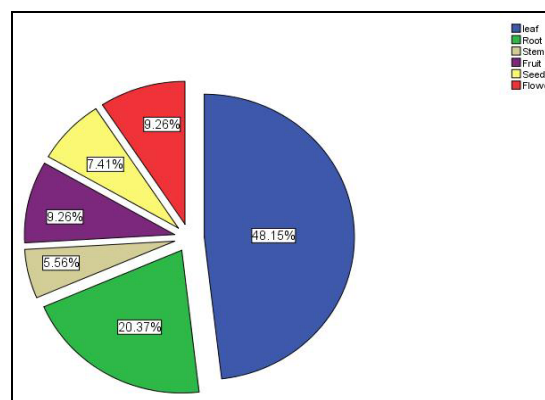


Fig 2: Percentage of plant parts used for preparation of remedies in the study area.

Among the different parts of medicinal plants Leaf is the most commonly used part (48.15%) followed by root (20.37%), fruit (9.26%), flower (9.26%) and seed (7.41%) (Fig 2). The finding of present study was in line with report of [5, 3 and 30]. Most of the traditional medicinal plant preparations were

used in fresh form (40, 74.1%) while some were in dried form for future uses (9, 16.7%) and dry or fresh form (5, 9.3%). Similar study also reported from elsewhere in Ethiopia [9].

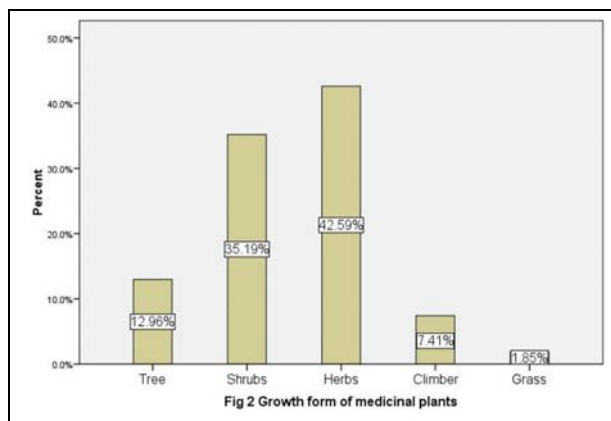


Fig 3: Growth forms (habits) of the reported ethnomedicinal plant species

In this study, most recorded medicinal plant form used were the herbs (23, 42.6%), followed by shrubs (19, 35.2%), trees (8, 14.8%), climber (3, 5.6%) and 1 (1.9%) was a grass (Fig 3). Likewise [7] report on Lwamondo community of South Africa indicated that herbs and shrubs plant species were major sources for traditional medicines. On contrary, [6] finding on the southern part of Ethiopia showed that 30 percent of documented medicinal plants were tree. Various author reported that tradition medicine includes knowledge human and livestock disease treatments. In the present finding forty-two species (78%) were used against human ailments, 4 species (7%) were used to treat health problems of livestock while 8 species (15%) species were used to treat both human and livestock ailment. According to healers some ethnomedicinal plant species were used to treat both human and animal ailments; *Plantago lanceolata*, *Calpurnia Aurea*, *Withania somnifera* (L), *Agave sisalana* Perrine, *Linum Usitatissimum* L, *Nicotiana tabacum* L, *Sida schimperiana* hochst. exa. rich. and *Citrus limon* (L.) (Table 4).

Table 1: Source of medicinal plants in the study area

Source of medicinal plants	Number of species	Percentage
Wild	27	50
Home garden	13	24.07
Farm land	5	9.26
Both wild and home garden	9	16.67

Present study result indicated that wild habitat is the major sources for medicinal plants while the rests were from home

Table 4: List of traditional medicinal plants used for treatments for human and livestock disease: scientific name, family, local name, disease treated and part used in the study area, Harari region, East Ethiopia

Voucher No.	Scientific name	Family	Local name	Habit	Disease treated	Parts used
MED-13	<i>Bidens pilosa</i> L.	Asteraceae	Teybdi	Sh	Skin fungus	L
MED-10	<i>Punica granatum</i>	Lythraceae	Roman	Sh	Amoeba Disease	L,Fr
MED-31	<i>Plantago lanceolata</i>	Plantaginaceae	Gorteb**	H	Spider disease	L
MED-29	<i>Salvia shimperi</i>	Lamiaceae	Haremajiwa	H	Cough	L
MED-32	<i>Cymbopogon citratus</i>	Poaceae	Citashekhussien	G	Intestinal parasite	L, St
MED-24	<i>Jasminum grandiflorum</i> sub sp. Floribundum	Oleaceae	Blue	Cl	Malaria disease	L
MED-06	<i>Mentha spicata</i> L.	Lamiaceae	Annan Kuti	H	Blood pressure	L
MED-22	<i>Xanthium strumarium</i>	Solanaceae	Deresa	H	Skin fungus	L,R
MED-30	<i>Gardenia ternifolia</i>	Rubiaceae	Gambello	T	Stomach ache	L
MED-20	<i>Calpurnia Aurea</i>	Fabaceae	Cekha**	Sh	Typhoid	L

garden and farmlands. The majorities (50%) of these medicinal plant species were from wild habitat while 24% were from home garden, and the remaining was from both home and wild (Table 1). As study conducted by [11, 6], reported above 70 percent of medicinal plants were collected from wild habitat but, in the present study relative proportion of medicinal plant sources collected from the wild was nearly 50 percent where home garden were the second major source for medicinal plants. This indicates the significant numbers of ethno medicinal plants were being cultivated at home garden by study area community. Possible reason could be decline in wild plant resources or such conservation might be indigenous practices of the study area community.

Table 2: Reported application methods of medicinal plant remedies used in the study area

Route of administration	Number of medicinal plants	Percentage
Oral	29	53.7
Dermal	13	24.1
Nasal	5	9.6
Both oral and Dermal	7	13

The medicinal plants were applied through different routes of administration like oral, dermal, nasal and oral or dermal routes. However, oral application (29 preparations, 53.7%) was the highest and most commonly used route of application followed by dermal application (13 preparations, 24.1%) (Table 2). The study result consistent with other ethnobotanical research elsewhere in Ethiopia for example [10, 17, 25, 6] showed oral is frequently reported as route of application.

In this study Traditional healers reported to process remedies mainly through crushing (53.70%), squeezing (25.93%), chewing (16.67%), and cooking (3.70%) (Table 3). Traditional healers reported that crushing is major preparation methods while squeezing and chewing second most used way of processing medicinal plants in this regards similar studies reported crushing widely used way of preparation. For example, [4] and many other previous studies such as that of [2] reported crushing application is frequently used preparation method

Table 3: Methods of medicinal plant preparation

Mode of preparation	Number of species	Percentages %
Crushing	29	53.70
Squeezing	14	25.3
Chewing	9	16.70
Cooking	2	3.70

MED-27	<i>Amaranthus thunbergii</i>	Amaranthaceae	Oromie	H	Constipation	St,L
MED-26	<i>Leucas deflexa</i> Hook. F.	Lamiaceae	Dunfurie	H	Bloodpressure	Fr, L
MED-09	<i>Withania somnifera</i> (L.)	Solanaceae	Hidebudie**	H	Evil eye	L,St
MED-19	<i>Cucumis ficifolius</i>	Cucurbitaceae	Hiddiharrie*	Cl	Stomach ache	R
MED-01	<i>Artemisia absinthium</i>	Asteraceae	Sakayo	H	Evil spirit	L
MED-05	<i>Commelina imberbis</i> Ehrenb. Ex Hask	Commelinaceae	--	T	Asthma	L,St
MED-28	<i>Commelina Africana</i>	Commelinaceae	Hollegebis	H	Allergic disease	St
MED-15	<i>Pycnocycla glauca</i> Lindl.	Apiaceae	Sukar	Sh	Stomach problem	L
MED-03	<i>Ocimum urticifolium</i> Roth	Lamiaceae	Dammakessie	H	Common cold	L
MED-36	<i>Kalanchoe marmorata</i> Bak.	Crassulaceae	wohachber	Sh	Wound	L
MED-17	<i>Kalanchoe equartiniiana</i> A. Rich	Crassulaceae	Bitu	H	Ear disease	L
MED-08	<i>Hydrocotyle manni</i> L.	Apiaceae	--	H	Stomach disease	L
MED-37	<i>Portulaca</i> Sp.	Portulacaceae	JebrieBuki	Sh	Bleeding disease	F
MED-02	<i>Kleinia odora</i> (Forssk.)	Asteraceae	Wushie	H	Herat disease	L,St
MED-04	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Kinina	T	Malaria Fungal infection, intestinal worms	L,Fl
MED-07	<i>Commicarpus sinuatus</i> Meikle	Nyctaginaceae	Kontom*	H	Throat infection	L,R
MED-11	<i>Cucumis dipsaceus</i> Ehrenb. ex Spach	Cucurbitaceae	Hare goge*	H	Snake bite, wound,Hepatitis	R, F
MED-14	<i>Oncoba spinosa</i> Forssk	Flacourtiaceae	Jilbo	T	Eye disease	FR
MED-18	<i>Heliotropium aegyptiacum</i> Lehm.	Boraginaceae	Maadaaris	H	Constipation	R
MED-12	<i>Euclea racemosa</i> Murr ssp. <i>Schimperi</i> A. Dc	Ebenaceae	Miesaa	Sh	Joint pain	L
MED-35	<i>Opuntia ficus indica</i> (L.) Miller	Cactaceae	Tini	Sh	Hair fungus	L
MED-21	<i>Portulaca oleracea</i> L. sub-sp. <i>Oleracea</i>	Portulacaceae	Merere hare	H	Gastritis,Fungal infection	L
MED-16	<i>Tamarindus indica</i> L.	Fabaceae	Roka	T	Stomachache/parasite Malaria	F, Fl,S
MED-34	<i>Ziziphus spina-christi</i> (L.) leaf.	Rhaminaceae	Kurkura	T	Diarrhea	L
MED-25	<i>Grewia ferruginea</i> Hochst. ex A. Rich.	Tiliaceae	Bururi*	Sh	Kidney infection Intestinal parasite	Fr
MED-33	<i>Aloe pirottae</i> Berger	Aloaceae	Hargeysa	Sh	Malaria, Snake bite,Insect repellent	L
MED-38	<i>Acacia brevispica</i> Harms	Fabaceae	Hamaresa	Sh	Headache	L
MED-39	<i>Acokanthera schimperi</i> (A. Dc) Schweinf.	Appocynaceae	Kararo	Sh	Malaria Tonsillitis	St, L
MED-40	<i>Agave sisalana</i> Perrine ex. Engl.	Agavaceae	Algee**	H	Black leg	R
MED-41	<i>Eucalyptus globules</i> Labill.	Myrtaceae	Baarzaafiadii	T	Cough,Evil spirit	L
MED-42	<i>Foeniculum vulgare</i> Miller	Apiaceae	Insilaalii	H	Urine retention	L
MED-43	<i>Linum Usitatissimum</i> L.	Linaceae	Talbaa**	H	Constipation	S
MED-44	<i>Nicotian atabacum</i> L.	Solanaceae	Tambo**	H	Leech, Skin fungus	L
MED-45	<i>Podocarpus falcatus</i> (Thunb.) R.B. ex. Mirb.	Podocarpaceae	Birbirs	T	Bird disease	L
MED-46	<i>Ruta chalepensis</i> L.	Rutaceae	Xenaaddaa	Sh	Fever,Stomachache,Headache	L
MED-47	<i>Senna italic</i> Mill.	Fabaceae	Fitii	H	Cough	L,Fr
MED-48	<i>Sida schimperiana</i> ochst. exA. Rich.	Malvaceae	Harmellaa**	Sh	Evil eye, Intestinal parasite	R, L
MED-49	<i>Vernonia amygdalina</i> Del.	Asteraceae	Ebichaa	Sh	Internalparasites,Hair Fungus	L
MED-50	<i>Carica papaya</i> L.	Caricaceae	Papaya	Sh	Malaria,Heart disease	L
MED-51	<i>Citrus limon</i> (L.)	Rutaceae	Loomii**	Sh	Stomach ache	Fr
MED-52	<i>Lagenari asiceraria</i>	Cucurbitaceae	Buqqe	Cl	Fungus disease	Fr
MED-53	<i>Carissa spinarum</i> L	Appocynaceae	Hagam	Sh	Head ache,Stomach ache,	L
MED-54	<i>Thymus schimperi</i>	Amiaceae	Masoleba	H	headaches, cough	L, Fr
MED-23	<i>Lantana camara</i> L.	Verbenaceae	Bekerkitie	Sh	Fungi	L

Habit: Sh-shrub, T-tree, Cl-climber, H-herb; Part used:-R-root, L-leaf, St-stem, Fl-flower, Fr-fruit, S-Seed Symbol:-**Medicinal plant used both animal and human, * medicinal plant used only for animal, others used only for human

4. Conclusion and Recommendation

The study revealed that a total of 54 medicinal plants were used to treat both human and livestock disease in the study area. It indicates that the study area community has a rich tradition of plant use for human and livestock disease treatment. This finding will fill knowledge gap on ethnobotanical studies and also provide baseline data future

pharmacological investigations. The study result also indicated that the local community used traditional medicine widely, not only because of limited health facilities but also it is part of their life, culture and even sources of income for some traditional healers. Besides, Harar is very ancient city of Horn Africa and world heritage site hence; accumulated indigenous knowledge for thousands of years could be a

reason for a rich traditional knowledge on medicinal plants use and its conservation. But study on efficiency proof and marketing for traditional medicine is not yet done. Hence, urgent action is required to integrate traditional herbal knowledge into national research agenda in order to generate baselines information's. Therefore, this study recommends that, extensive inventory of medicinal plants; establishing priority species for in-situ and ex-situ conservation, providing awareness for traditional healer, encouraging home garden cultivation of rare species, incorporate community knowledge into formal research and education before complete lost. Furthermore, there is urgent need for key national level laboratory for basic research on medicinal plant pharmaceutical efficiency, product development and packaging should be considered to benefit the knowledge holders and the nation at large.

5. Abbreviations

NPSAP: National Biodiversity Strategy and Action Plan

5.1 Availability of data and materials

The datasets analyzed during the current study are available from the corresponding author on request.

5.2 Authors' Contribution

Field data collection was done by Yeneayehu Fentehun and Taher Abdella while data analysis and manuscript writing was performed by Girma Eshetu. Specimen identification was done by Abebe Worku. All authors agreed on final manuscript.

5.3 Competing interests

The authors declare that they have no competing interests

5.4 Funding

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