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Research Article

Survey of Medicinal Plant in Kombolcha, Dessie and Hayek Markets Used by Indigenous People of Wollo, Ethiopia

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ABSTRACT

Ethnobotanical study on traditional medicinal plants were conducted between April and May, 2019 in Kombolcha, Dessie and Hayek markets and documented different types of traditional medicinal plants used by the indigenous peoples. The study was focused on identifying medicinal plants, disease treated, part of the plant used, methods of preparation and route of administration. The data was collected using interview and questionnaires by selecting 97 informants and 3 traditional healers using random and purposive sampling method, respectively. A total of 69 medicinal plant species were collected and identified from the study area for treating 35 human aliments. Out of these 44 (63.7%) were wild whereas 15 (21.7%) of them were cultivated and 10 (14.6%) were wild and cultivated plants. The most dominant plant part was leaf (40.8%) followed by root (15.9%). The route of administration was oral administration about 55 (40.44%) and the most common method of preparation is crashing and squeezing 55 (40.4%).

Keywords: Medicinal plant; Healers; Kombolcha; Tehuledere; Kalu; Hayek

INTRODUCTION

Ethnobotany is the study of the interaction between plants and people, with a particular emphasis on traditional tribal cultures. According to World Health Organization (WHO), traditional medicine is defined as the sum total of all knowledge and practice, in the diagnosis, prevention and elimination of physical, mental or social unbalances. These practical experiences and observations are being transferred from generation to generation, either verbally or in writing. About 85% of world population uses herbal medicines for prevention and treatment of diseases. Approximately 20% of known plants have been used in pharmaceutical studies, affecting the healthcare system in positive ways such as treating cancer and harmful diseases [1]. About 80% of the total population of Ethiopia is depending on traditional medicine to treat different types of human ailments [2].

Traditional knowledge of medicinal plants and their use by indigenous healers and drug development in the present are not only useful for conservation of cultural tradition and biodiversity but also for community health care and drug development in the local people [3]. The indigenous knowledge on medicinal plants appears when humans started and learned how to use the traditional knowledge on medicinal plants [4,5].

Plants are rich in many bioactive compounds. High concentrations of phytochemicals, which may protect against free radical, mostly accumulated in fruits and vegetables [6]. Plants have a long history of use on the African continent for the treatment of different diseases and complaints. In certain African countries, up to 90% of the population still relies exclusively on plants as a source of medicines [3].

Ethiopia has about 800 species of plants that are used in the traditional health care system to treat mental and physical disorders. Traditional medicine remains the main resource for a large majority (80%) of the people in Ethiopia for treating health problems [7]. Ethiopia is endowed with a diverse biological resources including about 6,500 species of higher plants, with approximately 12% endemic, hence making it one of the six plant biodiversity rich regions [8].

Ethiopia is one of a medicinal plant rich country in Africa. South Wollo is one of the zone rich in medicinal plants. Most lands of this zone are steep mountain slop and not well structured to plough by the farmers and covered by medicinal plants: herbs and shrubs. Moreover, the people living in the area have been a good experience of using such medicinal plants for the treatment of diseases by transferring traditional knowledge from generation to generation through the line of families.

Despite the use of natural products over many centuries, only relatively small numbers of plant species have been studied for possible applications and the spread of this knowledge is mostly

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limited to indigenous societies. The loss of valuable plants due to population pressure, agricultural expansion, drought and deforestation is widely reported by different researchers in Ethiopia, and also indigenous knowledge in danger due to influence of civilization. Absence of legal market to sell or buy such medicinal plants is the other point that needs special attention. To the best our knowledge, no more survey studies were conducted on the marketable medicinal plants in Kombolcha, Dessie and Hayek towns, Wollo, Ethiopia. Based on these sensitive issues this research topic is selected. So, the main objective of this study was to survey medicinal plants in market in South Wollo Kombolcha, Dessie and Hayek.

METHODOLOGY

Description of study area

This study covers three towns of South Wollo; Dessie, Kombolcha and Hayek belong to Dessie Zuriya, Kalu district, and Tehuledere district, respectively (Figure 1). These districts share the same geographical boundary as shown in the figure below. Kombolcha is 25 km from Dessie in the south and Hayek is 30 km away from Dessie in North on the main road. The altitude of the study area covers both high land and low land, Dessie zuriya and partly Tehuledere are high lands and Kombolcha and other parts of Tehuledere are low lands. People living in these districts have the same culture and religion composition (Christians and Muslims).

Selection of informants

A total of 100 informants were designed for interview; 40 from Kombolcha, 40 from Dessie, and 20 from Hayek as a source of data. Three key informants (traditional healers) were proposed from each site for the local knowledge on traditional medicinal plant. The selection of key informants was designed based on the recommendation of elders and religious leaders. Other informants were selected randomly as tabulated below. Only key informant was interviewed at Kombolcha. Before the interviews, informants were instructed carefully about the method and purpose of the study, and encouraged to admit if they did not know the medicinal plant species or its uses (Table 1).

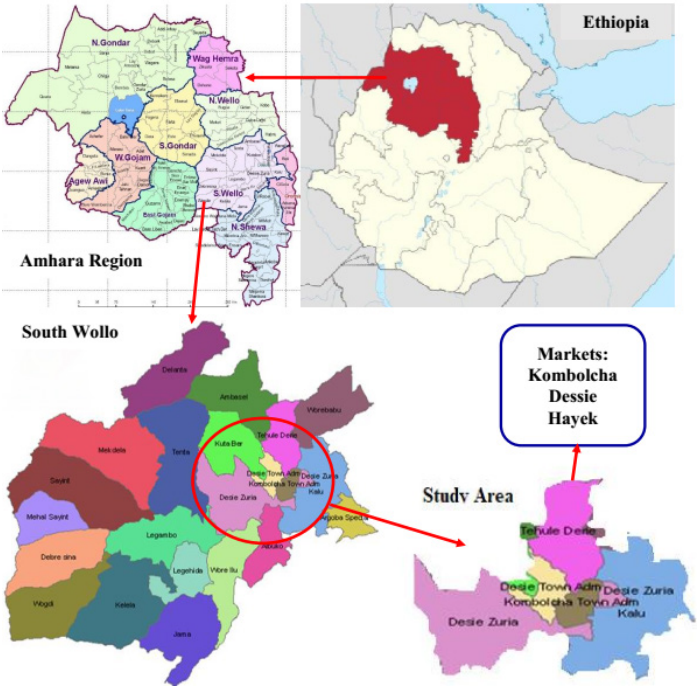

Figure 1: Map of study area.

Table 1: Selection of informants.

Study Area	Informants		
	Healers	Random	Total
Dessie	1	39	40
Kombolcha	1	39	40
Hayek	1	19	20
Total			100

Data collection

The data were obtained from primary source by interview. Base on the objective I concentrated on the needs and demands of medicinal plants by the community in towns but most of the people living in the towns are not familiar with medicinal plants. So to have valuable information, I invited some Kebele away from each town where the local people are living.

Data analysis

The data obtained from informants were tabulated, analyzed and interpreted based on the category of issues raised in the questionnaire.

RESULTS AND DISCUSSION

Distribution of medicinal plants in the survey area

As shown in Table 2, the distribution of medicinal plants was more or less the some in the study areas. Since they are sharing the same geographical location each other the data indicates that almost all medicinal plants used by the society found in each wereda are the same and highly demanded. Some plants like *Ruta chalepensis*, *Ocimum lamiifolium*, *Momordica foetida*, *Allium sativum*, *Cardamine hirsuta*, *Eucalyptus globulus* and *Withania somnifera* 100% used by the community as remedy in the study area.

A total of 69 species, belonging to 37 families were listed. Lamiaceae appeared the most dominant family that contains 8 species, followed by Astereaceae having 6 species. Next, Euphorbiaceae and Solanaceae were dominant; each family contains 4 and 5 species, respectively. Fabaceae contains 3 species, Apiaceae, Boraginaceae, Brassicaceae, Cucurbitaceae, Myrtaceae, Oleaceae, Ranunculaceae, Rhamnaceae, Rutaceae found with 2 species aand the remaining are 1 species. The dominant species used as treatment of disease in the area is Cucumis ficifolius, 11.7% followed by equal percentage of Calpurina aurea and Croton macrostachyus, 10%.

Parts of plants used for remedy

The data collected from informants in the study areas indicated that the leaves and the roots were the most commonly used plant parts in the preparation of remedies accounting for 40.62% and 15.9% of the total medicinal plants, respectively as shown in Table 3. Analysis of the data showed that leaf is the most sought plant part in the preparation of remedies. Sets of works that were carried out previously elsewhere in Ethiopia also revealed that leaves followed by roots were the common plant parts used to treat various health problems [9].

Diseases categories and treatment

Based on the informants, disease treated by medicinal plants in the study area are related to wound and skin, gastrointestinal problems, associated with respiratory diseases, sun strike and livestock diseases. The types of diseases and their remedy are given in Table 4 below.

Table 2: Lists of medicinal plants in the study area.

S.No	Scientific Name	Family	Parts of plant used	No of Informants			
				Ko/cha	Dessie	Hayek	%
1	*Ruta chalepensis*	Rutaceae	W	30	28	14	
2	*Carduus nyassanus*	Asteraceae	S	5	2	4	
3	*Datura stramonium*	Solanaceae	L	24	21	12	
4	*Phytolacca dodecandra*	Phytolaccaceae	S & L	19	21	12	
5	*Otostegia integrifolia*	Lamiaceae	W	11	9	9	
6	*Clematis simensis*	Ranunculaceae	L	2	3	6	
7	*Artemisia abyssinica*	Asteraceae	L	13	20	7	
8	*Calpurunia aurea*	Fabaceae	L & ST	5	18	8	
9	*Cucumis ficifolius*	Cucurbitaceae	S & ST	9	5	8	
10	*Ferula communis*	Apiaceae	L	1	10	7	
11	*Kalanchoe citrina*	Crassulaceae	L	6	14	7	
12	*Lippia adoensis*	Lamiaceae	L	24	18	9	
13	*Myrtus communis*	Myrtaceae	L	29	12	7	
14	*Ocimum lamiifolium*	Lamiaceae	L	30	28	14	
15	*Ricinus communis*	Euphorbiaceae	S	1	3	1	
16	*Momordica foetida*	Cucurbitaceae	L	30	28	14	
17	*Allium sativum*	Alliaceae	ST	30	28	14	
18	*Salvia merjamie*	Lamiaceae	S	16	17	3	
19	*Nigella sativa*	Ranunculaceae	S	12	10	7	
20	*Croton macrostachyus*	Euphorbiaceae	L	24	22	9	
21	*Crinum abyssinicum*	Amaryllidaceae	ST	4	1	-	
22	*Cynoglossum coeruleum*	Boraginaceae	L	1	-	2	
23	*Euphorbia schimperiana*	Euphorbiaceae	L	2	1	2	
24	*Inula confertiflora*	Asteraceae	L	3	2	-	
25	*Malva verticillata*	Malvaceae	R	1	14	3	
26	*Rhamnus prinoides*	Rhamnaceae	L	20	15	6	100%
27	*Piper nigrum*	Piperaceae	L & S	8	1	2	
28	*Carissa edulis*	Apocynaceae	R	2	1	6	
29	*Justicia schimperiana*	Acanthaceae	L	1	2	2	
30	*Cardamine hirsuta*	Brassicaceae	L & S	30	28	14	
31	*Echinops kebericho*	Asteraceae	R	22	17	10	
32	*Vernonia schimperi*	Asteraceae	L	11	10	1	
33	*Ziziphus mauritiana*	Rhamnaceae	S	9	-	2	
34	*Leonotis ocymifolia*	Lamiaceae	L	2	-	1	
35	*Verbasicum sinaiticum*	Sclrophulariaceae	L & R	21	23	9	
36	*Clerodendrum myricoides*	Lamiaceae	L	4	2	1	
37	*Clutia lanceolata/ abbysinica*	Euphorbiaceae	L	1	12	4	
38	*Solanum incanum*	Solanaceae	L & S	14	21	12	
39	*Asparagus officinalis*	Asparagaceae	R	3	-	4	
40	*Capparis tomentosa*	Capparidaceae	R	15	-	8	
41	*Jusminum grandiflorum*	Oleaceae	L & R	1	1	4	
42	*Eucalyptus globulus*	Myrtaceae	L	30	28	14	
43	*Citrus aurantiifolia*	Rutaceae	L	13	11	9	
44			L	22	-	-	
45	*Cordia africana*	Boraginaceae	L & S	1	3	4	
46	*silene macroselen*	Caryophyllaceae	R	2	-	-	
47	*Dodonaea angustifolia*	Sapindaceae	L & R	12	-	10	
46	*Acacia abyssinica*	Fabaceae	R	9	1	1	
49	*Rumex nervosus*	Polygonaceae	L & R	1	2	1	
50	*Moringa stenopetala*	Moringaceae	W	2	-	1	
51			R	1	-	2	

52	*Tagetes minuta*	Asteraceae	L	1	-	3
53	*Carica papaya*	Caricaceae	L	-	-	2
54	*Brassica carinata*	Brassicaceae	L	-	4	2
55	*Rosa abyssinica*	Rosaceae	R & ST	9	-	5
56	*Nicotiana tabacum*	Solanaceae	L	1	-	2
57	*Coriandrum sativum*	Apiaceae	S	10	2	9
58	*Olea europaea*	Oleaceae	W	1	-	-
59	*Premna schimperi*	Lamiaceae	W	3	-	1
60	*Linum usitatissimum*	Linaceae	S	12	21	7
61	*Crotalaria spinosa*	Fabaceae	R	-	-	1
62	*Sorghum bicolor*	Poaceae	S	21	17	8
63	*Aloe macrocarpa*	Aloaceae	W	12	10	9
64	*Euclea racemosa*	Ebenaceae	R	2	-	1
65	*Impatiens tinctoria*	Balsaminaceae	R	-	7	6
66	*Euphorbia abyssinica*	Ephorbiacea	L	-	-	2
67	*Thymus schimperi*	Lamiaceae	L	1	3	-
68	*Withania somnifera*	Solanaceae	ST	29	28	14
69	*Solanum nigrum*	Solanaceae	L & S	7	2	3
Total number of medicinal plants in the study area				65	51	64

Table 3: Parts of plants used for remedy.

S.no	Plant part used	No of plants in study area	Total %
1	Root only	11	15.9
2	Leaf only	28	40.6
3	Seed/fruit	8	11.6
4	Steam/bark	3	4.3
5	Root and leaf	4	5.8
6	Root and steam	1	1.4
7	Leaf and steam	1	1.4
8	Leaf and seed/fruit	6	8.71
9	Seed and Steam	1	1.4
10	Whole part	6	8.71
	Total	**69**	**100**

Table 4: Diseases and medicinal plants used for remedy.

S.no	Name of disease	Medicinal Plants
1	Sun strike	*Ocimum lamiifolium, Eucalyptus globulus, Momordica foetida, Allium sativum, Tagetes minuta, Cynoglossum coeruleum*
2	Stomach ache	*Ruta chalepensis, Cucumis ficifolius, Malva verticillata, Verbasicum sinaiticum, Sida schimperiana, Rumex abyssinicus, Citrus aurantiifolia, Allium sativum, Brassica carinata, Foeniculum vulgare, Myrtus communis, Vernonia amygdalina*
3	Joints pain*	*Carissa edulis, Capparis tomentosa, Justicia schimperiana, Croton macrostachyus, Impatiens tinctoria, Cucumis ficifolius, Croton macrostachyus, Jusminum grandiflorum*
4	Evil eye/spirit	*Clerodendrum myricoides, Calpurunia aurea, Otostegia integrifolia, Echinops kebericho, Dodonaea angustifolia, Withania somnifera, Artemisia abyssinica, Silen macrosclen, Capparis tomentosa, Rosa abyssinica, Carissa edulis, Piper nigrum, Echinops kebericho*
5	Malaria	*Rhamnus prinoides, Cordia africana, Allium sativum*
6	Snake bite/poison	*Asparagus officinalis, Nicotiana tabacum, Allium sativum, Solanum incanum*
7	Wound	*Carduus nyassanus, Momordica foetida, Cucumis ficifolius, Euphorbia schimperiana, Dodonaea angustifolia, Euphorbia abyssinica*
8	Vomiting	*Salvia merjamie, Allium sativum, Nigella sativa, Clerodendrum myricoides, Justicia schimperiana, Vernonia amygdalina*
9	Gastritis	*Linum usitatissimum, Thymus schimperi*
10	Bone fractured	*Kalanchoe citrina, Sorghum bicolor, Asparagus africanuss*
11	Tonsillitis	*Jusminum grandiflorum, Rhamnus prinoides, Piper nigrum*
12	Ringworm	*Cynoglossum coeruleum, Solanum nigrum, Croton macrostachyus, Datura stramonium,*
13	Rh disease	*Clutia lanceolate*
14	Impotency	*Cucumis ficifolius, Aloe macrocarpa*

15	Hypertension	*Moringa stenopetala, Thymus schimperi*
16	Eczema	*Cucumis ficifolius, Clutia lanceolate, Rumex nervosus, Calpurina aurea, Dodonaea angustifolia*
17	Dandruff	*Datura stramonium, Croton macrostachyus, Vernonia schimperi, Ziziphus mauritiana, Calpurina aurea*
18	Tuberculosis	*Croton macrostachyus, Calpurunia aurea*
19	Tooth pain	*Datura stramonium, Premna schimperi, Cardamine hirsute, Euclea racemosae, Inula confertiflora, Olea europaea*
20	Yellow fever	*Cucumis ficifolius, Piper nigrum*
21	Skin disease	*Myrtus communis, Clutia lanceolate, Rumex nervosus, Ziziphus mauritiana, Cucumis ficifolius, Datura stramonium, Impatiens tinctoria*
22	Fire burn	*Rumex nervosus, Aloe macrocarpa*
23	Herpes Zoster	*Clerodendrum myricoides, Premna schimperi, Olea europaea, Asparagus officinalis*
24	Emergency	*Foeniculum vulgare, Carduus nyassanus, Croton macrostachyus, Justicia schimperiana, Otostegia tomentosa*
25	Bloating	*Ferula communis, Asparagus officinalis, Brassica carinata, Crinum abyssinicum, Datura stramonium*
26	Donkey disease	*Inula confertiflora*
27	Cattle disease	*Inula confertiflora, Croton macrostachyus, Justicia schimperiana*
28	Insecticide	*Calpurunia aurea, Solanum incanum, Otostegia integrifolia, Phytolacca dodecandra*
29	Diarrhea	*Leonotis ocymifolia, Acacia abyssinica, Calpurina aurea, Cucumis ficifolius*
30	Bleeding nose	*Solanum incanum, Asparagus officinalis*
31	Allergies	*Vernonia schimperi*
32	Hemorrhoids	*Justicia schimperiana, Euphorbia abyssinica*
33	Cough	*Allium sativum, Artemisia abyssinica, Coriandrum sativum, Calpurunia aurea, Lippia adoensis, Thymus schimperi*
34	Asthma	*Capparis tomentosa*
35	Eye infection	*Carissa spinarum, Inula confertiflora, Linum usitatissimum, Premna schimperi*

The name of disease given by the surveyor

Preparation for treatment

In the collection of data concerning the preparation of medicine, informants have responded various skills associated with medicine preparation. These include plant composition (whether single or combined), condition of plant material used (fresh or dry) and methods of preparation. The informants in the study area agreed that most remedies were prepared from combined plant rather than single plant species. The most dominantly used preparation methods are given in the Table 5.

Administration

The dosage of medicinal plant is varying from place to place in the study area. In some case they used cup and in other case used bottle for oral treatment. The key informants revealed that through their long time experience, there was no any problem related to dosage. However, they suggested that care has to be taken whenever we use plants as remedy. Most of the medicinal plants, 40.44%, in the study area are oral followed by smoking (steaming) and dermal 24.3% and 19.12%, respectively, as indicated in Table 6.

Market of medicinal plants

Based on the information gathered from informants there are no medicinal plants that are sold in the market legally. Except smoking barks, eg. *Carissa edulis*, Chat and *Nicotiana tabacum*, other medicinal plants are not accessible in the market. During the interview at each town the informants responded that most healers prepared and sold traditional medicines in their home rather than selling in the market. Most people practice those plants as remedy are unwilling to buy such medicines at any market. Because respondents believed that the plant material will be effective for remedy when collected by especial gifted persons and paid its price otherwise it will be passive. However, some medicinal plants were marketed but only for other use values like food, spices, smoking, steaming and cleaning purpose but not every market day.

Table 5: Preparation of medicinal plants for treatment.

S.no	Methods of preparation	No of medicinal plants	% medicinal plants
1	Powdering	27	19.9
2	Boiling	6	4.4
3	Crushing and squeezing	55	40.4
4	Smoking or inhaling	33	24.3
5	Chewing	15	11
	Total	**136**	**100**

Table 6: Administration of remedy.

S.no	Mode of administration	No of medicinal plants	Percentage (%)
1	Oral	55	40.44
2	Dermal	27	19.12
3	Eye	5	3.7
4	Nasal	6	4.4
5	Smoking (steaming)	33	24.3
6	Other	10	7.3
	Total	136	100

CONCLUSION

Ethnobotanical study one a key instruments that give valuable information about natural products, medicinal plants. People living in the developing country needs an alternative source of medicine for disease remedy because of the rising cost of artificially made medicines. Ethiopia is one of the developing country and rich in natural products, medicinal plants. About 80% of the total population of Ethiopia is depending on traditional medicine to treat different types of human ailments. South Wollo is one of the regions covered by high dominancy of medicinal plants

and accumulation of indigenous knowledge. However, due to some reason this resource and knowledge stagnant only in the community.

This survey research indicates that there are more than 69 species of medicinal plants in the area but the way of transferring indigenous knowledge and accessing medicinal plant to the market needs especial attention. Moreover, the people living in the area have been a bad experience of using lands by deforestation. As the informants responded, such valuable medicinal plants are in danger due to population pressure, agricultural expansion, drought, deforestation and overgrazing. Even though this is the case the study area is still rich in medicinal plants and people living there are using such plants for treatment of diseases.

DATA AVAILABILITY

All the necessary supplementary data will be available on the request of authors.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

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