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**Mulugeta Kebebew**
Department of Biology, Arba Minch University, Arba Minch, Ethiopia

# Knowledge of medicinal plants used in and around Fincha'a Town, Western Ethiopia

## Mulugeta Kebebew

### Abstract
From time immemorial, plants have been an indispensable source of both preventive and curative medicinal preparations for human beings. Medicinal use is one of the services that plants provide for human welfare. The practice of traditional medicine is common in Ethiopia although it is not utterly studies and documented. An ethnobotanical study of medicinal plants was conducted in and around Fincha'a town, Western Ethiopia from September 2013 to August 2014. This study documents indigenous medicinal plant and utilization system. Ethnobotanical data were collected using semi structured interviews and field observations. The data were analyzed using descriptive statistics using MS-Excel 2010. The ethno-medicinal use of 120 plant species belonging to 85 genera and 52 families were documented in the study area. The highest family in terms of species number is Fabaceae. Herbs were dominant (30%) flora followed by shrubs (28.33%). Most of the medicinal species (52.7%) were collected from the wild. Most of the plants (60.2%) were reportedly used to treat human diseases. The most frequently used plant part were leaves (34.68%), followed by roots (23.39%). Fresh plant parts were used mostly (53.3%) followed by dried (29.3%) and the remaining (17.4%) either in fresh or dried. Among the preparations, pounding was the dominant (34.1%) form followed by powdering (13.29%). The remedial administration was mostly oral (54.91%) followed by dermal (30.64%). Documenting the eroding plants and associated indigenous knowledge can be used as a basis for developing management plans for conservation and sustainable use of medicinal plants in the area.

**Keywords:** Ethno-medicine, ethnobotany, Fincha'a town, medicinal plants, traditional healers

## 1. Introduction
Ethiopia is home to many languages, cultures and beliefs which have in turn contributed to the high diversity of traditional knowledge and practices of the people which, among others, includes the use of medicinal plants to cure such diversified diseases and possible causative agents. Traditional medicine refers to the sum total of all the knowledge, beliefs and practices that are used in diagnosis, prevention and elimination of physical, mental or social imbalance and rely exclusively on practical experiences and observation handed down from generation to generation (WHO, 1998) [31]. Medicinal plants have important contributions in the healthcare system of local communities as the main source of medicine for the majority of the rural population. Traditional medicine has remained as the most affordable and easily accessible source of treatment in the primary healthcare system of resource poor communities and the local therapy is the only means of medical treatment for such communities (Haile and Delenasaw, 2007) [17]. The World Health Organization (WHO) estimates that up to 85% of world population uses herbal medicines for prevention and treatment of diseases, and the demand is increasing in developed and developing countries.

Indigenous knowledge refers to the knowledge, rules, standards, skills and mental sets generated by and kept in custody of local people in a particular area (Quanash, 1998; Getnet *et al.*, 2015) [29, 16]. It is the result of many generations and long years of experiences, careful observations and trial and error experiments (Martin, 1995, Getnet *et al.*, 2015) [25, 16]; and this study focuses on the medicinal plants and the associated ethno-medicinal knowledge in the Abay Chomen distinct, western Ethiopia. The ethnobotanical literature (Cunningham, 1996) [6] underlines that both saving plant species and documenting and preserving indigenous knowledge associated with them are fundamental urgent concerns.

Ethiopia is endowed with a diverse biological resources including about 6, 500 species of higher plants, out of which more than 14% are said to have been used as traditional plant medicines to treat different human and livestock ailments while more than 1,000 species have been documented at the Ethiopian National Herbarium database (Tesfaye 2004; Getnet *et al.*, 2015) [30, 16]. Documenting traditional medicinal plants and the related traditional medical knowledge is important in order to facilitate the discovery of new sources of drugs and promote sustainable use of natural resources in Ethiopia.

The local people, as in other parts of Ethiopia depend on traditional medicine, which mostly relies on medicinal plants, to fulfill their healthcare needs as pointed out by Zegeye *et al.* (2011) [32]. Despite this fact, there are no studies on ethno-medicinal plants, associated knowledge and the use in the Fincha'a town.

**Correspondence**
**Mulugeta Kebebew**
Department of Biology, Arba Minch University, Arba Minch, Ethiopia

However, this study provide sufficiently detailed information on the status of traditional botanical knowledge transfer from generation to generation based on age groups and educational levels as wells as on the ranking of most potential medicinal plants for specific disease treatment in the Fincha'a town, western Ethiopia. Hence, this study was framed with the aim of documenting the medicinal plants and the associated ethno-medicinal knowledge of people living in the study area used for the treatment of various diseases.

## 2. Materials and Methods
### 2.1 Characteristic Features of the Study Area
Fincha'a is the capital town of the Abay Chomen district, about 47 km from the zonal capital Shambu and 280 km from capital town of Oromia called Finfinne. The distinct has a latitude and longitude of 09°54′N 37°27′E with an altitude ranges from 880 to 2,400 meters above sea level. The mean annual temperature and rainfall are 22 $^0$C-27 $^0$C and 510-1530 mm, respectively. According to 2007 national census reported a total population for this woreda of 48,316, of whom 24,972 were men and 23,344 were women; 9,440 or 19.54% of its population were urban dwellers. A survey of the land in these distinct shows that 11.4% is arable or cultivable, 2.2% pasture, 1.4% forest, and the remaining 83.8% is considered mountainous, unusable, or part of the Fincha'a Sugar Project. Niger seed, teff, maize, wheat, barley, bean; and root and tuber crops such as potato, Anchote and other are dominant crops grown in the area.

### 2.2 Reconnaissance survey and study site selection
A reconnaissance survey was conducted from September 2, 2013 to September 4, 2013. Before starting the ethnobotanical study, contacts were made with various offices to seek permission to carry out the study by informing them about the aims and significance of the study. Letters authorizing the study were obtained from the relevant offices which were then presented to the concerned kebele offices and informants in the study area. In this way, full legal procedures were followed and the informed consent of interested participants was obtained. Community-forest interactions and altitudinal differences were the basic site selection criteria. Community forest interaction were taken as criteria after collecting information from kebele administrative offices and inhabitants of the area during the reconnaissance survey in order to compare the indigenous knowledge of the communities found nearest to the forest with those found relatively far away (reached after traveling for more than 30 kilometers).

### 2.3 Informant selection
Eighty informants (60 males and 20 females) aged 18 to 80 were interviewed in this research. Among these, 10 (7 males and 3 females) were key informants and the rest 70 were general informants. Purposive and random sampling techniques were employed to select traditional herbalists and general informants respectively. The traditional association leaders, members of the tourism and culture office, elderly people and religious leaders helped to identify the key informants. The general informants were randomly picked (from the list of inhabitants) during field and house visits by checking their names from the list of residents obtained from kebele offices. All interviews were administered after obtaining voluntary consent of each informant and assuring them that the data will be used only for academic purposes.

### 2.4 Data collection
Ethnobotanical data collection was accomplished from September 2013 to August 2013 by living in close contact with the community in the study area, following standard methods (Cotton, 1996; Martin, 1995; Cunningham, 2001) [5, 25, 7]. Accordingly, semi-structured interview, guided field walk, direct observation, market survey and focus group discussions with key informants and other knowledgeable community members were applied and their knowledge on medicinal plants gathered. Interviews were held based on checklist of questions prepared before hand in English language and simultaneously translated into Afan Oromo. The major part of the interviews were focused on the local names of medicinal plants used, their habits and habitats, plant part/s used, remedy preparation methods, materials used during preparation, condition of preparation, additives/ingredients used during preparation and administration, dosages administered, and route of administration. Likewise, side effect of the medicine (if any), use of antidotes for adverse effects, the season, month, dates and time of collection and preparation of plant medicines, and market value were also included.

The semi-structured interviews held with informants usually started at their sitting places and further broadened into field walk with interviewed informants in order to see the plants mentioned in their habitats and voucher collections following Martin (1995) [25]. This activity further helped to record growth habits of medicinal plants. Focus group discussions were done with traditional medicinal plant association members, other herbalists, monks and general informants to obtain additional information and to check the reliability. At times, the preparation methods of the medicinal plants were said to be secret and were not included during discussion. Most field observations were conducted with a single informant in order to keep the knowledge top-secret as this was what the healers in particular preferred.

### 2.5 Plant collection and identification
Voucher specimens were collected for each plant species during guided field walk with the informants. At times, the field activities included taking notes on plants and the associated indigenous knowledge with preliminary identification of the plants to family and sometimes to species levels. Photographic records were also taken in the field to capture the field sites, plants and other useful memories. The specimens were dried, deep-frozen, and determinations were made at the National Herbarium (ETH), Addis Ababa University, using taxonomic keys and descriptions given in the relevant volumes of the Flora of Ethiopia and Eritrea (Edwards *et al*., 1997; 2000; 1995; Hedberg and Edwards, 1995; 1989; Hedberg *et al*., 2003; 2004; 2009; 2006) [11-13, 19, 18, 20-23] and by visual comparison with authenticated herbarium specimens. Finally, the accuracy of identifications was confirmed by a senior plant taxonomist and the voucher specimens with labels were deposited at the ETH.

### 2.6 Data analysis
The ethnobotanical data were analyzed using Microsoft Office Excel spreadsheet (2010). The Excel was used to calculate sum, percentages, tabulate and draw graphs. A descriptive statistic procedure like percentage and frequency distribution were employed for analyzing plant habit, plant parts used & methods of preparation, dosages and route of administration.

## 3. Results and Discussion
### 3.3 Ethno-medicinal plant species used by people of the study area
A total of 120 species of medicinal plants were gathered and documented from the study area. The species were represented 85 genera and 52 families. Family Fabaceae with 10 species has the highest species. The second highest family in terms of species number is Asteraceae, 7 species. Lamiaceae is the third, 6 species; Rutaceae and Solanaceae are the fourth with 4 species each; Cucurbitaceae, Euphorbiaceae and Moraceae fifth with three species each; Acanthaceae, Araceae, Boraginaceae, Myrsinaceae, Myrtaceae, Polygonaceae, Ranunculaceae, Rosaceae and Verbenaceae ranked sixth with two species each. The remaining of the families are represented by one species. This result showed that Fincha'a town is rich in medicinal plants as shown by the presence of 120 species exhibiting wide taxonomic diversity. This number of diverse taxonomic groups of medicinal plants and associated ethno-medicinal knowledge have been observed in different regional state of Ethiopia (Ermias *et al*., 2008; Meaza *et al*., 2015; Getaneh, 2016; Balcha, 2014; Getnet *et al*., 2015; Abiyu *et al*., 2014) [14, 26, 15, 3 16, 2]. The existence and utilization of such a large number of medicinal plants by people in the study area indicates that the majority of the people used indigenous medicinal practices to take care of medication problems. The study shows that the traditional healers of the study area were found to play great roles in the primary healthcare systems of the local people as they were treating resource

poor people who had little access and couldn't afford the cost for modern medications.

### 3.4 Sources of medicinal plants
Among the reported medicinal plants of the area about 58 (52.7%) were obtained from wild followed by 34 (26.9%) and 28 (20.4%) from home garden (cultivated and both cultivated and wild). This indicates that the practitioners depend on the wild source or the natural environment rather than home gardens to obtain the medicinal plants, and the activity of cultivating medicinal plants is very poor in the study area. It also indicates that the natural forest of the study area is being over exploited by traditional practitioners for its medicinal plants composition. This finding is similar to the general pattern seen in most medicinal inventories (for example, (Haile and Delensaw, 2007; Ermias et al., 2008; Meaza et al., 2015; Getaneh, 2016; Balcha, 2014; Getnet et al., 2015, Abiyu et al., 2014) [17, 14, 26, 15, 3, 16, 2] where wild medicinal plants dominate. The local people cultivate some popular medicinal plants in their home garden for the purpose of medicine such as Allium sativum, Schinus molle, Asparagus africanus, Lepidium sativum, Carica papaya, Ocimum lamiifolium, Otostegia tomentosa, Rhamnus prinoides and Nicotiana tabacum. This and field observation during data collection clearly confirmed that some traditional healers do not have interest to grow in their home garden some plant species that are used to treat specific ailments in order to keep the secret of their medicinal value. This means that most of the medicinal plants found in the home gardens are those also known to have other uses particularly as food.

### 3.5 Growth form of plants used for medicine
Analysis of growth forms of medicinal plants reveals that herbs constitute the largest category (36 species, 30%) followed by shrubs (34 species, 28.33%). Trees amounted to (31 species, 25.83%). The others included climbers (13 species, 10.83%), epiphytes (4 species, 3.33%) and lianas (2 species, 1.67%). Herbs and shrubs make up the highest proportion (70 species) of the medicinal plant species. This could be related to the fact that these species exhibit high level of abundance and easy to obtain them. Relatively high number of herbs and shrubs for medicinal purpose were also previously reported in Ethiopia (Bayafers, 2000; Debela, 2001; Getaneh, 2016; Balcha, 2014; Getnet et al., 2015) [4, 10, 15, 3, 16]. However, it is a fact in the country that woody plants (forest and wood land species) are declining and most of the easily available plants become the herbs.

### 3.6 Medicinal Plants and their main uses by the local People
Among the reported medicinal plants of the area, some plants were found to treat different health problems affecting the health of both humans and livestock. Out of 120 medicinal plant species in this study, 65 species (60.2%) were noted to treat only human ailments while 29 species (21.5%) are used to treat livestock ailments. Twenty six species (18.3%) are used to treat both livestock and human ailments.

### 3.7 Parts of plants used for medicine
The result of the survey showed that various parts of medicinal plants resources were employed to prepare remedies by local practitioners. From the total plant parts used for remedy preparation, the leaves and the roots were the most commonly used plant parts in the preparation of remedies accounting for 34.68% (43 species) and 23.39% (29 species) of the total medicinal plants, respectively and lower values for other parts used to treat various health problems (Table 1). The fear of destruction of medicinal plants due to plant parts collected for the purpose of medicine is minimal as leaves were the leading plant parts sought in the area. 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 (Mirutse and Gobana, 2003; Balcha, 2014; Getnet et al., 2015; Abiyu et al., 2014) [27, 3, 16, 2]. Herbal preparation that involves roots, rhizomes, bulbs, barks, stems or whole parts have effects on the survival of the mother plants but leaves generally have low impact on individual plants as compared to roots, rhizomes, bulbs, barks, stems or whole parts.

**Table 1:** Parts of plants used for medicine preparations

| Plant parts | Number | Percentage |
|---|---|---|
| Leaf only | 43 | 34.68 |
| Root only | 29 | 23.39 |
| Bark only | 10 | 8.06 |
| Seed only | 9 | 7.26 |
| Fruit only | 8 | 6.45 |
| Stem only | 4 | 3.23 |
| Sap only | 4 | 3.23 |
| Latex only | 2 | 1.61 |
| Bulb | 1 | 0.81 |
| Above Ground | 1 | 0.81 |
| Rhizome | 1 | 0.81 |
| Two and more parts | 12 | 9.68 |

### 3.8 Composition, condition and preparation methods of medicinal plants
In the collection of data concerning the preparation of medicine, informants have reported various skills associated with herbal preparation. These include plant composition (whether single or combined), condition of plant material used (fresh or dry) and methods of preparation. The result showed that most remedies were prepared from single plant (61.5%) and preparation from combined plant species was about 38.5%. Local people depend on both dry and fresh remedies. In this case, 98 preparations (53.3%) are in fresh form, 54 (29.3%) are dried and 32(17.4%) are dried and fresh (Table 2). The dependency of local people on fresh materials put the plants under serious threat than the dried form, as fresh materials are harvested directly and used soon with its extra deterioration with no chance of preservation i.e. not stored for later use. However, local people argue that fresh materials are effective in treatment as the contents are not lost before use compared to the dried forms. The livelihood of most traditional healers relies on fresh materials that have aggravated the decline of rare medicinal plants from the study area according to the informants. Traditional practitioners are collecting medicinal plants with less attention than would be preferred from viewpoint of conservation of plant resource. This finding is significantly similar from all the other findings from other regions of Ethiopia (Debela, 2001; Kebu et al., 2004; Balcha, 2014; Getnet et al., 2015; Abiyu et al., 2014), [10, 24, 3, 16, 2]. The local healers employed several methods of preparation of traditional medicines from plants. The result showed that most remedies were prepared from single plant (61.5%) and preparation from combined plant species was about 38.5%. The result is in agreement with the findings of Dawit (1986) [8], Debela (2001) [10] and Getnet et al. (2015) [16] in which the single plant preparation were reported to be high and disagrees with works of Mirutse (1999) [28] and Bayafers (2000) [4] in which the combined plant materials were reported to have high proportion in herbal preparation. The local people employ several methods of preparation of traditional medicines. The frequently used methods were pounding, powdering and smashing respectively. Pounding 59 (34.1%), powdering 23 (13.3%) and smashing 22 (12.7%) are the three main methods of preparation of medicine (Table 2). The preparation and application methods vary based on the type of disease treated and the actual site of the ailment. The majority of the preparations are made from mixture of different plant species with water and different additive substances like honey, sugar, butter, and salt and milk. These additive substances have different functions i.e. to reduce poisons, improve flavor and as antidotes during adverse effects such as vomiting and diarrhea. Dawit (1986) [8] has also identified the additive substances in herbal remedy preparations with their possible benefits. It was also reported that some medicinal plants are mixed with food and drinks in such manner that, they change their flavor and simple to take. For instance, Lepidium sativum is added with a honey to improve its taste. Mixing and using some medicinal plants with common foods and drinks might be easy way for effective treatment (Abdu and Hamed, 1982) [1].

**Table 2:** Composition, condition and preparation methods of medicinal plants

| Composition | Percentage | Condition | Number | Percentage | Preparation | Number | Percentage |
|---|---|---|---|---|---|---|---|
| Single | 61.5 | Fresh | 98 | 53.3 | Pounding | 59 | 34.10 |
| Combined | 38.5 | Dry | 54 | 29.3 | Powdering | 23 | 13.29 |
| | | Fresh and Dry | 32 | 17.4 | Smashing | 22 | 12.72 |
| | | | | | Chewing | 11 | 6.36 |
| | | | | | Crushing | 10 | 5.78 |
| | | | | | Rubbing | 6 | 3.47 |
| | | | | | Fumigating | 6 | 3.47 |
| | | | | | Infusion | 6 | 3.47 |
| | | | | | Cream | 6 | 3.47 |
| | | | | | Sap collection | 5 | 2.89 |
| | | | | | Latex collection | 3 | 1.73 |
| | | | | | Cooking | 3 | 1.73 |
| | | | | | Concoction | 2 | 1.16 |
| | | | | | Warming before fire | 1 | 0.58 |
| | | | | | Burned to ash & mixed with bread | 1 | 0.58 |
| | | | | | Boiling and inhaling its smoke | 1 | 0.58 |
| | | | | | Other | 8 | 4.62 |

### 3.9 Route of remedy administration and dosage determination
There are various routes of administration of traditional medicinal plants prepared products by the local community. The major routes of administration in the study area are oral, dermal, nasal, anal and optical. Oral administration is the dominant route (54.91%), followed by dermal route (30.64%) (Table 3). Both oral and dermal routes permit rapid physiological reaction of the prepared medicines with the pathogens and increase its curative power. This fact has been documented by different authors in the other part of Ethiopia (Dawit, 1986; Bayafers, 2000; Kebu *et al*., 2004; Balcha, 2014; Getnet *et al*., 2015; Abiyu *et al*., 2014) [8, 3, 24, 4, 16, 2]. In addition, informants reported that there are related restrictions to enhance rapid physiological reaction and to increase its curative power of remedies. For example, a patient who takes remedy against tapeworm should not take any food six hours before and after administration of the medicine. People of the study area used various units of measurement and the duration of administration to determine the dosage. Local units such as finger length (e.g., for bark, root, stem,), pinch (e.g., for powdered plant medicine) and numbers (e.g., for leaves, seeds, fruits, bulbs, rhizomes, flowers and latex) were used to estimate and fix the amount of medicine. Recovery from the disease, disappearance of the symptoms of the diseases, fading out of the disease sign and judgment of the healer to stop the treatment were some of the criteria used in determining duration in the administration of the dosage. However, from the interview made during the study, it was found that there was disagreement among the healers concerning the dosage system used. For example, some informants suggested that four or five drops of the latex from *Euphorbia candelabrum* is used to treat Ascariasis or gonorrhea, while some suggested that only one drop is enough for the same problem. Still some others suggested that they apply the latex randomly without such measuring system. Although the full dose determination is varying from healer to healer, the dose given depends on age, physical strength and heath conditions. This finding is significantly agree with other findings from other regions of Ethiopia (Dawit and Ahadu, 1993 and Abiyu *et al*., 2014) [9, 2].

**Table 3:** Mode of administration of the plant remedies

| Mode of administration | Number | Percent |
|---|---|---|
| Oral | 95 | 54.91 |
| Dermal | 53 | 30.64 |
| Nasal | 13 | 7.51 |
| Optical | 6 | 3.47 |
| Anal | 2 | 1.16 |
| Nasal or Oral | 4 | 2.31 |

The healers never administer treatments that are taken internally to pregnant women. This finding indicates us that there is lack of precision in the determination of doses in the area.

### 4. Conclusion
The present study showed that Fincha'a town a high diversity of medicinally useful plants and the people living in the area have a long history of plant use, and that of medicinal plants is exceptionally notable and culturally rooted in the area. Despite the gradual socio-cultural transformation, the inhabitants have retained remarkable knowledge of the plants and their uses. Difficulties in knowledge transfer and the resulting generation gap in knowledge are threatening the continuity of the medicinal plants and the indigenous knowledge on them. On the other hand, the study provided evidence that medicinal plants will continue to play an important role in the healthcare system in the study area, given support through conservation and education. Knowledge and herbal medical practices for the treatment of various ailments among both rural and urban people are major parts of their livelihoods and culture. The traditional knowledge of the use and conservation of these plants is still being transferred from generation to generation, but appeared to be aging. The problem of transfer of knowledge from the elders to the young generation probably arose following the introduction of modern education, religious, spiritual and culture-related factors. Therefore, it is not only essential to conserve such a wealth of information hidden among the local people but also to apply modern science and technology to meet the ever increasing requirements of humankind. Furthermore, conservation of these biological resources is very important because their sustainable use can generate higher levels of employment and income.

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