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Ethnobotanical study on medicinal plants used by indigenous people in Tenta District, South Wollo, Ethiopia

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Ethnobotanical study on medicinal plants was conducted in Tenta District, South Wollo, Ethiopia from December 2016 to May 2017. Data were collected using guided field walk, semi-structured interview, group discussion and direct field observation. Data were analysed using descriptive statistics and response compared with chi-square test. The results documented 121 species of medicinal plants under 98 genera and 53 families based on local medicinal values. Of the total species recorded, Fabaceae contributed higher number (12) of medicinal plant species. Majority of plants (63.5%) were harvested from wild habitat and 16.5% from home garden. Shrubs (44.1%) were the major plant types followed by herbs (30.5%) and trees (12.7%). Pearson correlation analysis (r = 0.44) indicated that there was significant increase of knowledge about medicinal plants as age increases. According to the present study, the existence of a number of medicinal plants is an indication of the presence of ample traditional medicinal knowledge among the community but these curative medicinal plant species decline from time to time. This calls for urgent and collaborative actions to keep the balance between medicinal plants availability and their utilization by the community.

Key words: Ethnobotany, indigenous knowledge, medicinal plants, Tenta District, traditional healers.

INTRODUCTION

Medicinal plants make important contributions in the healthcare system of indigenous people as the main source of medicine for the majority of the rural populations. Plants serve as food, medicines, fuel, fodder and construction materials. They have also ritual or magical values (Abbink, 1995). They play a key role in the development of modern medicines (Pramono, 2002). Humans started to use plants for their livelihood long ago (Martin, 1995). Over centuries, indigenous people have developed their own locality specific knowledge on plant use, management and conservation (Cotton, 1996). The use of medicinal plants by indigenous people is mainly achieved through accumulation and transfer of knowledge from one generation to the next (Cunningham, 1996).

Plant diversity remains crucial for human well-being and provides a significant number of remedies required in healthcare. Medicinal plants played a pivotal role in the treatment of various problems in Ethiopia (Fekadu, 2007). For the role to be played by plant-derived products in human and livestock health care, systematic scientific investigation is vital. Due Attention was not given to

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ethnobotanical studies in the past decades in Ethiopia (Dawit et al., 2001). However, there exists an accelerated devastation of plant resources with loss of indigenous knowledge. There is a need to develop a sound research strategy and program for medicinal plants conservation, utilization and documentation including their location, existing population, places of conservation, and known traditional uses. When this documentation is achieved, it would be necessary to identify priority species for further work on characterization and data sharing through national, regional and international collaboration. Previously, no ethnobotanical study of medicinal plants was conducted in the study area. Therefore, the main objective of the study was to investigate the use and management of medicinal plants and to document the associated ethnobotanical knowledge by the indigenous people of Tenta District.

MATERIALS AND METHODS

Description of the study area

Tenta District is found in the South Wollo Zone of the Amhara Regional State, northern Ethiopia about 545 km away from the capital Addis Ababa. It is located at a latitude 11°19′N and longitude 39°15′E with average elevation of 2972 m a.s.l. (Figure 1). The average temperature of the area ranges from 4-40°C. The climate is dry where the average annual rainfall is between 700 and 1100 mm. Therefore, the rainfall is bimodal in nature with two main rainy seasons (from June to August and from February to April) (Teferi, 2013).

Reconnaissance survey

A reconnaissance survey was conducted from December 2016 to January 2017. The study was carried out in the natural forest of the district mainly in 17 kebeles (peasant associations), ten of which have forest.

Sampling design

The study was conducted in 17 kebeles of Tenta District by following rapid ethnobotanical appraisal research procedure. The selection of kebeles was made systematically based on the information gathered on the relative status of forest coverage, settlement, different agro climatic zones and availability of practitioners. Key informants were selected based on the seniority of age in the community; local residency for a period of not less than 20 years; knowledge of forest plants in the local dialect and well versed with their use(s). Current or previous experience as herbalist was preferable.

Data collection

Actual data collection was conducted from February to May 2017. A total of 96 key informants (59 males and 37 females), were purposively selected based on their age, length of stay in the area and gender. A key informant was identified from each kebele in the study area for detail discussion about the medicinal plants. A semi-structured questionnaire guided by a mix of closed and open-ended questions was employed. Using field observation, 22 plant species were collected from the study area. Medicinal plant species were also collected from natural vegetation and home garden.

Data analysis

Data were analyzed using descriptive statistics and responses compared using chi-square test. Informant consensus factor (ICF) was calculated for categories of ailments to identify the agreements of the informants on the reported cures using the formula used by Tilahun and Mirutse (2007):

ICF = nur - nt /nur -1

Where, ICF is the Informant consensus Factor, Nur is the number of use citation and Nt is the number of species used.

RESULTS

Medicinal plant resources in the study area

A total of 121 plant species from 98 genera and 53 families were recorded as having medicinal value in the study area. About 56.2% of the medicinal plants were collected from the wild and 23.9% from home gardens and the rest was from both wild and home garden. The leading family was Fabaceae with 12 species, followed by Lamiaceae with 6 species, Asteraceae, Cucurbitaceae, Euphorbiaceae and Solanaceae each with five species.

Distribution of medicinal plants in the study sites

Of the 121 medicinal plant species identified, the highest (72.7%) proportion was recorded in Yemit and the least (19%) in Gaya (Table 1). There was no significant difference (χ^2= 12, df =9, P > 0.05) between agro climatic zone and availability of medicinal plants. There was no significant difference (χ^2= 221, df =16, P > 0.05) with respect to different kebeles and the number of medicinal plants available in the study area.

In the study area, some cattle diseases were treated with various medicinal plant species. For instance, wound was treated with 12 medicinal plants. The Informant Consensus Factor (ICF) was between 0.71 and 1 which indicates the presence of high valid information in the treatment of cattle disease in the study area (Table 2).

Most human diseases are treated with different medicinal plants and the ICF was between 0.79 and 1 which indicates the agreement of information in the study area. Stomach ache and wound, are treated with 14 and 12 plant species, respectively with high ICF (Table 3).

Among the medicinal plants reported by the local people, 57.85% were used to treat human ailments whereas the least was recorded for livestock aliments (Table 4).

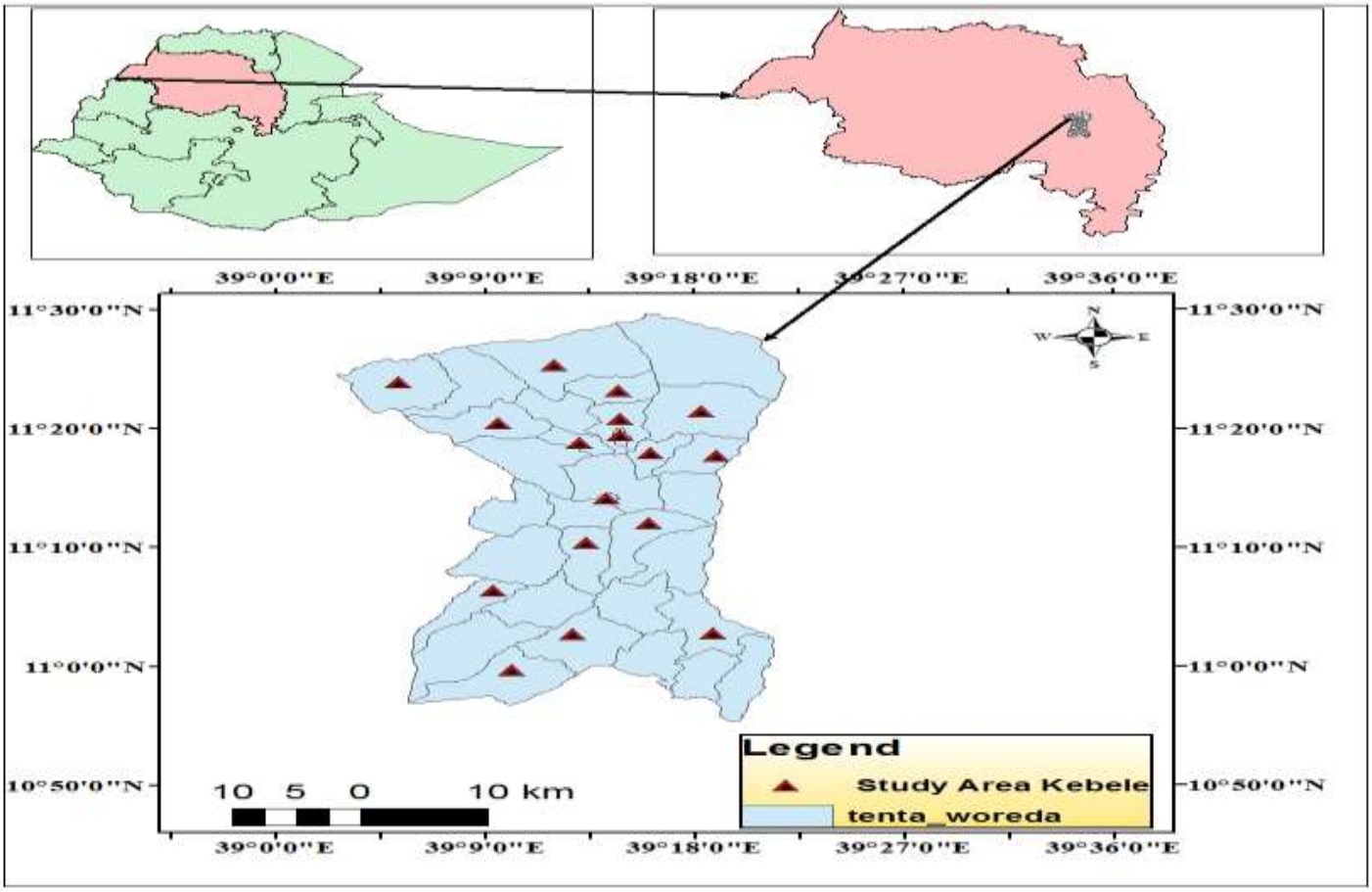

Figure 1. Map of the study area and sample sites.

Table 1. Distribution of medicinal plants in the study area.

Kebeles	Number of informants	Number of medicinal plants available
Chelemie	6	68(59.2%)
Yemit	7	88(72.7%)
Yamed	6	53(43.8%)
Tedat	6	72(59.5%)
Tenta town	6	35(28.9%)
Adjibar town	5	33(27.3%)
Billa	6	66(54.5%)
Debek	6	70(57.9%)
Yederek	7	81(66.9%)
Gafa	6	81(66.9%)
Baja	6	81(66.9%)
Sengola	4	75(62%)
Wata	6	59(48.8%)
Wortej	4	47(38.8%)
Meserbi	4	32(26.4%)
Zakunat	5	39(32.2)
Gaya	5	39(32.2)
Total	96	121(100%)

Table 2. Major livestock diseases and number of ethno veterinary plant species used treat livestock by indigenous people of Tenta District.

Disease treated	Total species	Percentage	Number of use reports	ICF value
Anthrax	1	1.53	28	1
Bloating	4	6.55	33	0.9
Coccidiosis	2	3.27	25	0.95
Cough	5	8.19	45	0.91
Diarrhoea	8	13.11	43	0.83
External parasites	3	4.91	44	0.95
Leeches	3	4.91	79	0.97
Rabies	8	13.11	39	0.71
Scabies	1	1.53	21	1
Snake poison	1	1.53	35	1
Wound	12	18.46	51	0.78
Internal parasites	3	4.91	19	0.89

Table 3. Major human diseases and number of ethno medicinal plant species used to treat human and ICF value by indigenous people of Tenta District.

Disease treated	Total species	% total	Number of use reports	ICF value
Abdominal pain	8	6.61	91	0.92
Amoeba case	3	2.48	87	0.97
Ascaris	2	1.65	53	0.98
Common cold	5	4.13	89	0.95
Cough	5	4.13	86	0.95
Dandruff	4	3.31	75	0.95
Diarrhoea	8	6.61	84	0.79
Dysentery	2	1.65	65	0.98
Eye Infection	2	1.65	63	0.98
Febrile illness	7	5.79	58	0.89
Fever	5	4.13	61	0.93
Gastritis	5	4.13	69	0.94
Head ache	5	4.13	85	0.96
Heart disease	2	1.65	35	0.97
Internal parasite	3	2.48	72	0.97
Dermal fungus	2	1.65	19	0.94
Stomach ache	14	11.57	86	0.96
Taeniasis	4	3.31	89	0.96
Wound	12	9.92	92	0.87
Lung diseases	1	0.83	39	1
Malaria	5	4.13	45	0.9

Table 4. Medicinal plants used to treat human, livestock and both human and livestock ailments

User	Number of plant species	Percentage
Human	70	57.85
Livestock	17	14.05
Both human and livestock	24	28.1
Total	121	100

Table 5. Preparation methods of the reported traditional medicinal plants.

Methods of preparation	Total preparation	%
Homogenizing in water	10	2.7
Crushing	17	11.6
Decoction	3	2.1
Squeezing	10	2.7
Chewing	11	7.5
Smoking/fumigating	16	10.9
Chopping	4	2.7
Extract with cold water	8	5.5
Concoction	4	2.7
Roasting	1	0.7
Rubbing	4	2.7
Wrapping	2	1.4
Sniffing	3	2.1
Boiling	5	3.4
Grinding	10	2.7
Heating	1	0.7
Swallowing	4	2.7
Pounding	22	15.1
Tying	8	5.5
Maceration	3	2.1
Total	146	100

Plant parts used for remedy preparation

Plant parts were prepared as medicine using fresh materials that accounted for 79%, and dried plant materials accounted for 21 %. Widely used plant parts by the people to treat human and livestock diseases include leaves, roots, barks, and stems. Majority of plant species (47.8%) were harvested for their leaves, followed by roots (14.5%), barks (9.8%), and stems (8.3%). According to informants, 91.5% of herbal preparations were from fresh plant parts followed by dried parts.

Preparation, dosage and route of administration of medicinal plants

The local communities of the area employ several methods of preparation of traditional medicines from plants. The result revealed that herbal medications were prepared differently. They often had a preference of mixing two or more medicinal plants to avoid or minimize side effect of the remedies. Most of the remedies were prepared by squeezing whereas only few species were used as medicine without being processed (Table 5).

There were different routes of administration of medicinal plants prepared by indigenous people. The main routes of administration in the study area were oral, dermal, optical, nasal, anal and sometimes mixed. Most (60.7%) medicines were administered orally followed by dermal route (15%) (Figure 2).

Indigenous knowledge transfer

A total of 43.8% of the respondents acquire medicinal plant knowledge from father/mother and least (8.3%) of the respondent obtain medicinal plant knowledge from their uncle/aunt (Table 6). There was significant difference (χ^2 =52.63, df =5, P<0.05) among respondents in transfer of indigenous knowledge about medicinal plants to the next generation.

Respondents varied (χ^2= 24.65, df =7, P <0.05) in terms of knowledge transfer about medicinal plants. Transfer of traditional knowledge from parent to elder son accounted for 25% followed by transfer to eldest daughter (17.8%) (Table 7).

DISCUSSION

According to the present study, family Fabaceae contributed the highest medicinal plant species followed by Lamiaceae and Astraceae. Similarly, other studies also showed large number of plant species from family Fabaceae used for medicinal purposes compared to other families (Abrha, 2008; Haile et al., 2008; Seyoum, 2009; Behailu, 2010).

Majority of the medicinal plants recorded in the present study were used to treat human ailments. Similarly, a study conducted in Bale Mountain National Park, Ethiopia indicated the use of large number of medicinal plants for treating human diseases than domestic animals (Haile et

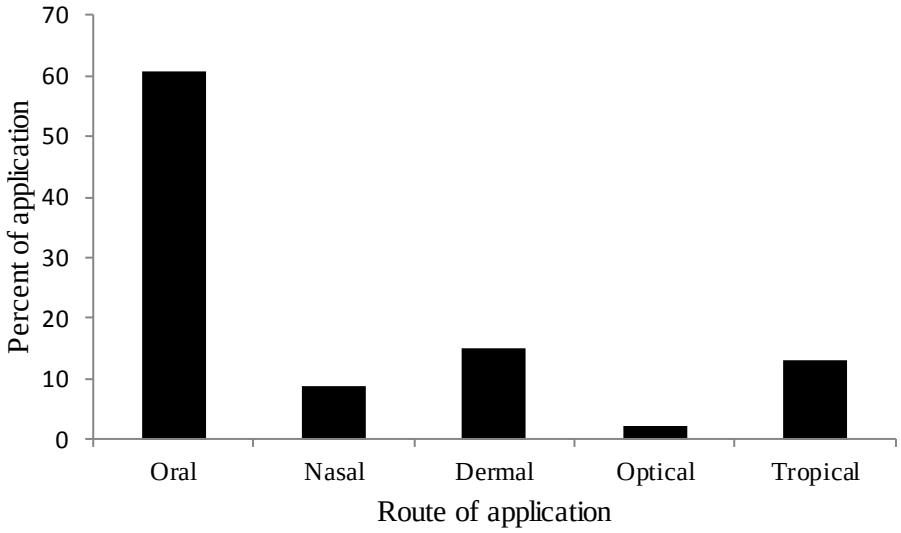

Figure 2. Route of administration.

Table 6. Sources of knowledge on the practice of traditional medicine.

Source of knowledge for	Number	Percentage
Traditional healer		
Father/ Mother	42	43.8
Wife/Husband	13	13.5
Sister/Brother	11	11.5
Uncle/Aunt	8	8.3
Neighborhood	13	13.5
Trial and error	9	9.4
Total	96	100

Table 7. Transfer of knowledge of traditional medicinal plants.

To whom knowledge is transferred to	Frequency	Percent of total
Eldest son	24	25
All children	15	15.6
Eldest daughter	18	17.8
Wife	8	8.3
Husband	7	7.3
Brother/Sister	9	9.4
Not to all	0	0
All members of the family	10	10.4
To all freely	5	5.2
Total	96	100

al., 2008).

The present study also revealed that mixing of two or more medicinal plants are common practices in remedy preparation. Similarly, according to Fisseha (2007), most traditional remedies were prepared by mixing components of two or more plants. Such practices might enhance healing capacity and minimize side effect on the patient (Mirutse, 2003). In the present study, only few remedies were made from single plant preparations. However, a study conducted in Bahir Dar Area indicated that most of

the traditional medicines were prepared single plant species (Fisseha, 2007). This might be due to difference in traditional knowledge from one area to the other. Mostly, the local people of Tenta District preferred fresh plant part for preparation of medicine. Similar findings were reported in other areas of Ethiopia (Zerihun, 2009).

The route and method of applications in the study area varied with the type of disease treated and the position where it occurred. The most common route of application found was oral followed by dermal. This might be due to the presence of wide spread internal diseases. Similar finding was also noted in other studies (Haile and Delnesaw, 2007).

Majority of the respondents were interested to transfer their traditional knowledge to their first son. This preference was associated with the perception and fear that daughters would share the knowledge with their husbands' family when they get married. Knowledge transfer to the new family was not appreciated by respondents for the purpose of keeping secret. When the first son was not considered trustworthy to keep the knowledge secretly, parents transfer to their second son or grandson. Similar finding was reported by Eskedar (2011).

In the study area, older people cited more species than the younger. As age increases experience also increases. Many studies in West African semiarid areas have reported that age has a direct bearing on knowledge of plants and plant use (Wezel and Haigis, 2000; Pare et al., 2010). Local knowledge of plants tends to accumulate with time and with continued interaction with the natural environment (Ayantunde et al., 2008). The results of this study failed to confirm the findings of Lykke et al. (2004) in five Fulani villages in the North-Sahelian area of Burkina Faso, where it was found that age was not an important determinant of plant knowledge. There was no significant difference in knowledge of plants between genders. These findings are similar to those of other studies in the Sahel of Burkina Faso (Lykke et al., 2004) and Niger (Ayantunde et al., 2008), but differ from the results of studies carried out in Niger and Mali (Wezel and Haigis, 2000).

Conclusion

The people of Tenta District are rich in indigenous knowledge in using, conserving and managing plant resources in general and medicinal plants in particular. This knowledge is transferred from elders to youngsters entirely through oral traditions and personal experiences. But this way, knowledge transmission will lead to distortion of the original knowledge or total disappearance of the practice. Human induced and natural factors are the major threats to plant species in general and to the medicinal plants in particular in the study area. Human induced threats include agricultural expansion, over grazing, deforestation, eucalyptus plantation, fire wood, medicinal plant trade, household equipment, and natural factors such as extended dry time are cited to be major threats for reduction of medicinal plants. The main threats to indigenous knowledge are caused by globalization; unwillingness of traditional healer to transfer their experience to the next generation; and increased business work; and negligence of the young generation to have the traditional knowledge. Therefore, the government has to do more in utilizing and managing different medicinal plant resources not only in Tenta District but also in the country as a whole through different activities.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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