ETHNOBOTANICAL STUDY OF SOME COMMONLY USED TRADITIONAL PLANTS BY SHAMBAA TRIBE OF TANGA REGION, TANZANIA

RASHID RASOOL RABBANI ISMAILI[a1], SAMEERA GHAZAL[b], OWAIS MAQBOOL RABBANI ISMAILI[c], SELEMANI KASSIM TENGEZA[d] AND MA HAIYANG[e]

[a]Department of Ecology and Nature Conservation, Beijing Forestry University, Beijing, China
[b]Department of Zoology, Shibli National (P.G.) College, Azamgarh, India
[c]Shaikh-Ul-Hind Maulana Mahmood Hasan Medical College, Saharanpur, India
[d]Department of Forestry Economics and Management, Beijing Forestry University, Beijing, China
[e]Department of Environmental Science and Engineering, Beijing Forestry University, Beijing, China

ABSTRACT

The current research reveals the conventional knowledge relevant to the usage of various plants and plant-derived products as remedies by Shambaa tribe belong to Tanga region of Tanzania. They utilize the different plant parts in treating acute as well as chronic diseases widespread between the tribal people. From March to July 2020, a field survey was conducted with 20 selected respondents, who supplied information on the use of plants and their products in traditional medicine through interviews using a prepared questionnaire. A total of 20 plant species were documented with their different ethnomedical purposes including physical weaknesses, wound, stomachache, gastritis, malaria, male impotency, schistosomiasis, diabetes, asthma, hernia, gall problem and inflammation etc. Shambaa tribe in the study area have conventional knowledge of medicinal plants in curing different human ailments; however, lack of concern of young generation in agricultural expansion became the considerable threatening remark to medicinal plants. It is, therefore, important to preserve this indigenous knowledge on traditional medicines by proper documentation, identification of plant species used, and herbal preparation. To save medicinal plants from further loss, involving local communities in cultivation of the most utilized medicinal plants is recommended.

KEYWORDS: Ethnobotany, Traditional Medicine, Medical Anthropology, Tanzania, Shambaa Tribe

Throughout history, plant resources have remained an important aspect of human society. The usage of plants or herbs as medication to treat or prevent diseases in human is known as phytotherapy or herbalism (Yasmin *et al.*, 2020). In recent years, ethnobotanical knowledge has been used as a starting point for several successful drug screening studies (Heinrich *et al.*, 2015). Because Tanzania is one of the poorest countries in the world, ordinary tribes find it difficult to acquire medicines, particularly for chronic diseases. Indeed, ethnomedicinal research has aided in the discovery of both natural and synthetic medications (Fabricant and Farnsworth, 2001). According to the World Health Organization (WHO), traditional medicines are still used by about 80% of the world's population, particularly in developing countries' rural areas. As the matter of fact, aboriginals possess the art of healing by the application of various plant parts (Jima and Megersa, 2018). The Usambaras have traditionally used a wide range of forest resources (Iversen, 1991). In general, people's survival is heavily reliant on the natural world (Modest Mrecha, pers. comm.). In the Usambaras, Fleuret (1980) found 78 medicinal plant species. Ruffo *et al.*(1989) provides a list of forest species utilized for various uses by local people in the East Usambaras (timber, poles, firewood, fruits and colors, ropes, kitchen tools, plywood). In the East Usambaras, fourteen traditional healers employ as many as 185 plant species to cure 63 different ailments and diseases. In her nutritional research in Lushoto District, Fleuret identified around 15 species of wild leaf vegetables. 25 wild leafy vegetable species were included in Woodcock's (1995) study on indigenous knowledge and forest use in the East Usambaras (Fleuret, 1979) (Woodcock, 1995).

Notably, Tanzania's government enacted legislation to address national health needs, traditional knowledge, and the resource base for TM throughout the last ten years (e.g., practitioners, biodiversity) (Stangeland et al., 2008). Established Tanzanian medical systems recognized the relevance of such pharmaceuticals, as some drugs are derived from plants. The primary goal of this study is to collect ethnomedicinal information from traditional healers in these three communities to create a comprehensive database of medicinal plants and their traditional uses, like how we have been documenting ethnomedicinal

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[1]Corresponding author

practices in other indigenous communities for several years. A secondary goal is to find new ethnomedicinal plant species in the study area that could be used for further researcher in the field of medicine.

METHODS

Shambaa tribe and Study Area

The Shambaa people live in northeastern Tanzania's Usambara Mountains, as well as the Kilimanjaro and Manyara regions. Shamba means "farm," and these people reside in one of Tanzania's most productive regions (Lawrence, 2009). Botanical and ecological knowledge are abundant in the native Shambaa language (Sangai, 1963). Shambaa's population was predicted to be 664,000 in 2001. Local people's perceptions about who has better plant knowledge in Tanga are congruent with the above-mentioned research findings. Traditional healers who work privately (rather than publicly in markets) are believed to be medicinal plant experts, particularly those who are elderly, live-in rural locations, and appear to live a more traditional lifestyle (based on clothes and/or the use of spirits in their healing). Because of historic antecedents and because their activity is generally considered as a benevolent service to society, healers are confident in their right to gather therapeutic herbs. Multiple healers are not only in contact with local foresters, but they are also among those who are being sought for participation in participatory forest management, which was made legal with the passage of the Forest Act of 2002. (Ministry of Natural Resources and Tourism 2006) (McMillen, 2012). The study took place at Tanga region of Tanzania, between 5° 18′ 15″ south latitude and 38° 19′ 3″ east longitude (Figure 1).
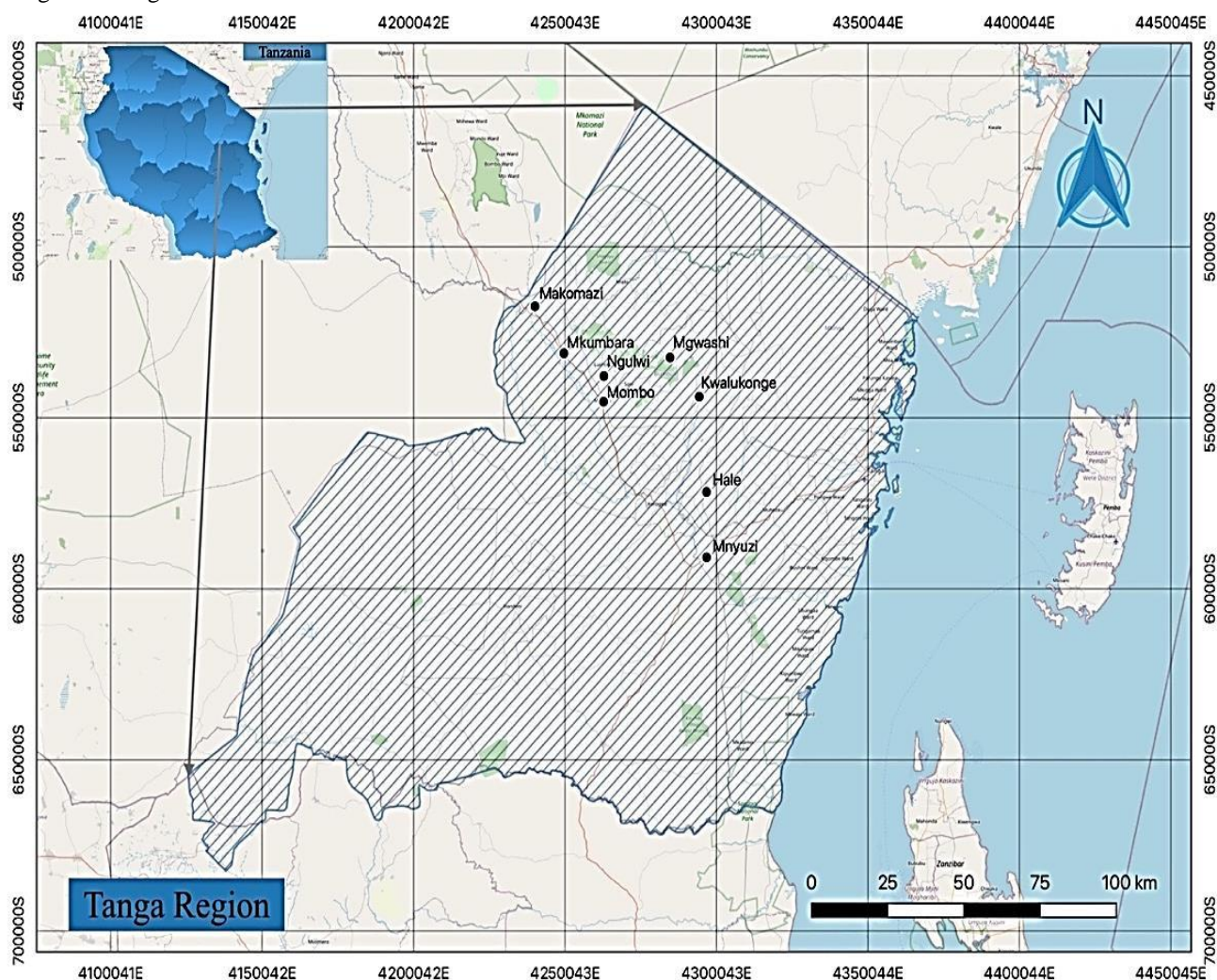

Figure 1: Map showing the locations of the ethnozoological research area in Tanga region of Tanzania

Tanzania's Tanga Region is one of the country's 31 administrative divisions. The municipality of Tanga city serves as the regional capital. The region is bordered to the north by Kenya and the Kilimanjaro Region, to the west by the Manyara Region, and to the south by the Morogoro and Pwani Regions. from which this study is

conducted in Hale, Mkumbara, Mombo, and Ngulwi. Plants and minerals used for therapeutic purposes in this tribe, however, have yet to be highlighted. As a result, we've focused on the phytotherapeutic properties of the Shambaa tribe in this paper.

Selection of Study Sites

From February 25 to March 5, 2020, a site investigation of the research region was conducted. The study sites were chosen based on elders' recommendations, local authorities' recommendations, and the altitudinal range. As a result, the research was conducted in Tanga region of Tanzania.

Selection of Participants

A total of 58 people were chosen at random from the representative kebeles (38 males and 20 women). Martin (Martin, 2004) used random and purposive sampling procedures to recruit representative common people and knowledgeable traditional medicine practitioners (key participants) from Berbere district. Twenty experienced people were carefully and methodically chosen based on the advice of wise elders, local officials, and development agents. The quality of explanations given by certain participants during an interview was also used to select crucial participants. Local healers were automatically designated as key participants since they are traditional specialists and keepers of indigenous medicinal plant knowledge.

Enumeration

The medicinal plant species are enumerated alphabetically, with their botanical name, family, common name(s), followed by habit status, parts used, ailments, rout of administration and mode of administration are tabulated in Table 1.

Data Collection and Analysis

The strategies adopted for phytopharmacological data gathering were semi structured interviews, group discussion, guided field walks. This district has a rural population of 332,436 people. Semi structured interviews were done based on checklist of questions developed in English and translated to Swahili the language of Shambaa tribes of Tanga region (Jima and Megersa, 2018) (Martin, 1995). During an interview with a participant, information was meticulously recorded. When a language barrier arose, interpreters were called in. During the survey process we also collected the relevant pictures of some plant species mentioned in this research article and two of the collected photographs overuse of *Aloe vera* and *Citrus limon*. As far as

conservation status of collected medicinal plants concerned, we found 4 plants out of 20 like *Cussonia arborea*, *Lannea welwitschii*, *Cassia sungueana* and *Pupalia lappacea* were least concerned plants while 16 plants were found unspecified in IUCN Red List of Threatened Species, Version 2021-3. Field observations of the morphological features and habitats of each medicinal plant species in the field were conducted with the assistance of local guides. Threats to medicinal plants, medicinal plant conservation, and knowledge transferability in the community were all topics of debate. Prior to the interviews, participants' verbal consents were gained through group talks on the study's objectives, and all data was collected through their oral consents.

Fidelity Level

For the data analysis, the fidelity level (FL) was determined for the most reported diseases or ailments, which shows the percentage of participants claiming the usage of a certain plants for the same principal purpose:

$$FL\ (\%) = Np \times 100/N$$

Where Np denotes the number of respondents who claim to have used a species to treat a specific ailment, and N denotes the number of respondents who claim to have used animals as a medication to treat any condition (Alexiades and Sheldon, 1996).

Relative Frequency of Citation

The Relative Frequency of Citation Index identifies each species' common association. The RFC standard was determined using the formula RFC=FC/N, where FC means the total number of respondents who notified the use of species and N denotes the total number of respondents who participated in the survey. The RFC index ranged

$$RFC = FC/N$$

from 0 to 1, with a value of 0 indicating the species' profitability. If the RFC number is 1, it means that everyone in the survey refers to the animals as appropriate.

RESULTS

Ethnobotanical Exploration

A discussion with the Shambaa tribe gave knowledge on 20 plant species' medicinal uses. The format is an alphabetical list of plants' vernaculas names, with botanical names in brackets. The shambaa tribe employed a total of 20 medicinal plant species from 15 families to heal 17 human diseases (Table 1). People in the study region gather various plant components for use

in traditional treatments (e.g., leaves, roots, barks, and fruit). The Tanga region is an ethnobotanically rich place with significant medicinal plant availability and knowledge that might serve as an example for low-cost health treatment (McMillen, 2012). Many of the plant species studied in this study have had their active components and pharmacological qualities evaluated, which is consistent with the ethno-medicinal usage mentioned in this work. Traditional medical care is still used by people in rural regions because it is safe, has no side effects, is inexpensive, and is readily available.

Plant Constituent as Remedy

Leaves (38%) were the most used plant parts in the preparation of herbal remedies, followed by roots (28%), fruits (9.5%), bark (4.7%), and cane (4.7%) (Figure 2 & 3). The species found in this study were utilized to treat identical diseases in 55 %, while 45 % of the species had no documented ethnomedicinal information. Other studies in Africa found a similar distribution (Constant and Tshisikhawe, 2018). Most of the plants indicated by the interviewees were usually taken in the wild, posing a threat to the survival of several useful species, and the state of the forests near these towns is deteriorating year after year. If not swiftly rectified, this condition could result in an extraordinary environmental crisis and the extinction of much of traditional ethnobotanical culture. In this context, the current study aspires to contribute, at least in part, to the preservation of knowledge held by the studied people, which is still deeply rooted in nature, and to the transmission of this irreplaceable tradition to future generations.
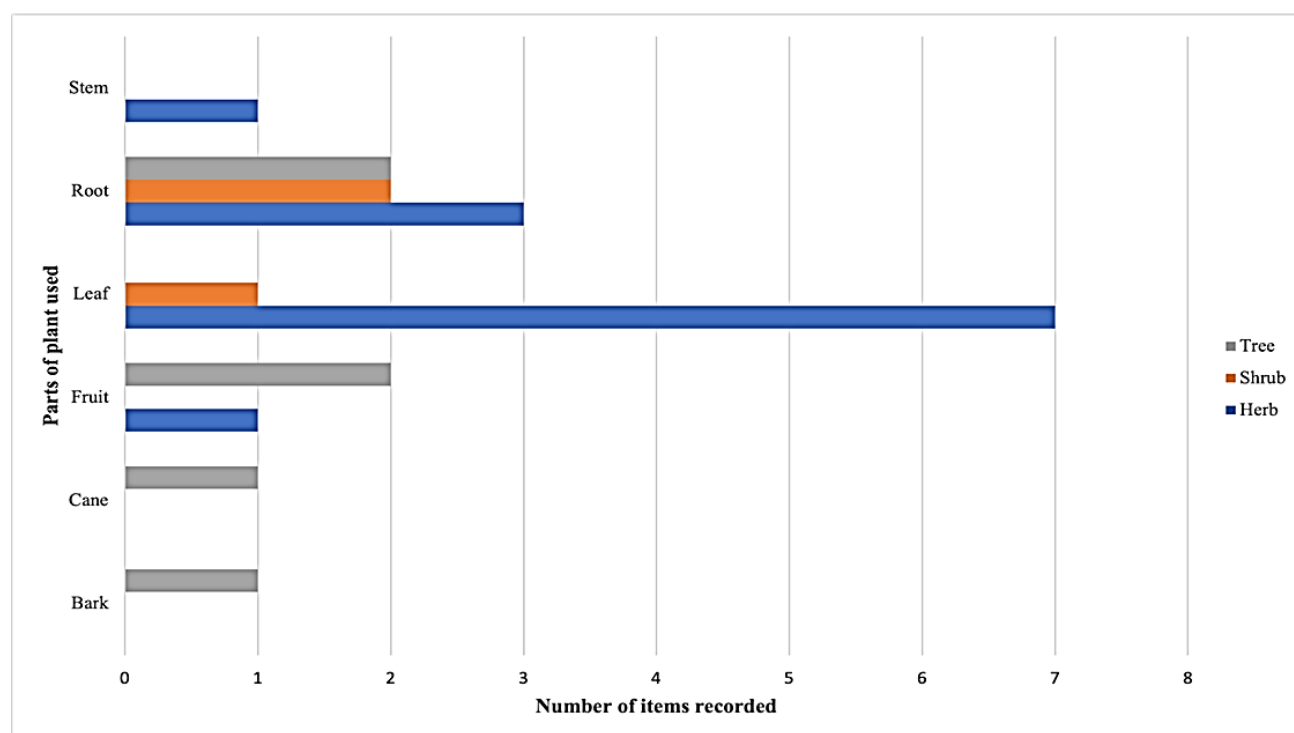

Figure 2: Bar graph showing the species parts used by Shambaa tribe of Tanzania and their recorded numbers in current research study

Table 1: Summary of medicinal uses of reported plant species in different ailments by Shambaa tribe

S. no.	Name of Plants	Common name	Families	Habit	Part(s) used	Mode of administration	Rout of administration	Ailments	References
1.	*Aloe vera*	Jolonji	Asphodelaceae	Herb	Leaves	Small pieces of leaf macerated in water for 24 hours and half cup of juice administered twice a day for about a week to cure malarial infection.	Oral	Malaria	Sedaghat and Fereshteh, 2020
2.	*Aristolochia petersiana*	Unkulwe	Aristolochiacea	Shrub	Root	Chopped pieces of root chewed, swallowed the secreted juice to cure gastritis.	Oral	Gastritis	Unstated*
3.	*Artemisia afra*	Fivi	Asteraceae	Shrub	Leaves	Drink the juice of decocted leaves	Oral	Malaria	Anneke du Toit and Frank van der Kooy, 2019
4.	*Asparagus setaceus*	Mwinika nguu	Asparagaceae	Herb	Root	Oral intake of decocted roots	Oral	Schistosomiasis	Unstated*
5.	*Brassica integrifolia*	Kasunga	Brassicacea	Herb	Leaves	Drink the broth of boiled leaves	Oral	Diabetes	Jo *et al.*, 2018
6.	*Cassia singueana*	Mhumba	Fabaceae	Shrub	Root	Oral intake of decocted roots	Oral	Physical weakness & loss of strength	Adzu *et al.*, 2003
7.	*Citrus limon*	Limao	Rutaceae	Tree	Fruit	Apply lemon juice to the place having fungal infection after cleaning and drying	Dermal	Fungal infection & skin rashes	Otang and Afolayan, 2016
8.	*Cussonia arborea*	Mntindi	Araliacea	Tree	Root	Oral intake of decocted roots	Oral	Hernia	Morris and Msonthi, 1996
9.	*Erelangea tomentosa*	Boha	Fabaceae	Tree	Cane branch	Consume the cane twice in a day	Oral	Gall problems	Unstated*
10.	*Euphorbia hirta*	Mtago	Euphorbiaceae	Herb	Fruit	2-4 fruits dried in sunlight and consumed three times a day for about one month.	Oral	Diabetes	Subramanian *et al.*, 2011
11.	*Hibiscus micranthus*	Mhurusha mbuzi	Malvaceae	Herb	Root	Chew its root and swallow the secreted juice	Oral	Male impotency	Unstated*

12.	*Lannea welwitschii*	Mumbu	Anacardiaceae	Tree	Bark	Drink the mixture of decocted barks and milk	Oral	Abnormal nipple discharge	Ajao *et al.*, 2022
13	*Musa balbisiana*	Mgomba	Musaceae	Herb	Root	Boil the cleaned roots, drink 1/4 liters thrice in a day for 21 days	Oral	Asthma & breathing discomfort	Unstated*
14	*Ocimum sanctum*	Kivumbasi	Lamiaceae	Herb	Leaves	Decoction of leaf is given orally twice a day for 9-12 days to the patient suffering from Stomachache. Same formulation is also useful in case of diabetes.	Oral	Stomachache and Diabetes	Unstated*
15	*Plectranthus barbatus*	Mzugwa	Lamiaceae	Herb	Leaves	Decoction of leaf is given orally thrice a day to the patient to relive the fever.	Oral	Fever & Flu	Unstated*
16	*Pupalia lappacea*	Mamata	Amaranthaceae	Herb	Leaves	Ash of the burnt leaves is applied as ointment in scabies and burns, to heal the wounds and immediate relief from pain.	Dermal	Wound	Prasad and Rajesh, 2013
17	*Ricinus communis*	Mnyonyo	Euphorbiaceae	Herb	Leaves	150 g of boiled fresh tender leaves made into paste and dilute with water, which is applied gently on legs having burning sensation to cure it.	Oral	Burning sensation in legs	Unstated*
18	*Saccharum officinarum*	Muwa	Poaceae	Herb	Stem	About half cup blend stem is mixed with water to make juice and given twice a day for about 1 to 2 weeks to relieve yellow fever or small chopped pieces of soft stem chewed to cure yellow fever.	Oral	Yellow fever	Anand *et al.*, 2012
19	*Tragia schefflera*	Mabawa	Araleacea	Tree	Root	Half cup decoction of root is diluted with equal amount of water and taken once a day for 2-3 as a remedy against stomach trouble.	Oral	Stomachache	Unstated*
20	*Zehneria scabra*	Fsuiza	Cucurbitaceae	Herb	Leaves	Steam inhalation of boiled leaves with a sheet of blanket covered over the head.	Nasal	Acne	Anand *et al.*, 2012

* Unstated: The plant species employed in the diseases listed are not mentioned anywhere else in the research report.

Fidelity Level

To measure the value of each of the ten most chosen plant species in treating a major disease, a fidelity level was calculated for each of them (Ali-Shtayeh *et al.*, 2000). It was determined using the number of people who had used a specific plant species to treat a serious illness. FL depicts the proportion of respondents who claim to have used a plant species for the same primary condition in relation to the total number of informants who mention the plant for any reason. Table 2 reveals that eight plant species have high fidelity levels of more than 50%, highlighting the usefulness of these species in the treatment of the diseases indicated in the study region. In the treatment of malaria and vomiting, *Aloe vera*, *Citrus limon*, and *Euphorbia hirta* all had a 100% faithfulness rate. These species' high FL levels showed a strong propensity for malaria, fungal illness, and diabetes (Figure 4 & 5).

Figure 3: Photographs of some of the studied medicinal plant species in Tanga region of Tanzania (a-i): a. *Ricinus communis* b. *Aloe vera* c. *Euphorbia hirta* d. *Plectranthus barbatus* e. *Musa balbisiana* f. *Ocimum sanctum* g. *Citrus limon* h. *Cassia singueana* i. *Zehneria scabra*. Photograph b and g shows the excessively used species
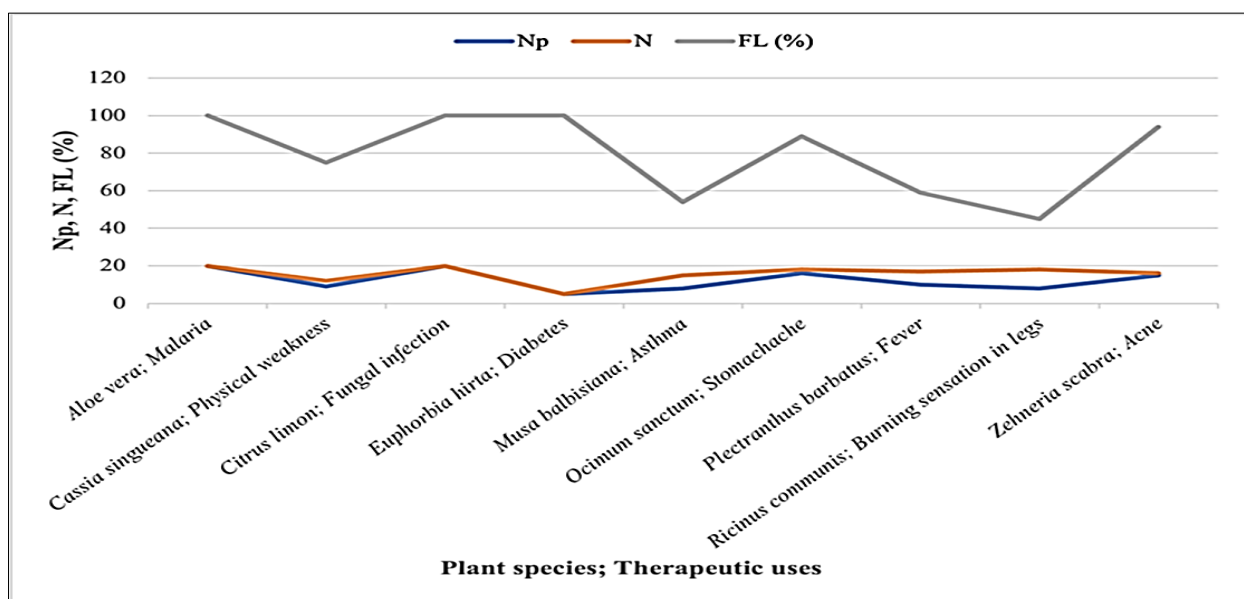
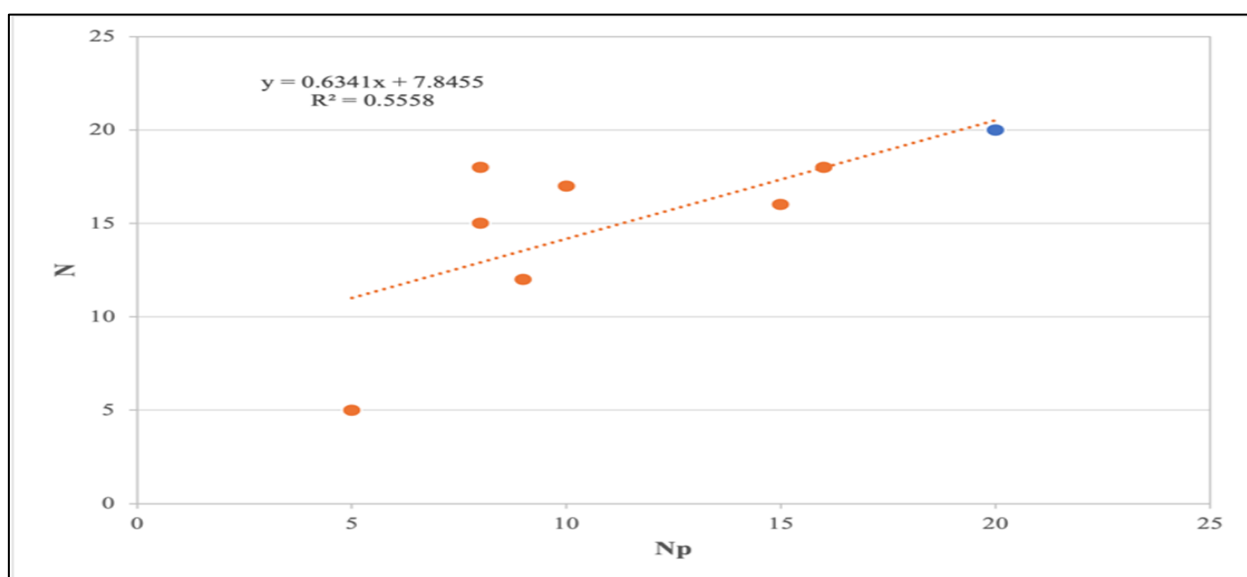**Figure 4: Graph showing Np, N, FL (%) variation**

Figure 5: The correlation between Np and N. The blue dot shows the overlapped value of *Aloe vera and Citrus limon*

Table 2: Fidelity Levels (FL) of most commonly used plants by Shambaa tribe

Plant species	Therapeutic uses	Np	N	FL(%)
Aloe vera	Malaria	20	20	100
Cassia singueana	Physical weakness	9	12	75
Citrus limon	Fungal infection	20	20	100
Euphorbia hirta	Diabetes	5	5	100
Musa balbisiana	Asthma	8	15	54
Ocimum sanctum	Stomachache	16	18	89
Plectranthus barbatus	Fever	10	17	59
Ricinus communis	Burning sensation in legs	8	18	45
Zehneria scabra	Acne	15	16	94

Key: Np denotes the number of respondents who claim to have used a species to treat a specific ailment.

N denotes the number of respondents who claim to have used animals as a medication to treat any condition.

Relative Frequency of Citation

The relative frequency of citation was produced to establish the common connection of each species. The most cited animal species were *Aloe vera* (RFC = 1), *Citrus limon* (RFC = 1), *Tragia schefflera* (RFC = 0.9), *Ocimum sanctum* (RFC = 0.8), *Erelangea tomentosa* (RFC = 0.8), *Zehneria scabra* (RFC = 0.75), *Artemisia afra* (RFC = 0.75), *Lannea welwitschii* (RF = 0.7), while *Ricinus communis*, *Musa balbisiana*, *Saccharum officinarum*, and *Euphorbia hirta* had the lowest RFC values 0.4, 0.4, 0.35, and 0.25, respectively. According to informants, *Aloe vera* and *Citrus limon* obtained the highest RFC index score, indicating the importance of these species in the studied site of Rajasthan, India. Species with the lowest Citation Relative Frequency values, such as *Ricinus communis* (RFC = 0.4), *Musa balbisiana* (0.4), *Saccharum officinarum* (0.35), and *Euphorbia hirta* (0.25), may not be beneficial locally because most aboriginals are ignorant of their therapeutic potential.

DISCUSSION

We collected all the ethnobotanical data from 20 selected local informants from Tanga region of Tanzania, the majority of those who responded were men, with an average age of 54. Traditional healers in Africa are said to be men (Bekalo *et al.*, 2009) (Cheikhyoussef *et al.*, 2011). According to research in Africa, a substantial share of key informants are men aged 50 and up (Kamagaju *et al.*, 2013). Because of their lengthy direct interaction with plant resources, older individuals (aged 51–80 years) in society have a greater understanding of medicinal plants and their uses. Younger individuals, on the other hand, appear to be uninterested in traditional medicine in general, and so there seems to be a risk of knowledge loss unless something is done to stimulate them. Younger generations have been exposed to modern education and are thus uninterested in acquiring and applying ethnomedicinal expertise, which would help to perpetuate indigenous knowledge. Other Ethiopian research found significant differences in medicinal plant knowledge between age groups (Chekole *et al.*, 2015). The medico-ethnobotanical data presented in this paper reveals peculiar and engrossing information about the curative application of different plant and plant parts by Shambaa tribe. A fidelity level (Table 2) was calculated for each of the 9 most favored plant species to quantify their importance in treating a major disease. It was determined using the number of people who used a specific plant species to treat a serious illness. The proportion of informants who claim to have used a plant species for same primary condition to the total number of

respondents who mentioned the plant for any reason is shown in FL. We observed that the fidelity level varies between 45% to 100%. The RFC standard was computed using the formula RFC=FC/N, where FC denotes the number of respondents who reported the use of species and N signifies the total number of respondents. We analyzed the relative frequency citation of every mentioned species and calculated the average RFC value 0.6175. Which encourages positively to approach for more research in the field of ethnobotany and use of traditional knowledge in curing different ailments. In terms of the conservation status of the medicinal plants collected, we discovered that four plants out of twenty, such as *Cussonia arborea*, *Lannea welwitschii*, *Cassia sungueana*, and *Pupalia lappacea*, were the least concerned, while 16 plants were unspecified in the IUCN Red List of Threatened Species, Version 2021-3.This report may pique the interest of biomedical experts, leading to significant endeavors to investigate the potential, effectiveness, and suitable application of such medicines to treat the ailments listed in our current ethnobotany research article.

CONCLUSION

Our investigation of Shambaa people revealed that 20 plant species are used for 20 different medical uses. We recommend that more research be done on these traditional treatments to establish the presence of any bioactive compounds, as well as incorporating this traditional knowledge into conservation and management policies for faunistic resources for long-term use.

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