

Traditional medicinal plants used to treat human disease in and around ambo town, western Ethiopia: An ethno botanical study

Tilahun Tolossa

Department of Biology, College of Natural Sciences, Ambo University, Ethiopia

Abstract

Medicinal plants are playing remarkable role in primary health care of human in developing countries in general and Ethiopia in particular. The study was carried out to document the indigenous knowledge and medicinal plants in and around Ambo town. It was carried out from April 2018 to August 2018. Forty nine (49) informants were selected from the representative kebeles (small administrative units) randomly using lottery method. Twenty two traditional medicinal plants were identified and documented based on their usage in traditional medicine to treat different human diseases. The Euphorbiaceae Family is represented by highest number of species of all plants followed by Asteraceae. The declining number of medicinal plant is one of the causes for the losses of the associated knowledge of the medicinal plants. Traditional knowledge of medicinal plants uses and management is owned by people of the study area and need to be integrated to modern school.

Keywords: ambo, Ethiopia, indigenous knowledge, Kebele, traditional medicine

Introduction

Traditional medicine is defined by the WHO as "...the sum total of all knowledge and practice, whether explicable or not, used in the diagnosis, prevention and treatment of physical, mental or social imbalances, and depending exclusively on practical experience and observation transferred from generation to generation, whether verbally or in writing" (WHO,20010). Humans have been using folk medicine to treat Human since ancient times; however, this information was only studied and documented accurately in recent times (Muhammad et al., 2019) [17]. In Ethiopia, plant remedies are up to now the most important and sometimes the only sources of treatment for more than 80% of human population that lives in rural area (Giday et al., 2003) [5]. The most of the population that lives in the rural area and the people with low income in urban areas rely mainly on traditional medicines to meet their primary health care needs. Ethiopia has different agro ecological zone which serves as a home of many medicinal plants and which is not well studied and documented: see Sori *et al.* (2004) [19] and Feyssa *et al.* (2015) [3]. Traditional knowledge of medicinal plants and their use by indigenous cultures are not only useful for conservation of traditions and biodiversity, but also for healthcare and drug development in the present and future Andarge et al.(2015) [1] and Gijan and Tussie, (2018) [7]. The researches done on the traditional medicinal plants in Ethiopia are very limited compared to multiethnic

cultural diversity and the diverse flora of Ethiopia (Giday et al., 2009 and Gidey et al., 2015) [4, 6]. Documentation of this indigenous knowledge of healing system still remains at Minimum level: see Jima and Megersa (2018) [10]. Findings in certain parts of Ethiopia have indicated that the rate of loss of both indigenous knowledge and the herbs is a signal for intervention. Even though traditional knowledge of medicinal plants is very crucial in treating different diseases, there is no study conducted in and around Ambo town, western Shewa, Ethiopia on this regard. Hence, this study was tending to identify and document medicinal plant species and traditional knowledge of the traditional health practitioners in the study area.

Methodology

Ambo is one of the towns located in western Oromia, 110km west of the capital city, Finfinne (Addis Ababa). It is elevated at 2100–2200 m above sea level and receive annual rain fall 900mm with average minimum and maximum temperature at 15°C and 29°C respectively. The study are includes four rural kebeles and two urban Kebeles (Fig.1). The study was conducted from April to August 2018 at selected area in and around Ambo town in west Shewa, Oromia Regional State, Ethiopia. The study sites were selected based on the availability of practice of traditional medicine and on the recommendations of knowledgeable elders and local authorities

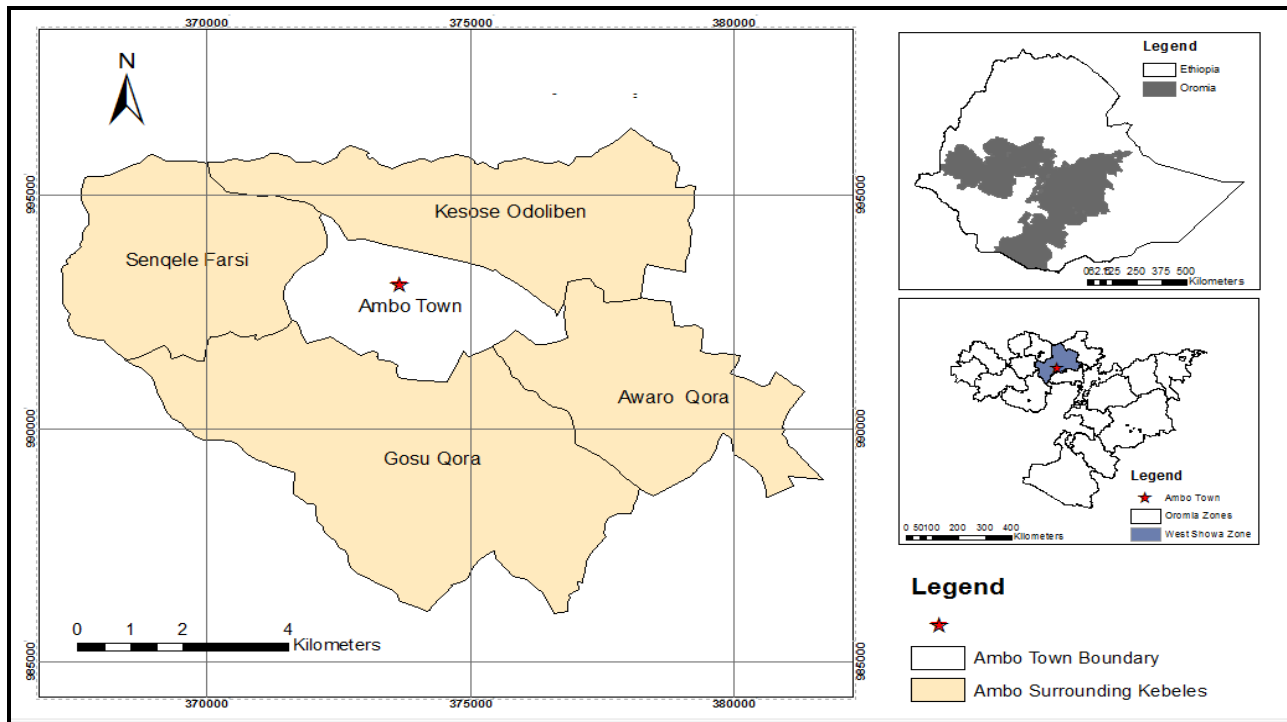


Fig 1: Map of Study area

Selection of Participants

Forty nine participants (29 men and 20 women) randomly selected from the representative kebeles. Representative participants and knowledgeable traditional medicine practitioners (key participants) in and around ambo town were selected purposively: see Martin (1995) [15]. Twenty key participants were selected purposively and systematically based on the recommendations of knowledgeable elders, local authorities, and development agents.

Checklist of questionnaires prepared in English and translated to the working language (Afaan Oromo) of the oromia region during interview. Information regarding local names of medicinal plants, preparation methods, part(s) used, diseases treated, dosage used and route of application was recorded at the spot. Observations were made on the morphological features and habitats of each medicinal plant species in the field for plant identification purposes.

Specimen collection and identification

Based on ethnobotanical information provided by informants, specimens were collected, numbered, pressed and dried for identification and plates of each traditional medicinal plant were collected. The local names and growth habits of the medicinal plants recorded for each plant species. In the field, preliminary identification was done. The specimens which could not be identified during field were taken to Ambo University herbarium for identification by using taxonomic keys, Flora of Ethiopia and Eritrea and the specimens that could not be identified using the taxonomic keys, Flora of Ethiopia and Eritrea were taken to the National Herbarium (ETH), Addis Ababa University and compared with already identified specimens.

Data analysis

Descriptive statistics

Descriptive statistics like percentage and frequency were employed to analyze and summarize the data on medicinal

plants and associated knowledge. The information gathered on medicinal plants reported by informants analyzed using descriptive statistical analysis. Facilities in MS Excel spread sheet were utilized to make simple calculations, determine proportions and draw bar graphs.

Preference ranking

Preference ranking was computed according to Martin (1995) [15] for five most important medicinal plants used in treating intestinal parasite. Seven key (informants were selected to assess the degree of effectiveness of these five medicinal plants against the disease. The medicinal plant considered being most effective in treating the illness given the highest value (5), and the least effective has lowest value (1). The value of each plant species was summed up and the rank for each species was determined based on the total score. This helped to indicate the most effective medicinal plants used by the community to treat the disease.

Paired comparison

This analytical tool was used for evaluating the degree of preferences or levels of importance of certain selected plants/parts of plants depending on the method used by Nemarundwe and Richards (2002) [18]. Paired comparisons to indicate the efficacy and popularity of five medicinal plant species used to treat skin disease were employed. Ten key informants randomly selected by flipping coins and allowed to show their responses separately for pairs of five traditional medicinal plants that were believed for treating the disease.

Results and Discussion

Disease treated with medicinal plants in the study area

In the study area different human ailments were treated with different medicinal plants (Table 1). The diseases were grouped depending on the site of infection.

Table 1: Disease treated in the study area

S.no	Diseases treated
1	Sexual incompetence
2	Tape worm, Lice infestation, Wound
3	gastro-intestinal, Ascaris, Gonorrhoea
4	Rabies, , Leech, snake bite, Spider poison , pests ,Malaria
5	Abdominal pain ,Chest pain,
6	Retained placental membrane
7	Itchy, Anthrax, Skin disease
8	Tonsillitis, Evil eye, Cough, nose, Sour throat, headache

Medicinal plant species diversity and origin

Twenty two medicinal plants were reported by the informants from the study area as being used for treatment

of human diseases in the study area. These plants are distributed in 21 genera and 17 families (Table -2).

Table 2: Medicinal plants of the study area

Plant species	Family	Habit	Plant type, cultivated/wild	Diseases treated	Ingredients added	Parts used	Application routes	Voucher no
<i>Acacia mellifera</i> Benth.	Fabaceae	Tree	wild	Sexual incompetence of male	Root & bark of <i>Amaranthus cruentus</i>	Root	Oral	Am 007
<i>Allium sativum</i> Linn.	Alliaceae	Herb	Cultivated	Closed wound. Cold , Cough Headache , Malaria Skin disease , Sour throat	Honey, Girardinia diversifolia, oil, water	Root	Oral Dermal Nasal	Am016
<i>Calpurnia aurea</i>	Fabaceae	Shrub	Wild	nose , Lice infestation, Leech	Water	leaves	Topical	Am023
<i>Catha edulis</i> Endl.	Celastraceae	Shrub	Cultivated	Skin disease	Coffee	Seed	Oral	Am 010
<i>Cordia africana</i> Lam.	Boraginaceae	Tree	Wild	Spider poison	Butter	Leaf	Topical	Am012
<i>Croton macrostachyus</i> Hochst	Euphorbiaceae	Tree	Wild	Skin disease	<i>Hagenia abyssinica</i>	Fruit	Dermal	Am 008
<i>Cucurbita pepo</i> L.	Cucurbitaceae	Herb	Cultivated	Tape worm	water	seed	oral	Am 011
<i>Dodonaea angustifolia</i> Linn.	Sapindaceae	Shrub	Wild	Tape worm, Lice infestation, Wound	Salt	Leaf	Oral/topical	Am004
<i>Echinops hispidus</i> Fresen.	Asteraceae	Herb	Wild	Evil eye	None	Bark	inhalation	Am019
<i>Embelia schimperi</i> Vatke.	Myrsinaceae	Shrub	Wild	Tape worm	None	Fruit	Oral	Am 009
<i>Euphorbia abyssinica</i> J.F. Gmel.	Euphorbiaceae	Tree	Wild	gastro-intestinal, Ascaris, Gonorrhoea	None	Bark	Oral	Am 006
<i>Hagenia abyssinica</i> Bruce.	Rosaceae	Tree	Wild	Tape worm	Water	Leaf	Oral	Am014
<i>Justicia schimperiana</i>	Acanthaceae	Shrub	Cultivated	Rabies, headache		Root/Leaf	Oral	Am 002
<i>Lippia javanica</i>	Verbenaceae	Shrub	Cultivated	Chest pain, Cough	butter	leaf	Inhalation	Am021
<i>Maesa lanceolata</i> Forsk	Myrsinaceae	Tree	Wild	Insecticide	Water	Fruit	Smoking	Am018
<i>Nicotiana tabacum</i> L.	Solanaceae	Herb	Cultivated	Leech, Tapeworm snake bite	None	Leaf	Oral	Am 003
<i>Olea europaea</i>	Oleaceae	Tree	Wild	Abdominal pain	Water	Root	Inhalation	Am 013
<i>Phytolacca dodecandra</i> L'Hér.	Phytolaccaceae	Shrub	Wild	Abortion Itchy Anthrax	<i>Apodytes dimidiata</i>	Root	Oral/ Dermal	Am015
<i>Rhamnus prinoides</i> L Herit.	Rhamnaceae	Shrub	Cultivated	Tonsillitis	None	Leaf	Oral	Am022
<i>Ricinus communis</i> Linn.	Euphorbiaceae	Shrub	Wild	Common Cold	Water	Root	Oral	Am 001
<i>Verbascum sinaiticum</i> Benth	Scrophulariaceae	Herb	Wild	External parasites	None	leaf	Topical	Am017
<i>Vernonia anygdalina</i> L.	Asteraceae	Tree	Wild	Retained placental membrane	None	Leaf	Oral	Am 005

Family Euphorbiaceae was represented by 3 species followed by 2 species of Asteraceae, Fabaceae and Myrsinaceae each. The remaining families were represented by 1 species. Of 22 species, 15 (68.18%) species were

reported from the wild while the rests were from home garden cultivated by the community (Figure 1). In the result of Assefa and Abebe (2014) [2] family euphorbiaceae was the leading medicinal plants' family.

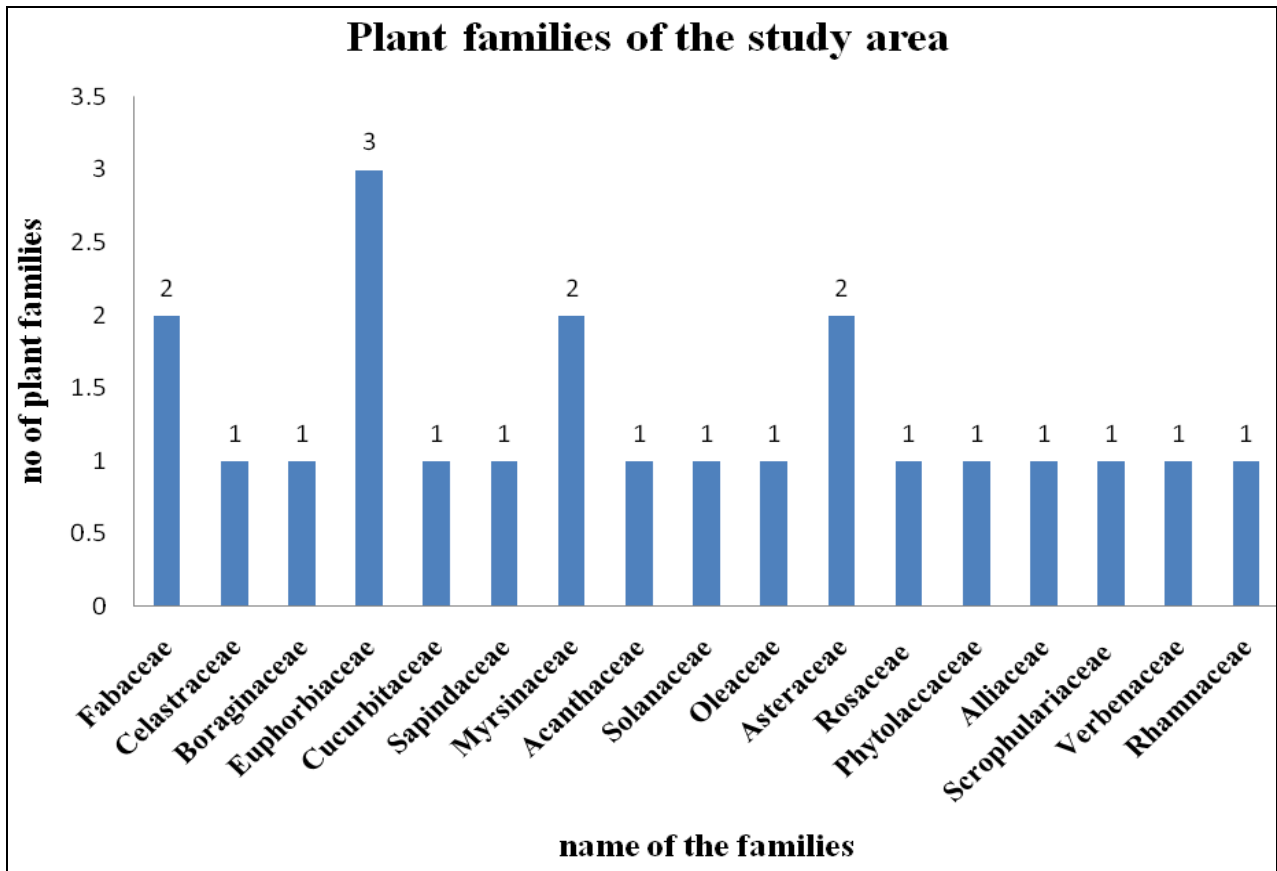


Fig 2: Plant Families of the Study Area

Growth habit

The growth form analysis of medicinal plants shows that shrubs constitute the largest category (9 species, 40.9%) followed by trees (8 species, 36.4%) and herbs (5 species, 22.7%) (Figure 2). Different studies indicated that all plants' form could be used for the treatment of diseases (Suleman and Alemu, 2012 and Tewelde et al., 2017) [20, 22].

6 (26.1%), fruit 3 (13%) bark 2(8.7%) and seed 2 (8.7%) (Figure- 3). Similar studies show different parts could be used and mainly leaf which reduce the stress of the plants (Kebebew and Mohamed, 2017 and Kebede et al., 2017).

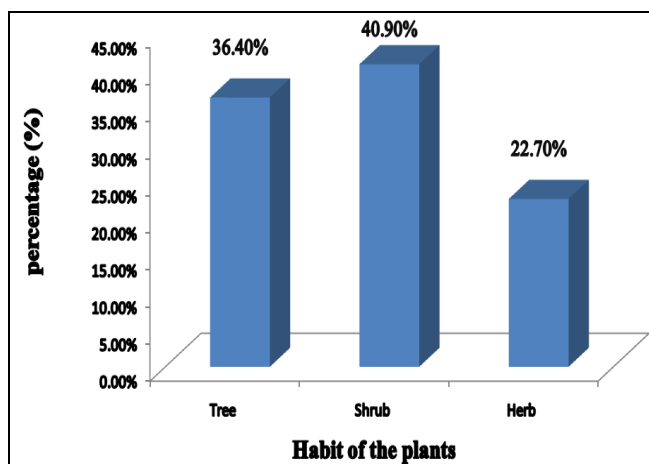


Fig 3: Habit of the Medicinal Plants

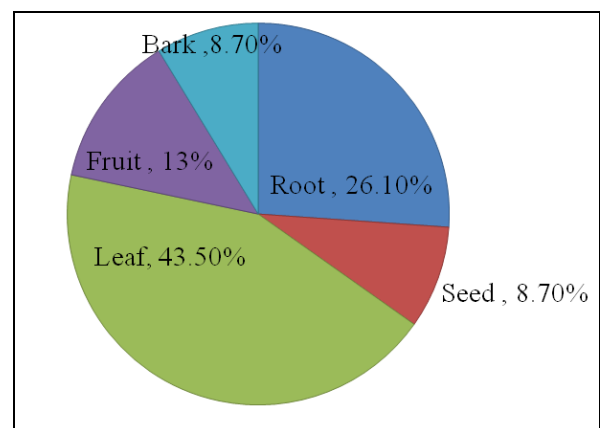


Fig 4: Medicinal Plants Part Used in the Study Area

Plant part(s) used for medicinal purpose

Plant part(s) used for medicinal purposes indicated that Leaf 10 (43.5%) is part of the plant mostly used followed by root

Medicinal plants condition

The local healers of the study area employ several collections of plant conditions. Twenty one (55.26%) preparations are made from fresh form, followed by dry 17 (44.74%). The results of different studies show significant similarities: see Suleman and Alemu (2012) [20] and Tewelde et al (2017) [22].

Mode of preparation and routes of administration

The total plant species documented from the study area were 22, but since one plant species can be used to treat more than one disease, and thus has more than one remedial preparation, the total number of the plant preparations were 29. Traditional medicine preparation was also varied in plant species compositions. In this study, the preparations using one or more species have different percentages. The prepared traditional drugs are administered through different routes of administration. The major routes of administration in the study area include; oral, dermal, nasal, anal, and ocular and others /local, topical, etc/.

Table 3: Routes of Administration and Application of Herbal Medicine

Route of administration	Total application	%
oral	14	53.85
Dermal/topical	7	26.9
nasal	1	3.85
Inhalation /smoking	4	15.4

In this study, the most popular way of administration of herbal medicines were oral which accounted for 14(53.85%), followed by 7(26.9%) dermal, 4(15.4%) inhalation/smoking and nasal 1(3.85%) (Table 3). Different studies done in different part of Ethiopia shows similar results (Luizza et al.2013 and Limenih et al., 2015) [14, 13].

Ranking of Medicinal Plants

Preference ranking of 5 medicinal plants that were reported as effective for treating intestinal parasite was conducted after selecting seven key participants.

Table 5: Paired comparison of medicinal plants used to treat skin disease

Plant species	<i>Dodonaea angustifolia</i>	<i>Allium sativum</i>	<i>Calpurnia aurea</i>	<i>Catha edulis</i>	<i>Croton macrostachyus</i>
<i>Dodonaea angustifolia</i> Linn.	Da				
<i>Allium sativum</i>	As	As			
<i>Calpurnia aurea</i>	Ca	As	Ca		
<i>Catha edulis</i>	Da	As	Ca	Ce	
<i>Croton macrostachyus</i>	Cm	As	Cm	Cm	Cm
Frequency	2	5	3	1	4
Rank	4	1	3	5	2

(Da: *Dodonaea angustifolia*, As: *Allium sativum*, Ca: *Calpurnia aurea*, Ce: *Catha edulis*, and Cm: *Croton macrostachyus*)

As it is seen from the above table, *Allium sativum* selected five times and stood first indicating that it is the most effective in treating skin disease followed by *Croton macrostachyus*, *Calpurnia aurea*, *Dodonaea angustifolia* and *Catha edulis* the frequency of skin disease to be treated by more medicinal plants was also reported.

Threats and Conservation of Medicinal Plants

Urbanization is the major threats to medicinal plants and associated knowledge of the study area. The degradation of medicinal plant and/ or tax is one of the causes for the losses of the associated knowledge of the plants. The other reason for the losses (threats) of the knowledge of medicinal plant is modern school and refusal to inherit/ practice the knowledge by new generation. As reported by the informants, the expansion of modern health institutions, schools some environmental and cultural modifications reason for the losses (threats) of the knowledge of medicinal plant. Research done in different parts of Ethiopia indicated similar results: see Gonfa et al. (2015) [8] and Jima (2018) [9, 10]. In addition, Usage of medicinal plants for other purpose than their medicinal value leads to the overexploitation of

Intestinal parasite is the mostly occurring disease treated by more medicinal plants. The participants were asked to compare the given medicinal plants based on their efficacy. The results showed that *Hagenia abyssinica* scored the highest mark and ranked first indicating that it was the most effective in treating intestinal parasite and followed by *Embelia schimperi* (Table 4). The finding of Mesfin et al. (2014) [16] Shows that *Hagenia abyssinica* used by the community to treat intestinal parasite in Amaro district of southern Ethiopia.

Table 4: Preference rank of medicinal plants used for treating human intestinal parasite.

Medicinal plants used	Respondents (A-G)							Total	rank
	A	B	C	D	E	F	G		
<i>Nicotiana tabacum</i>	1	2	1	3	2	2	3	14	4
<i>Hagenia abyssinica</i>	5	5	4	5	5	4	5	33	1
<i>Euphorbia abyssinica</i>	2	4	2	2	3	1	1	15	3
<i>Embelia schimperi</i>	4	3	4	4	4	5	4	28	2
<i>Cucurbita pepo</i>	3	1	3	1	1	3	2	14	4

For medicinal plants that were identified by the participants to be used in treating skin disease, a paired comparison was made among five of them using ten participants to know their rank. Skin disease is frequently occurring external health problem in the study area. The results that were obtained from all the participants were summed up and compared plants were abbreviated in the table (Table-5).

medicinal plants Tefera and Kim (2019). Even though, there are threats to medicinal plants and associated knowledge, the significant numbers of the local people of the area know the importance of conserving the plants in the study area. Some people have started conserving the plants by cultivating in home gardens, live fences of the gardens, plantation fields, and so on.

Conclusion

From the present study, it is possible to state that medicinal plants are part of the health care system of people of the study area. Knowledge of medicinal plants uses and managements is integral part of local people in the study area. And need to integrate the traditional knowledge to conventional approach of medicinal plants production. The concerned body must give attention and work with local people in order to conserve the indigenous knowledge and plants in the study area.

Data Availability

The data used in this study is available from the corresponding author upon request.

Conflicts of Interest

The author declares that he has no conflicts of interest.

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