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Ethnobotanical Study of Medicinal Plant Uses and the Problems Associated With Local Community Perception in Dale District, Sidama Region, Ethiopia

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ABSTRACT

Peoples have used traditional human and veterinary medicine to treat diseases for generations. An ethnobotanical study was conducted at Dale district in Sidama Region, Ethiopia. The objective of this study was to document indigenous medicinal plant utilization and the factors affecting it. A total of 90 informants 66 male and 24 females (including 20 key informants) were selected and snowball sampling techniques was used. Ethnobotanical data were collected using semi-structured interviews, field observations, guided field walk, group discussion, preference ranking and paired comparison with traditional medicine practitioners. The Ethnomedicinal uses of 55 plant species which are distributed across 52 genera and 36 families were documented used as cure for 38 ailments. Among these, 31 medicinal plants were reported for human ailments treatment, 7 for livestock and 15 for both human and livestock ailment treatment. The most frequently utilized plant parts were leaves. Intestinal parasite ailment was reported as common problems. Oral administration observed as dominant one. Preference ranking analysis indicates that Vernonia amygdalina ranked first and most effective medicinal plant to cure intestinal parasite problems in human. While for livestock ailment, Achyranthes aspera ranked first and most effective medicinal plant to cure pneumonia. In paired wise comparison Stephania abyssinica ranked first and most effective medicinal plant to cure jaundice in humans as compared to the others. Informant consensus analysis showed that ailments like rabies, poisoning and snake bite scored the highest value (0.98), while pneumonia and jaundice scored the lowest values (0.63) respectively. Agricultural expansion, fire wood, deforestation and cash crop expansions were reported as driving factors for loss of medicinal plants.

Keywords: *Dale, Medicinal plant, Indigenous knowledge, Informant, Informant consensus*

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INTRODUCTION

In Ethiopia, approximately 80% of humans and 90% of the livestock population rely on traditional medicinal plants to cure different ailments [1] and due to difficulties in accessing modern health facilities, the cultural acceptability of healers and low cost of traditional medicine invited local communities to dwell traditional healers [2]. Similarly Peoples have used traditional human and veterinary medicine to treat diseases for generations [3]. Owing to its long period of practice and existence, traditional medicine has become an integral part of the culture of Ethiopian people [4]. The previous studies conducted on medicinal plants in Ethiopia also reported that, the existing medicinal plants were on conservation risk [5, 6]. Also the problem is further compounded by the fact that traditional knowledge on traditional medicine is also being lost at an alarming rate [7].

Additionally, the medicinal plants available in the study region are becoming extinct and the associated knowledge held by elders has received less attention and hence, they are in the verge of disappearance [8 – 10]. Furthermore, the rich ethnomedicinal knowledge held by the Sidama community at large and traditional medicine practitioners in particular needs an in-depth study and documentation [11] and medicinal plants are exposed to various destructive anthropogenic activities. Thus, this study aimed on documenting the medicinal plants and the associated indigenous knowledge and factors affecting those resources in Dale district of Sidama Region, Ethiopia.

MATERIALS AND METHODS

This study was conducted at Dale district in Sidama Region, Ethiopia, The study area geographically extends from 6°44’99’’N to 6074’99’’N and 38°19′60’’E to 38°33’33’’E Latitude and Longitude respectively and about 320 km south of Addis Ababa, the capital of Ethiopia. Dale district is the biggest district in Sidama Region. The altitude of Dale district ranges from 1170 m around Lake Abaya to the west and about 3200 m a.s.l. in the eastern part of the district. Hence, there is a general decrease in altitude and resulted in associated change in climatic elements from east to the west. The district has four agro-climatic zones. Moist dega and wet dega (2300-3200 m a.s.l), moist weina dega (1500-2300 m a.s.l) and Moist Kola (500-1500 m, a.s.l). Except Wet-dega which recives 1400 mm of rainfall, all the rest receives less annual rainfall. The district is subdivided into 76 Peasant Associations. According to CSA (2003), the population of the district is estimated at 36,954 of which women account for 57.6% of the population. The altitude at Yirgalem (Capital city for the district) is 1,765 m asl. According to the data obtained from Sidama Region, in the district there are about 37,040 rural agricultural household heads, out of which 63.4% and 36.6% are male and female headed households respectively.

The wealth status of the households was the major variable influencing farm size, with average sizes of 0.51, 1.37 and 2.37 ha for the poor, middle income and rich farmers respectively. Coffee and en set dominate in over 50% of the home garden area, while the share of other crops is much smaller than the dominant crops. The home gardens were on average 0.66 ha in area (range: 0.13-6.79 ha). The land holdings included forest cover (1.5%), residential and grazing areas (11.5%), cultivated lands (49%) and arable land (38%). Average farm size is estimated at 1.5 ha and the area under coffee is 15,375 ha.

Sample size and sampling techniques

The study was conducted in five Kebeles in the Dale district in 2019. Kebeles were purposively selected based on reconnaissance survey and recommendation from local society (knowledgeable elders, religious leaders and development agent). The selected Kebeles were ‘Awada,’‘Masincho,’‘Tulla,’Debub Kege and ’Debub mesinkella‘(Figure 1). A total of 90 informants 66 male and 24 females were selected. Out of these, 20 key informants were purposively selected based on recommendations from local authorities (Kebele administrator, knowledgeable elders, religious leaders, development agent and local guides). Appointments were made prior to visiting the key informants and the informants except the key informants, were selected through the Snowball method [12], which consists in the search for new interviewees by the indication of people already interviewed. They were asked to give their knowledge about the

plants they use against a disease, plant parts harvested method of preparation of the remedy, details of administration and the dosage and were proportionally selected from each Kebele [10]. The ages of the informants were between 18 to 93 years.

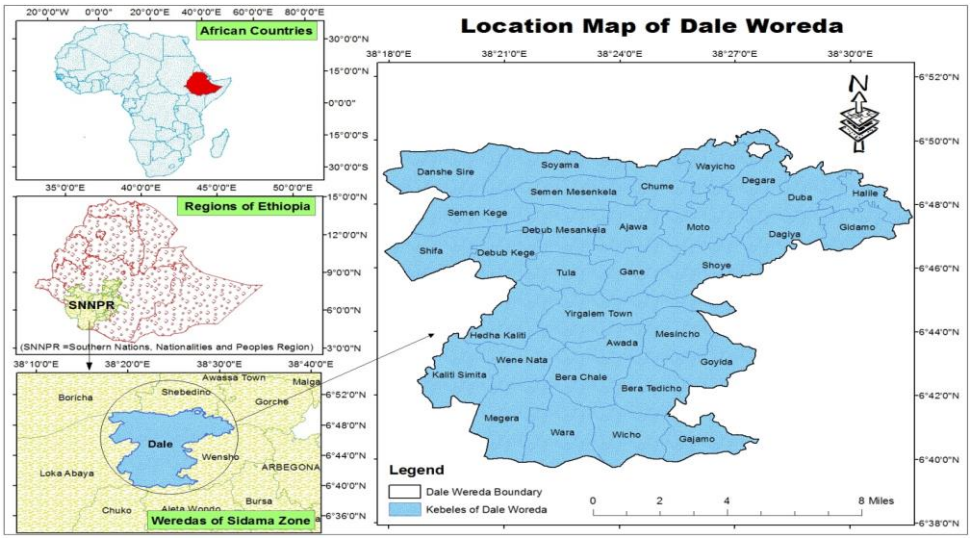

Figure 1: Location map of the dale district

Ethnobotanical data collection

Following techniques described [13, 14], Ethno botanical study was collected from April to July of 2019. The techniques employed for data collection were group discussions; field observations, guided field walks, and a semi-structured questionnaire pre-prepared by Sidama language and finally translated to English. Floristic voucher specimens were collected with the help of traditional healers, knowledgeable elders and development agent. The collected specimens were properly identified by comparing with already identified specimens in National Herbarium of Ethiopian using taxonomic literatures [15 – 17].

Data analysis

Descriptive statistical methods such as percentages and frequency were employed to analyze and summarize the data on medicinal plants [13, 14]. The most useful information gathered on medicinal plants reported by local people: medicinal value, application, methods of preparation, routes of administration, disease treated, and parts used and habit was analyzed through descriptive statistics. To make simple calculation, to determine proportions and to draw bar graphs MS Excel spread sheet was utilized.

Quantitative analysis

Factor Informant Consensus (FIC) was measured to study total usage of plant species according to culture applicability. Health disorders were categorized into eight groups like plant with high FIC value can be consider as more pharmacologically active as compared to low FIC value. FIC values will be high if maximum respondents acknowledge one or few plants to treat a specific disease. FIC value can be calculated by the formula FIC = nur – nt/ nur – 1; Where FIC = informants consensus factor, nur=number of use citation, nt=number used species [18].

Preference ranking

Preference ranking was undertaken [13]. Using eight key informants based on the values of free listing and informant consensus, selected MPs used to treat intestinal parasite for human and lung infection for livestock were subjected to this procedure. The healers gave MPs believed to be most effective to treat those illnesses the highest value (5), and the least effective was given the lowest value (1). The preferences of the top five and four MPs said to be used to treating intestinal parasite and Pneumonia disease. The practitioners

were requested to compare selected MPs based on their knowledge to treat the illnesses. The values given to each species were summed up, and the ranks were determined based on the total score. This procedure helped to identify the MP species that are very likely to be the most effective for treating the specific disease based on the consensus/agreement among the healers**.**

Paired comparison

Paired comparisons can be used for evaluating the degree of preference or levels of importance of certain selected plants. This method was used to find out about the efficacy and popularity of five medicinal plants species used to treat jaundice following the procedure [13]. Eight key informants were randomly selected by lottery method to show their responses independently for pairs of five medicinal plants that are noted for treating jaundice. A list of the pairs of selected plants with all possible combinations was made and sequence of the pairs and the order within each pair was randomized before every pair is presented to selected informants. Then their responses were recorded. The total value summed and the rank made based on the total score of the informants.

RESULTS AND DISCUSSION

The field interviews conducted here included heterogeneous informants with varying educational levels, gender, social position and age. The sample comprises of 27% female and 73% male informants. Fifty five plant species distributed into 52 genera and 36 families were documented and reported. (Table 1, 2, 3). The leading family was Fabaceae with five species, followed by Cucurbitaceae, Euphorbiaceae, Rutaceae and Solanaceae each with four species and Asteraceae with three species (Table 1).

Table 1: Medicinal plants used for the treatment of livestock diseases in Dale District, Southern Ethiopia. Habit (Ha): Tree (T), Shrub (Sh); Herb (H); Climber (Cl)

List of medicinal plants for treating livestock diseases								
Scientific name	**Family**	**Local name**	**Ha**	**Parts used**	**Preparation**	**Application**	**Diseases treated**	**Uses**
Achyranthes aspera L.	Amaranthaceae	Nole	H	Fresh leafs / Fresh root	Pounding	Oral	Intestinal parasites and Lung infection	Livestock
Antiaris toxicaria Lesch.	Moraceae	Dimbicho	T	Dry/fresh stem bark	Pounded/powdered	Oral	Rabies	Livestock
Dodonaea angustifolia L.f.	Sapindaceae	Itancha	T	Fresh leafs	Crushed and pounded	Oral/dermal	Ecto-parasites	Livestock
Ehretia cymosa Thonn.	Boraginaceae	Gidicho	T	Fresh stem bark	Crushing and pounding	Oral	Intestinal parasites	Livestock
Hypoestes forskaolii(Vahl)R. Br	Acanthaceae	Xexxe	H	Fresh root	Pounding	Oral	Intestinal parasites	Livestock
Millettia ferruginea (Hochst.) Bak.	Fabaceae	Hengedicho	T	Fresh stem bark	Crushing and pounding	Oral/dermal	Ecto-parasites	Livestock
Nuxia congesta R.Br. ex Fresen.	Loganiaceae	Burcanna	T	Fresh leafs	Pounding	Oral	Intestinal parasites	Livestock

CONCLUSION

Common ailments and plant species used in the study area

Traditional healers have amazing and surprising indigenous knowledge on diagnosis, treatment and determination of diseases or ailments. Different 28 human and 12 livestock ailments were recorded. The practitioners commonly diagnose each health problem by interviewing and visual inspection of the patient. The patients are commonly interviewed for symptoms observed and the duration of the diseases. Such as changes in eye color, tongue color, throat, body temperature and status of sores are all visually inspected by the practitioner. In this study multi-functionality of plant species also reported in Figure 2. For disease like fibril illness, evil eye and Jaundice, the local people prefer traditional healers for treatment. Some of the medicinal plants in this study were also reported to cure specific diseases. Vernonia amygdalina, Solanum incanum, Croton macrostachyus, Carica papaya, Arundo donax and Momordica boivinii were reported to cure intestinal parasites and associated illness. Datura stramonium and Vernonia auriculifera were also reported to cure head infection (Fungal disease) and Allium sativum, Vernonia amygdalina, Zingiber officinale, Artemisia abyssinica and Melia azedarach were claimed as the treatment for malaria.

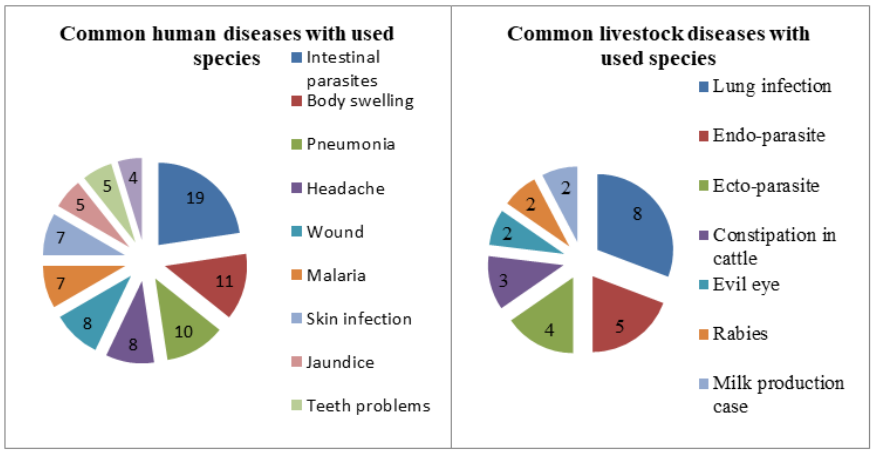

Figure 2: Common human and livestock ailments in Dale district

Parts of medicinal plants used

Leafs were reported as most frequently utilized plant part with (45.78%) for human remedy preparation followed by root (19.28%), bark (12.05%), seed (6.02%). Large proportion of herbal preparation from leafs and the root sources were reported. Similarly, leaf and stem barks are claimed as the dominant plant parts used in the remedy preparations for livestock ailment treatment. Both leaf and stem bark accounting to (75%) from the total remedy preparation followed by whole plant parts and root (12.5%) each respectively.

Like human remedy preparation, leaf is the most harvested forms in remedy preparation for livestock ailment treatment. But, remedy preparations from stem bark, roots and whole plants are very risk to plant survival. So, the local people must adapt alternative ways of conservations of medicinal plants in their home gardens. In both human and livestock treatments, leaves are more harvested parts of the plants. Which covered (38.71%) followed by bark (20.97%); seed (16.13%); root (14.52%); whole plant (4.84%); fruits (3.23%) and latex (1.61%). Such wide harvesting of seeds, barks and roots, which are important for survival of plants has a negative influence on the survival and continuity of useful medicinal plants

and hence affects sustainable utilization. The preference of leaves to other plant parts may be due to the easy to preparations compared to remedy preparations from other plant parts. Furthermore, leaves carry copious amounts of plant secondary metabolites that have medicinal properties were reported.

Fifty five medicinal plants species used by the local community were collected and recorded from the study site. The medicinal plant resource in the area is considerable, the Wereda being relatively rich in medicinal plant diversity. The associated knowledge of the local people is deep-rooted in the time-honoured use practices of herbal medicine. Of the identified medicinal plants, 31 species were noted to treat human ailments, 7 species for livestock ailment treatment and 17 species for both human and livestock health treatments. Twenty six different human ailments and 12 livestock ailments were recorded. Shrubs were found to be dominant as traditional medicinal plant remedy sources in the study area followed by trees, herbs and climbers. Leaves were also found to be the most harvested plant parts for the preparation of the remedies followed by bark and roots. In the preparation of medicines, single plants were used to prepare the medicines to cure the diseases rather than mixing with each other. The routes of administration are mainly internal in which oral administration is the common one. However, both the plant resources and the indigenous knowledge of herbal medicine are under threat. The main factors leading to loss of plant species in the study area are agricultural expansion in relation to population growth and cash crop expansion (e.g. Coffee Arabica). The study site has rich in medicinal plant diversity. But, the knowledge on medicinal plants becomes shrinking due to its secrecy, oral based knowledge transfer to close relatives. The medicinal plant resources, the associated traditional knowledge and medical practices are in dire need of protection through implementation of appropriate conservation strategies.

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CONFLICT OF INTEREST

The author declare that there is no conflict of interest

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