Traditional Medicinal Plants Used by People in Libo-Kemkem District, South Gondar, Ethiopia

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Abstract: The present study was conducted between June 2010 and September 2010, to document medicinal plant species traditionally used by peoples in Libo-kemekem district, South Gondar, Ethiopia. Ethnobotanical data were collected using semi structured interviews, focused group discussion and field observations. A total of 52 medically important plants belonging to 45 families and 47 genera were identified in the district. Majorities (47.37%) were collected from wild. Most of the plants (94.23%) were reportedly used to treat human diseases. The most frequently used plant parts were leaves (40.38%), followed by fruits (23.08%) and roots (17.31%). Local people depend on both dry and fresh remedies. The administration routes were oral (57.69%), dermal (25.00%), nasal (11.54 %) and anal (5.77%). The preference ranking showed that Lantana camara was the most important species in treating diarrhea followed by Vernonia amygdalin indicating high utility value of the species in the community. The results revealed existence of diverse medicinal plants and indigenous knowledge in the study area. Therefore, documenting medicinal 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.

Key words: Consensus factor, ethnobotany, habit, libo-kemkem, preference ranking

INTRODUCTION

Plant resources contain and provide materials for survival, with economic, medicinal and forage values, but also possess and preserve cultural heritages, biological information and indigenous knowledge on their utility. As the science of human-plant interaction, ethnobotany has become increasingly valuable in advancing health care systems and conservation programs in different parts of the world (Balick, 1996). Since, traditional medicine has remained as the most affordable and easily accessible source of treatment in the primary healthcare system of resource poor communities. And also the local therapy is the only means of medical treatment for such communities. Despite the use of herbal medicines over many centuries, only relatively small numbers of plant species have been studied for possible medical applications (WHO, 1998). In Ethiopia, detailed descriptions of plants used medicinally are scanty (FAO, 1986); however, few ethnobotanical investigations were conducted in recent past in different parts of the country (Abbink, 1995; Zemede, 1997; Yineger et al., 2007; Teklehaymanot et al., 2007; Teklehaymanot, 2009; Wondimu et al., 2007). These authors have reported the presence of a wealth of indigenous knowledge of the use, management of plant resources among the local people of various parts of the country and ethnic groups. But considering the country’s varied flora and socio-cultural diversity, these studies are few as ethnomedicinal healing systems vary across cultures. Moreover, reports have also indicated the reliance of nearly 80% of the population in the country on utilizing plant-based traditional medicines as major health-care system (Dawit, 2001). On the other hand, investigations have also showed the presence of erosion of genetic and indigenous knowledge, which in turn, calls for the need of collection, investigations, and conservation of these resources (Zemede, 1997). To our knowledge, there are no data regarding the traditional medicinal plant knowledge and use by the local communities in Libo-kemekem district, South Gondar, Ethiopia. Therefore, this study was conducted to assess and document the indigenous knowledge and use of medicinal plant species by local people and healers to treat human ailments in Libo-kemekem district.
MATERIALS AND METHODS

Description of the study area: The study was conducted in six Kebeles (the smallest administrative units in Ethiopia) of Libo-kemkem district, South Gondar, Ethiopia from June 2010 to September 2010. The district has an estimated population of 198,374 of which 88.9% live in rural areas (ECSA, 2007). The six selected Kebeles were Estifanose, Berkutate, Tehara, Godeguadite, Askura and Bera-abo. It extends from a latitude of 37°15′36″ E to 38°06′36″ E and from a longitude of 11°54′36″ N to 12°22′48″ N. The area receives a unimodal rainfall of approximately 1300 mm per year, the majority of which falls between June and August. The mean annual temperature in the area is 19.7°C. The rural population is relatively poor, relying on traditional farming and small holder livestock production. Rain-fed subsistence farming of crops (maize, millet, “teff” and sorghum), animal husbandry, and irrigated paddy rice cultivation remain the principal agricultural activities despite poor soil fertility and highly variable rainfall in most areas (information from agriculture office of the district).

Data collection: A reconnaissance survey of the study area was conducted prior to site selection. Subsequently, six Kebeles were selected for ethnobotanical data collection. Forty-two (20 female and 22 male) informants were randomly selected following Martin (1995), which covered both healers and certain social groups. Six key informants one from each of the study sites were preferentially selected with the help of local administrators, elders and other community members. Following this semi-structured interview was made with each traditional healer, elder and other member of the community about the knowledge and use of medicinal plant species used to treat human and livestock ailments in the study area. Moreover, field observation and focused group discussion were employed. Data on human and animal ailments treated, growth form, sources where plants were obtained (wild/cultivated), parts used, methods of preparation and route of administration and application were recorded. The specimens were dried, deep frozen and identified in the National Herbarium (ETH), Addis Ababa University. Identification was done using different volumes of Flora of Ethiopia, by comparing authenticated and labeled dried specimens deposited in ETH and using the knowledge of taxonomic expertise for confirmation.

Data analysis: Ethnobotanical information collected through semi-structured interviews and field observation were analyzed using descriptive statistics for such as percentage and frequency. Computation of preference ranking was done following Alexiades (1996) and Cotton (1996) using Microsoft Excel programme. The Informant Consensus Factor (FIC) was calculated to estimate user variability of medicinal plants (Canales et al., 2005). FIC values range from 0.00 to 1.00. High FIC values are obtained when only one or a few plant species are reported to be used by a high proportion of informants to treat a particular ailment, whereas low FIC values indicate that informants disagree over which plant to use. High FIC values can thus be used to pinpoint particularly interesting species for the search of bioactive compounds (Canales et al., 2005). FIC is calculated using the following formula (Canales et al., 2005):

$$FIC = \frac{Nur - Nt}{Nur - 1}$$

where Nur is the number of individual plant use reports for a particular illness category and Nt is the total number of species used by all informants for this illness category. Graphs were generated using Sigma Plot 8.0 (Systat Software, Inc.).

RESULTS AND DISCUSSION

A total of 52 plant species of ethnopharmacological importance belonging to 52 families and 51 genera were gathered, identified and documented (data not shown). Of these medicinal plants herbs constituted the largest number or proportion with 20 species (38.46%), followed by 18 shrubs (34.62%) and 14 trees (26.92%) (Fig. 1). The high usage of herbs could be an indication of their abundance especially during the rainy season. Hence the informants indicated that most of collection of medicinal plants is usually carried out during rainy season. The common use of herbaceous medicinal plants was also reported in studies carried out elsewhere in Ethiopia (Yineger et al., 2007; Teklehaymanot et al., 2007; Teklehaymanot, 2009; Wondimu et al., 2007; Giday et al., 2003; Giday and Ameni, 2003; Birhanu, 2002; Gebre, 2005; Teklehaymanot and Giday, 2007).

Fig. 1: The growth forms of the studied medicinal plants
Fig. 2: Sources where medicinally important plants are obtained. Where HG = home garden and both = home garden and wild

Fig. 3: Medicinal plant parts as used by local people in Libokemem district

Most medicinal plant resources 47.37% were collected from the wild in the near by forest and grassland areas; only a few (22.81%) were obtained from cultivated areas and 29.82 % from both wild and home gardens (Fig. 2). This indicates that people in the district mainly rely on wild sources in the natural environment than home gardens to obtain medicinal plants. This revealed that growing medicinal plants in home gardens is not well exercised. In turn this will have a disadvantage in conservation of resources in their wild environment if the plants are over exploited. The people are mainly involved in medicinal plant collection during rainy seasons since many plants are available at that time than others.

**Plant parts used**: The results revealed the presence of variation in using different plant part(s) to treat a particular ailment or other types. Leaves were the plant parts most frequently used, constituting 40.38%, followed fruits (23.08%) and roots (17.31%), stem and seeds (5.77%) evenly (Fig. 3). The common use of leaf in the preparation of remedies could partly be due to the relative ease of finding this plant part. The use of leaves in the preparation of remedies is also common elsewhere (Yineger et al., 2008; Kala, 2005; Tadesse et al., 2005; Tabuti et al., 2003; Wassihun et al., 2003). Nonetheless, the present study is not inline with the reports made by (Lulekal et al., 2008), which stated roots as the most sought plant part used. The usage of leaves as the most commonly utilized plant parts than the roots would have less consequence from both ecological point of view and from the survival of the medicinal plant species than the roots (Birhanu, 2002). Since collecting leaves alone could not pose a lasting danger to the continuity of an individual plant.

**Condition of medicinal plants during preparation and methods preparation**: Most remedies were prepared and used immediately after harvest; 55.77% were used while fresh and 26.92% were prepared after drying (Fig. 4). 17.31 percent of the remedies were reported to be used in both fresh and dry forms. The frequent use of freshly processed remedies could signify the accessibility of abundant plant materials in the vicinity. Other studies conducted in another place also indicated the wider use of fresh materials (Giday et al., 2003; Giday and Ameni, 2003; Tabuti et al., 2003; Yineger et al., 2008; Iyacimuthu et al., 2006). The frequent use of fresh materials might also be an attempt not to lose volatile
substances, the concentration of which could lessen up on drying. The traditional medicinal plants have prepared in a variety of ways prior to administration for prevention and curing different types of ailments. This includes crushing, pounding, decoction and juicing. Crushing (50%) constituted the highest type of preparation form, followed by pounding (24.14%) (Table 1). This is concurrent with the finding of Abebe and Ayehu (1993) who reported that the leading route of application used in northern Ethiopia is oral, which accounted for 42%.

**Route of administration and dosage:** The route of application for 57.69% of the remedies was oral while 25.00% were applied on dermal (Table 2). Few remedy preparations were taken nasally (11.54%) and through anal (5.77%). Oral application of remedies is popular as in the finding of Abebe and Ayehu (1993) who reported as the leading route of application used in northern Ethiopia. It is also in agreement with the result of various ethnobotanical studies (Hunde et al., 2004; Awas and Asfaw, 1999; Lulekal et al., 2008; Balemie et al., 2004; Giday and Ameni, 2003; Birhanu, 2002; Giday et al., 2003; Addis et al., 2001) and has indicated oral as the predominant route of application. The informants' responses indicated that there were variations in dosages of remedies, unit of measurement of remedies, duration and time that were prescribed for the same kind of health problems. Most treatments were reported to be completed within two or five days; most of them taken twice a day.

### Table 3: Values for preference ranking based on their degree of treating diarrhea for five selected medicinal plants in Libo-kemekem district as perceived by informants

<table>
<thead>
<tr>
<th>Plant species</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>R5</th>
<th>Total Score</th>
<th>Percent (%)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coffea arabica</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>9</td>
<td>12.0</td>
<td>5th</td>
</tr>
<tr>
<td>Lantana camara</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>23</td>
<td>30.67</td>
<td>1st</td>
</tr>
<tr>
<td>Lepidium sativum</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>13</td>
<td>17.33</td>
<td>3rd</td>
</tr>
<tr>
<td>Rumex nepalensis</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>11</td>
<td>14.67</td>
<td>4th</td>
</tr>
<tr>
<td>Vernonia amygdalin</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>19</td>
<td>25.33</td>
<td>2nd</td>
</tr>
</tbody>
</table>

### Table 4: Informant consensus factor (FIC) for different ailments

<table>
<thead>
<tr>
<th>Ailment categories</th>
<th>Number of taxa (Nt)</th>
<th>Number of use reports (Nur)</th>
<th>FIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abortion and constipation</td>
<td>5</td>
<td>14</td>
<td>0.69</td>
</tr>
<tr>
<td>Fever and headache</td>
<td>3</td>
<td>11</td>
<td>0.80</td>
</tr>
<tr>
<td>Malaria</td>
<td>4</td>
<td>3</td>
<td>-0.50</td>
</tr>
<tr>
<td>Gastrointestinal parasites</td>
<td>8</td>
<td>18</td>
<td>0.59</td>
</tr>
<tr>
<td>Inflammation and infection</td>
<td>2</td>
<td>10</td>
<td>0.89</td>
</tr>
<tr>
<td>Bone fracturing</td>
<td>3</td>
<td>9</td>
<td>0.75</td>
</tr>
<tr>
<td>Breathing problem</td>
<td>4</td>
<td>7</td>
<td>0.50</td>
</tr>
<tr>
<td>Evil eye</td>
<td>4</td>
<td>11</td>
<td>0.70</td>
</tr>
<tr>
<td>Cardiovascular problems</td>
<td>3</td>
<td>5</td>
<td>0.50</td>
</tr>
<tr>
<td>Snake Bite</td>
<td>3</td>
<td>3</td>
<td>0.00</td>
</tr>
<tr>
<td>Cough and cold</td>
<td>3</td>
<td>2</td>
<td>-1.00</td>
</tr>
<tr>
<td>Skin infection</td>
<td>4</td>
<td>3</td>
<td>-0.50</td>
</tr>
<tr>
<td>Swelling</td>
<td>2</td>
<td>5</td>
<td>0.75</td>
</tr>
<tr>
<td>Mental diseases</td>
<td>1</td>
<td>4</td>
<td>1.00</td>
</tr>
<tr>
<td>Muscular-skeletal problems</td>
<td>1</td>
<td>2</td>
<td>0.00</td>
</tr>
<tr>
<td>Bleeding problem</td>
<td>1</td>
<td>3</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Liquid remedies administered to humans were usually measured by tea or coffee glasses or plastic cups, or number of drops. In this regard Dawit (2001) have also discussed lack of precision and standardization as a drawback of the traditional health care system.

**Preference ranking:** Diarrhea was the most common disease for which large number of patients visits the traditional medicinal practitioners. *Lantana camara* was the most preferred as effective treatment against diarrhea (Table 3). Following it *Vernonia amygdalin* was preferred among the medicinal plants that were reported by more informants as a remedy to diarrhea.

**Informant consensus factor:** Table 4 shows the Informant Consensus Factor (FIC) for the different ailments traditionally treated by peoples in Libo-kemekem district. The level of informants’ agreement was high for most ailment categories (FIC = 0.7) and total consensus (FIC = 1.00) was even obtained for bleeding and mental diseases. Malaria, cough and cold, as well as skin infection and breathing problems showed relatively low levels of consensus (FIC = 0.50). High FIC values indicating that the species traditionally used to treat these ailments are worth searching for bioactive compounds.

**CONCLUSION**

The study shows that knowledge and usage of herbal medicine for the treatment of various ailments among peoples in Libo-kemeke district is still a major part of their life and culture. It also provides evidence that medicinal plants continue to play an important role in the healthcare system of the community in the district. The prominent used parts are leaves. Majority of the remedies are taken orally. The majority of plants used for curing ailments were herbs which could be attributed to their abundance. Fresh plant materials are mostly used in the preparation of remedies indicating little practice by people to dry and store medicines for future uses. Traditional medicinal plants were harvested mostly from natural vegetation/wild habitat/ area followed by home gardens. It is therefore, recommended that people need to be encouraged to cultivate medicinal plants in their home garden through training or education. Furthermore, the documented medicinal plants can be used as a basis for
further studies on the regions medicinal plants knowledge and for future phytochemical and pharmacological studies.

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REFERENCES