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RESEARCH ARTICLE

Quantitative assessment of ethnobotanical resources and medicinal plants utilization patterns in Tripura, India

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Abstract

The North Eastern Region of India is an essential component of the Indo-Myanmar biodiversity hotspot and ranks as one of the world's 25th most biodiverse regions. This region hosts more than one-third of India's total biodiversity. Ethnomedicinal plants are essential in meeting the primary healthcare needs of global population in their rural regions. In the present findings, 91 plant species belonging to 53 families and 87 genera used by the ethnic people in the state of Tripura, India have been documented. A total of 25 key informants (traditional healers) comprising both men and women were interviewed. Chi-square test show significant relationship exists between their age and ethnobotanical knowledge (χ^2 = 18.824, df = 10, P = 0.043). A quantitative ethnobotany helps us identify the utility of significant species used by the ethnic communities for the treatment of some common ailments that traditional medicine practitioners claim. Analysis of ethnobotanical indices such as UR, UV, CI, FC, RFC, and FL (%) can be used as a quantitative tool to assess the cultural importance of plants, prioritize species for further study or for conservation priority, and provide insights into local ecological knowledge and traditional resource management practices. This approach recognizes the importance of traditional knowledge and fosters a sense of community ownership over conservation efforts. Further formulations and research on each species can direct the discovery of new medicinal products with significant potential for the future.

Keywords: Quantitative Ethnobotany; Ethnic Community; Tripura; Medicinal Plants; Ethnobotanical Indices; Traditional Knowledge; Biological Diversity

1. Introduction

The North Eastern Region of India has been described as a geographical 'gateway' for unique flora and fauna (Roy et al., 2015). This is an essential component of the Indo-Myanmar biodiversity hotspot and ranks as one of the world's 25th most biodiverse regions (Myers et al., 2000). This region hosts more than one-third of India's total biodiversity. The North Eastern States alone are the homes of 225 ethnic communities out of India's 450 tribal communities (Sajem and Gosai, 2006). These ethnic groups have distinct cultures and histories (Sajem and Gosai, 2008). The majority of the ethnic peoples in this region lives in rural landscape and primarily relies on the ethnobotanical resources of the surrounding forest areas for medicines and food. Ethnomedicinal plants are essential in meeting the primary healthcare needs of the global population including India in their rural regions (Kumar et al., 2021).

Exploring the traditional medical practices of the ethnic groups of Tripura that use various plants to treat diseases is critical to ensure society's long-term well-being. Local healers are vital for preserving biodiversity, traditional knowledge, population health, and the invention and administration of treatments (Deb et al., 2013). Local healers are typically specialized in treating ailments with native herbs, particularly in hilly areas. Traditional medicine is still commonly practiced in rural areas, although the use of commercial medicine is rapidly increasing in recent decades. In the tribal society plant utilization knowledge have been reported to be orally handed down from generation to generation, with each generation adding novel treatment methods (Jain and Mudgal, 1999).

The ethnic community in Tripura has a rich heritage of traditional knowledge related to utilization of medicinal plants (Deb et al., 2013). This knowledge ranges from the therapeutic use of basic household medicines to specialized treatments accessible to traditional healers (Choudhury et al., 2015). One of the most critical stages in herbal therapies was preparing medicine from raw plant resources (Majumdar and Datta, 2007; Majumdar et al., 2006). According to recent research, ethnobotanical investigations of this plant species are frequently helpful for revealing regionally pertinent plant species leading to discovery of novel modern medicines (Khisha et al., 2012; Patari and Uddin, 2016). New pharmaceuticals and agrochemicals are being discovered due to research into traditional remedies (Prance, 1991). The utilization of medicinal plant is one of the oldest and most prevalent forms of traditional healthcare, which has been recognized to play an essential role in the healthcare system (WHO, 2015). Because medicinal plants are affordable, secure, and effective at promoting and maintaining health, they are frequently used in primary healthcare services worldwide (WHO, 2018). For most nations, documentation of medicinal plants is a vital component, but more exploration is needed for further discovery of novel phytomedicines effective several human ailments (Cordero et al., 2023).

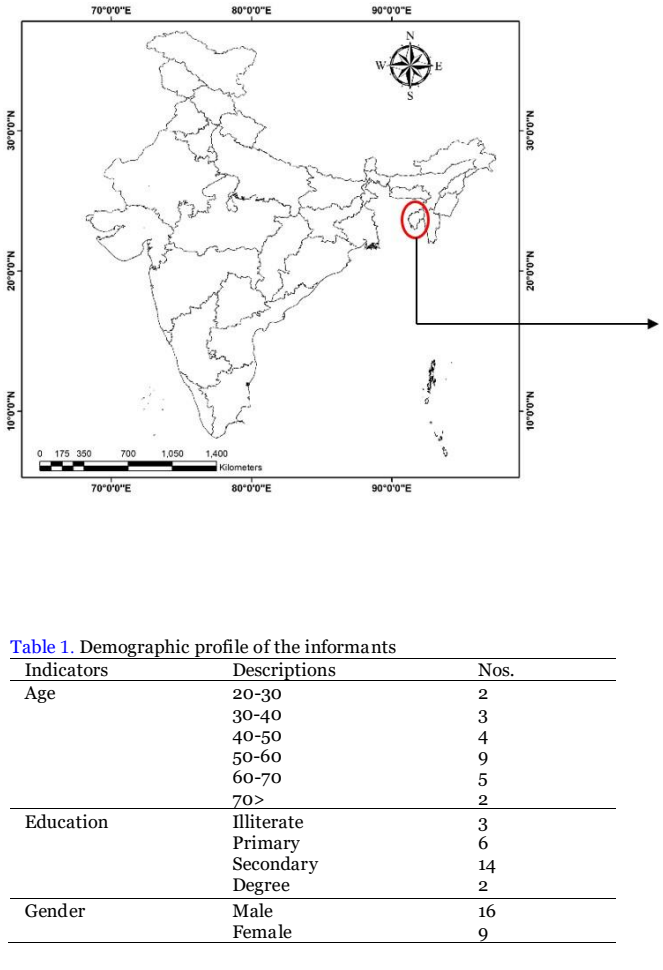

Figure 1. Map showing survey areas in Khowai and West districts of Tripura, India.

Table 1. Demographic profile of the informants

Indicators	Descriptions	Nos.
Age	20-30	2
	30-40	3
	40-50	4
	50-60	9
	60-70	5
	70>	2
Education	Illiterate	3
	Primary	6
	Secondary	14
	Degree	2
Gender	Male	16
	Female	9

Several ethnobotanical studies, lists of wild and cultivated food plants, and plant product consumption by ethnic communities of Tripura have been documented by previous workers (Singh et al., 1997; Das and Choudhury, 2009, Deb et al., 2012; Majumdar and Datta, 2014; Guha, 2015; Biswas et al., 2018); however, for such significant ethnomedicinal plants, a thorough quantitative assessment using the ethnobotanical indices are still lacking. In the present study, a quantitative assessment of the ethnobotanical resources has been made to establish the high priority species of ethnobotanical and ethnomedicinal importance and the analysis was also done on the utilization pattern of ethnomedicinal plants among the ethnic communities residing in the rural localities of Tripura state of India.

2. Materials and methods

2.1. Study area

Tripura is a state of North Eastern India, located within a geographical coordinate between 22°56' and 24°32' N latitude and 91°09' and 92°20' E longitude. It is surrounded by Bangladesh on three sides, with the state of Mizoram to the east and Assam to the north. With an area of approximately 10,491 square kilometers, Tripura is one of India's smallest states. The state is predominantly hilly, with three main ranges - Baramura, Atharamura, and Longtharai running parallel from north to south. The state is crisscrossed by several rivers, including the Manu, Gomati, and Haora, which are important sources of water and livelihood for the local population. The climate of Tripura is humid and subtropical, with hot summers and moderate winters. The monsoon season occurs from June to September with heavy rainfall, shaping the landscape and supporting agriculture, which is a major economic activity in the state. Tripura is also known for its rich biodiversity, with dense forests covering more than half of its area. These forests are home to a variety of flora and fauna, offering a unique geographical setting for studying various aspects of natural resource management, environmental conservation, and cultural practices, making it an interesting study area for research (Deb, 1983). The current study was conducted in Khowai and West districts of Tripura, covering potential 8 villages where traditional medicines are still practiced. The villages surveyed for ethnobotanical studies are Belphang, Borjo Nagar, Durga Chowdhury para, Gairing Para, Jadupa, Kali Krishna para, Ratanpur, and Sankhola (Figure 1).

2.2. Field survey and data collection

Field visits were made to eight villages in two districts, viz. Khowai and West Tripura. Small group meetings were held with older people, both men and women, to begin the preliminary work. They consented to provide assistance and support for the project. We carried out ethnobotanical surveys and compiled their traditional medical knowledge after receiving the required authorization (informal verbal consent). Semi-structured questions were used to conduct the surveys in accordance with the standard research protocols (Martin, 1995; Jain and Mudgal, 1999).

Interviews, discussions, the aid of local informants, and the collection of images have been employed to gather information on the ethnobotanical uses and modes of utilization (Kar and Borthakur, 2008). Key informants were individually questioned to gather information on the treatment of diseases, the utilization of medicinal plants, the method of medication production, usage, and dosage. Key informants (25 traditional healers) were interviewed, comprising men and women. The ethnobotanical species collected were identified using taxonomic literature, *Floras of Tripura State* (Deb, 1983) and the accepted scientific names were cross-checked on the online websites (www.worldfloraonline.org).

Table 2. Chi-square test to evaluate the relationship of the ethnobotanical knowledge between gender, age, education level, and source of information

Categorical Variable	Pearson Chi-Square Test (χ^2) Value	Degree of Freedom (df)	P-Value
Gender	0.497	2	0.780
Age	18.824	10	0.043*
Education	20.743	16	0.189
Source of Information	17.727	14	0.219

* P<0.05 hence, it is statistically significant

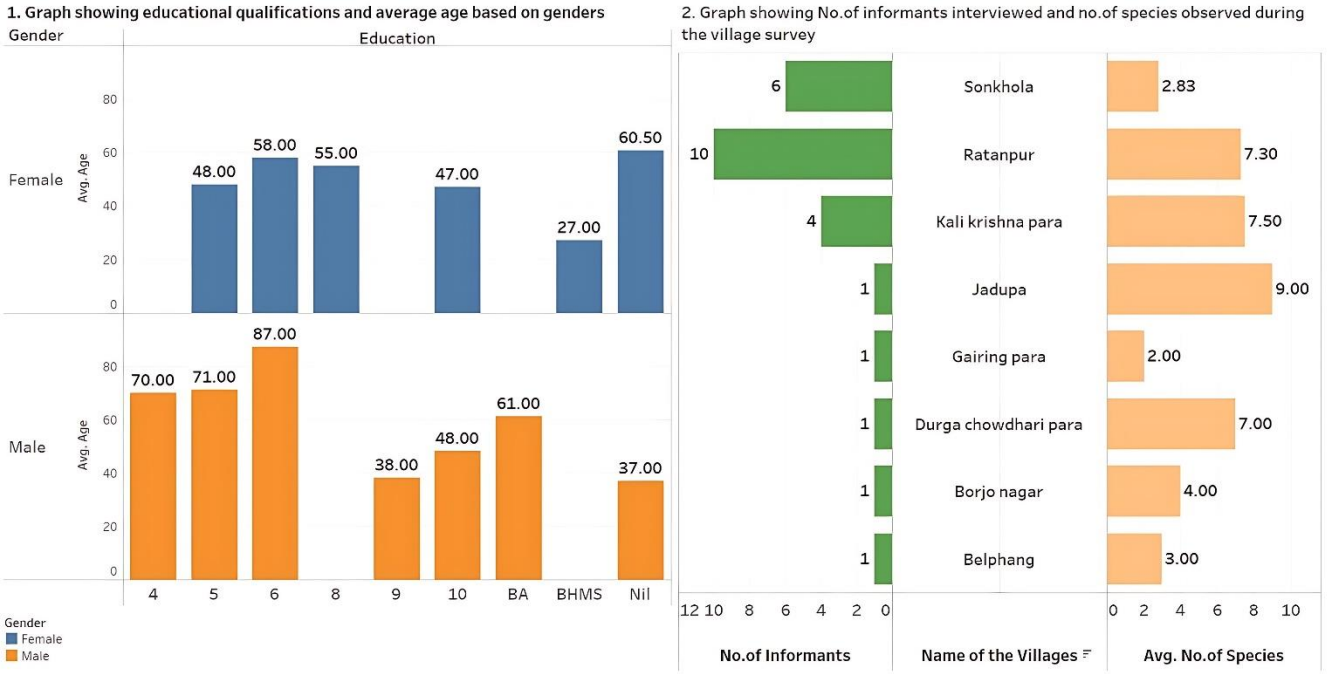

Figure 2 (1 & 2). Graph showing Demographic profile of the informants

2.3. Statistical analysis

IBM SPSS Statistics was used for statistical analysis. When there are two categorical variables from a single population, a chi-square test for independence is used to evaluate whether there is any significant relationship. Pearson's chi-square test was performed to see correlations between four variables (gender, age, educational level, and information source) and information solicits (ethnobotanical knowledge) (Karunamoorthi and Husen, 2012; Hailemariam et al., 2021).

2.4. Data analysis

Quantitative analysis plays a crucial role in ethnobotanical studies, allowing us to systematically analyze and interpret large datasets related to plant use and traditional knowledge. It also interprets the results of the ethnobotanical analysis based on the calculated indices, statistical analysis, and visualizations. Some of the useful ethnobotanical indices are evaluated using ethnobotany R programming (Whitney et al., 2012).

2.4.1. Use Report (UR)

The total number of uses of a species reported by all informants within each use category for that species is calculated by UR. Each UR is a total number of uses mentioned by informants for each use category of a species (Prance et al., 1987; Whitney et al., 2012).

2.4.2. Cultural Importance (CI)

For each species in the data set, the CI determines the cultural value index. It states that to account for the variety of uses for each species mentioned by an informant (Tardio and Pardo-de-Santayana 2008; Whitney et al., 2012).

2.4.3. Frequency of Citation (FC)

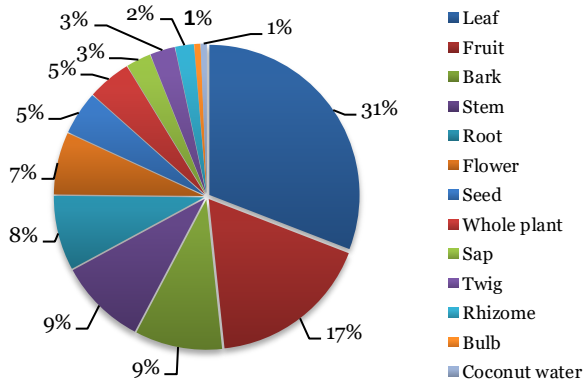

Figure 3. Showing (%) of plant parts used in various medicine formulations.

For each species, FC determines the frequency of citations; the total number of informants who convey the use of the species (Prance et al., 1987; Whitney et al., 2012).

2.4.4. Relative Frequency of Citation (RFC)

For each species, RFC determines the relative frequency of citations. It refers to how frequently informants discussed and utilized each species during the survey (Tardio and Pardo-de-Santayana 2008; Whitney et al., 2012).

2.4.5. Use Value (UV)

The relative value of plant species' usage is determined by UV. It is the number of use reports for each species indicated by each unique informant (Tardio and Pardo-de-Santayana 2008; Whitney et al., 2012).

2.4.6. Fidelity Level (FL)

FL identifies the plant species that informants in the study area use the most frequently to treat a particular disease category, and the fidelity level was calculated (Friedman et al. 1986; Whitney et al., 2012).

3. Results

3.1. Demography of the informants

From eight villages in the study area, 25 informants with extensive knowledge of ethnomedicinal uses of any plant species were interviewed (Table 1) while the distribution of informants by age, gender, and degree of education are also mentioned.
Among them, 36% of the informants were below 40 years old while 64% were above 40 years; about 12% were illiterate, while other 24% were in primary, 56% were in secondary, and 8% had degrees, respectively. More male informants (64%) than females (36%) were recorded during my survey. The highest number of informants were reported in Ratanpur village (10 informants) (Figure 2). Most frequently, farmers, retired persons, and homemakers make up the occupational groups of the informant. For this study, we were able to work with knowledgeable native healers who are considered to be traditional medicines practitioners.
Pearson's chi-square test finds no significant ($P<0.05$) relationship between the informants' gender, educational level, and source of information on their ethnobotanical knowledge in using several ethnomedicinal species. However, a statistically significant relationship exists between age and ethnobotanical knowledge ($\chi^2 = 18.824$, df = 10, P = 0.043) (Table 2). Using the chi-square test, the hypothesis that older informants are more knowledgeable about ethnomedicinal plant applications than younger informants was substantially associated with the inferences.

3.2. Mode of utilization of plant parts

The current findings document 91 plant species belonging to 53 families and 87 genera used by ethnic communities in the study sites. Most of the plant parts harvested for the medicine formulation for various ailments are- leaf (31%), fruit (17%), bark (9%), stem (9%), root (8%), flower (7%), seed (5%), whole plant (5%), sap (3%), twig (3%), rhizome (2%), bulb (1%) and coconut water (1%) (Figure 3).
According to this observation, gastrointestinal diseases (33%), dermatological diseases (14%), metabolic disorders (13%), respiratory diseases (12%), dental (7%), flu/infectious diseases (7%), hepatic disorder (5%), musculoskeletal diseases (5%), gynecological diseases (3%), others (1%) conditions were the frequently treated diseases (Figure 4). The way these species were used to cure specific illnesses was also documented, demonstrating that oral administration of the ethnomedicine was the most common mode of treatment. The medicinal plants' formulations and modes of administration also vary depending on the ailments or illnesses to be treated. Drinking decoction is the most common type for more significant health issues. The most popular medicine preparation technique employed by these traditional healers was decoction.

3.3. Quantitative analysis of medicinal plants

Based on the derived indices, statistical analysis, and visualizations and interpretation of the ethnobotanical analysis viz. UR, UV, CI, FC and RFC; our findings imply the following results (Table 3).

3.3.1. Use report (UR)

The use report value of the recorded medicinal plants ranged from 10 to 1. The maximum UR value was obtained for *C. asiatica* (10), followed by *A. indica* (9), *O. tenuiflorum* (9), *A. paniculata* (5), *P. nigrum* (5), while the lowest is observed in *Z. rhetsa* (1) and *Z. officinale* (1). This result indicates that *C. asiatica* holds the highest number of used report, which is used for treating various ailments.

3.3.2. Use value (UV)

The documented medicinal plants had use values ranging from 0.4 to 0.04. The highest UV was identified for *C. asiatica* (0.4), followed by *A. indica* (0.36), *O. tenuiflorum* (0.36), *A. paniculata* (0.2), *P. nigrum* (0.2) while the lowest UV were observed in *Z. rhetsa* (0.04) and *Z. officinale* (0.04). Present finding suggests that *C. asiatica* has the highest number of use value cited by traditional healers for treating certain diseases.

3.3.3. Cultural Importance (CI)

The Cultural Importance value of the recorded medicinal plants have been found to be varied from 0.4 to 0.04. The maximum CI value was obtained for *C. asiatica* (0.4), followed by *A. indica* (0.36), *O. tenuiflorum* (0.36), *A. paniculata* (0.2), *P. nigrum* (0.2) while the lowest CI were observed for *Z. rhetsa* (0.04) and *Z. officinale* (0.04). These observations indicates the diversity of uses for the species- *C. asiatica*, *A. indica*, *O. tenuiflorum* and *A. paniculata* in various ailments.

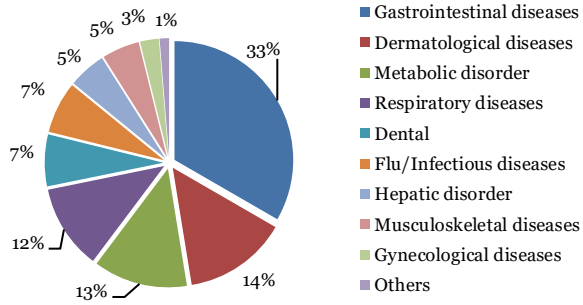

Figure 4. Chart showing utilization of ethnomedicine against specified disease categories

3.3.4. Frequency of Citation (FC)

The Frequency of Citation of the recorded medicinal plants were found to be ranging between 8 to 1. The maximum CI value was obtained for *O. tenuiflorum* (8), followed by *C. asiatica* (7), *A. indica* (6), *A. paniculata* (5), *P. nigrum* (4), while the lowest FC have been observed for *Z. rhetsa* (1) and *Z. officinale* (1). The total number of informants who mention the uses of a particular species is represented by this value.

3.3.5. Relative Frequency of Citation (RFC)

The relative frequency of citation of the medicinal plants have been found between 0.32 to 0.04. *O. tenuiflorum* has demonstrated highest RFC value (0.32), which is followed by *C. asiatica* (0.28), *A. indica* (0.24), *A. paniculata* (0.2), *P. nigrum* (0.16) while the lowest RFC was observed for *Z. rhetsa* (0.04) and *Z. officinale* (0.04). Higher RFC refers to informants reporting the practical use of specific plant species for various diseases due to their effectiveness.

3.3.6. Fidelity Level (FL)

The fidelity level in ethnobotany refers to the significance or frequency with which a given plant species or plant use is recorded in a particular cultural context. It is a measurement frequently used to evaluate cultural significance and application of a specific plant species. Fidelity level is frequently determined by ethnobotanical studies, which include questioning locals or indigenous communities regarding their traditional use of plants and plant knowledge.

Informants are asked about the plants they use, their varied applications, and their perceived significance or frequency of use during these surveys. The percentage representing the fidelity level is obtained by multiplying the number of informants who mention a specific plant use by the total number of informants interviewed for that particular cultural group or community. Table 4 shows the FL % along with disease categories and associated ethnomedicinal plant species.

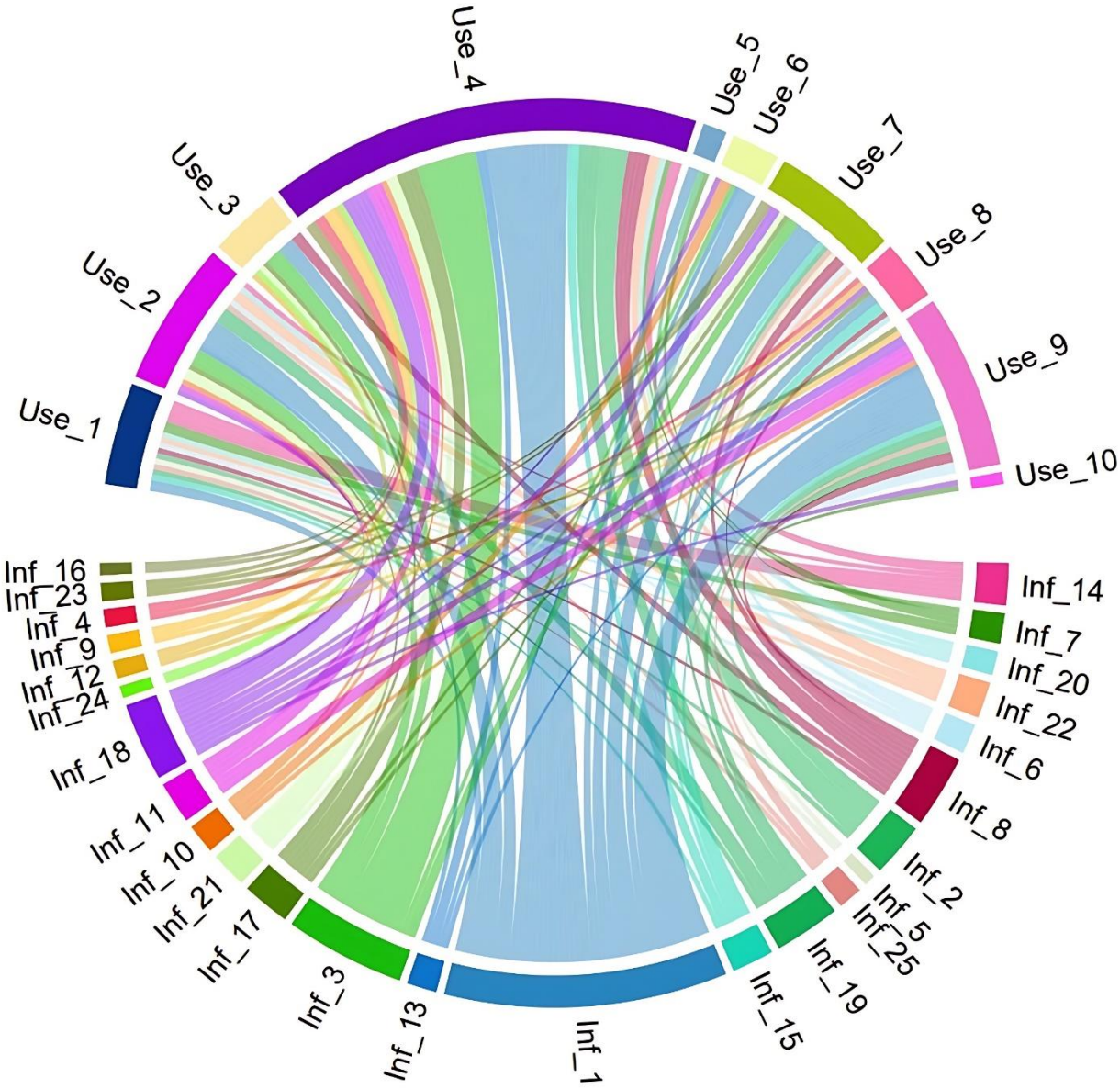

Figure 5. Chord diagram showing comparison between the used of ethnomedicine species mentioned by informants against use categories (disease). [Dental (Use_1), Dermatological diseases (Use_2), Flu/Infectious diseases (Use_3), Gastrointestinal diseases (Use_4), Gynecological diseases (Use_5), Hepatic disorder (Use_6), Metabolic disorder (Use_7), Musculoskeletal diseases (Use_8), Respiratory diseases (Use_9) and Others (Use_10)].

In our finding, various disease categories have been treated by using ethnomedicinal plants. Some of the promising diseases which were proven to have the best recovery rate using the plant species are gastrointestinal diseases reported by 20 informants and using 45 species against it. Subsequently, dermatological diseases were reported by 14 informants using 21 species, metabolic disorders reported by 14 informants using 18 species, respiratory diseases were reported by 13 informants using 18 species, dental issues were reported by 12 informants using 11 species, musculoskeletal diseases were reported by 8 informants using 8 species, flu/Infectious diseases reported by 7 informants using 11 species, hepatic disorder reported by 5 informants using 8 species, gynecological diseases reported by 3 informants using 4 ethnomedicinal plants (Figure 5).

3.4. Traditional medicine grade and formulation using various plants species

Plant-based remedies have been a fundamental component of traditional medicinal practices for many centuries. They often treat various ailments and illnesses, from minor cuts and bruises to more severe conditions like liver disorders and diabetes. Traditional medicine utilizes the properties found within plants to create standardized formulations for various ailments, considering factors like dosing and administration. These formulations can differ according to the plant parts used, extraction processes, and the specific symptom being addressed. In the recent years, scientific interest in these remedies has grown significantly as many researchers seek to understand their potential health benefits and develop new treatments based on their unique properties. More research is being undertaken, and it is becoming evident that plant-based medicines have much to offer modern medicine and may hold the key to generating new, effective treatments for a variety of ailments. As a result, the composition of each species against several ailments has been documented to aid in understanding the appropriate dosage of plant-based treatments (Table 5).

4. Discussion

4.1. Quantitative ethnobotanical indices and findings

Quantitative ethnobotanical indices help ethnobotanists to identify the utility of various significant species to treat some of the common

ailments which are claimed by traditional medicine practitioners. A higher value of quantitative ethnobotanical indices shows that a specific plant species or application is frequently cited or widely used within a community, suggesting a high cultural significance or importance. A lower value on the other hand, suggests that a specific plant species or plant application is cited infrequently or has low cultural significance within a community. Our assessment also highlights the consent of the informant's choice for every ailment and the potential of species related to treating the disease (Figure 5). Hence quantitative ethnobotanical indices such as URs, UV, CI, FC, RFC and FL (%) can be employed as quantitative tools to assess the cultural importance of plants, prioritize species for further study or for conservation priority, and provide insights into local ecological knowledge and traditional resource management practices (Philips and Gentry, 1993; Hoffman and Gallaher, 2007; Ojha et al., 2020; Tardio and Pardo-de-Santayana, 2008; Whitney et al., 2012).

Our findings shows that *C. asiatica*, *A. indica*, *O. tenuiflorum*, *A. paniculata*, and *P. nigrum* have the highest UR, UV, CI, and RFC values. These findings are consistent with the findings of previous ethnobotanical reports (Biswas et al., 2018; Choudhury et al., 2015), which indicate that these plants have ethnomedicinal importance for various ailments. However, ethnomedicinal species with high UVs and RFCs values should be assessed for their pharmacological activity (Amjad et al., 2017; Mir et al., 2021). High UR, UV, CI, and RFC values are also shown to be greatly valued and culturally important for the communities (Cordero et al., 2023).

Furthermore, in ethnobotany, the fidelity level refers to the frequency with which several plant species are used to treat an illness. It could also imply that these plants have useful phytochemical substances that fight against infections. Hence investigation for possible pharmacological use and multiple therapeutic applications can reveal a wide range of potent bioactive chemical compounds in a species (Caunca and Balinado, 2021). As a result, more research into these medicinal plants is needed.

Our findings demonstrates that the FL% for *A. paniculata* appears to be higher for dental treatments, as reported in other studies (Guha, 2015; Sajem and Gosai, 2006). According to Shivananda et al. (2023), investigations have been done on the chemical and structural characterization of the Spilanthol from *A. paniculata*. Spilanthol contains pharmacological effects such as analgesic properties that can alleviate toothache (Shivananda et al., 2023). Similar to our findings, several plants, including *P. guajava*, *T. indica*, *D. indica* and *H. suaveolens*, have been reported to treat gastrointestinal disorders (Guha, 2015). Additionally, our findings also demonstrated that *E. neriifolia* has a higher FL% which may be due to its antimicrobial activities against a variety of pathogens. Likewise, a study highlights that this species (*E. neriifolia*) may serve as a model for developing more potent drugs to combat COVID-19 and other newly emerging infectious diseases (Sultana et al., 2022).

Elderly individuals were more involved in possessing ethnobotanical knowledge than other age groups (Deb et al., 2012; Choudhury et al., 2015; Ojha et al., 2020). The chi-square test findings of the various age groups are a significant indicator of which there is substantial knowledge. The estimated p-value of 0.780, 0.189, and 0.219 for gender, educational level, and source of information are above the characteristic significance level of 5%. Except for the χ^2 test regarding age ($P<0.05$), which shows a relationship with ethnobotanical knowledge, it is consistent with previous findings (Karunamoorthi and Husen, 2012; Hailemariam et al., 2021).

4.2. Towards future of traditional medicines

Ayurveda, traditional Indian medicine (TIM), and traditional Chinese medicine (TCM) are the oldest living traditions widely employed as alternatives to Western medications. Traditional medicine has gained popularity worldwide (Payyappallimana, 2010; Patwardhan et al., 2005; Bodeker, 2005). China has successfully marketed its medicines through more significant research and a science-based approach, although Ayurveda and tribal medicines requires more thorough scientific research and evidence foundation (Patwardhan et al., 2005).

Plant-based treatments for several disease categories and ailments have gained popularity recently. For instance, many herbal formulations used in Traditional Chinese Medicine (TCM) have been demonstrated to help treat problems like chronic pain, sleeplessness, and mood disorders (Wing, 2001; Xiong et al., 2013). Similarly, Ayurvedic medicine utilizes plant-based remedies to treat ailments like digestive issues and skin conditions (Verma and Singh, 2008; Jaiswal and Williams, 2017). As modern pharmacological approaches continue to explore the potential of plant-based remedies, it is clear that these ancient practices offer many possibilities for developing new treatments for various health conditions (Sen and Chakraborty, 2017). More scientific investigation is necessary to confirm the effectiveness and safety of alleged therapeutic plants, including microbiological, phytochemical, pharmacological, and clinical studies (Karki et al., 2023).

5. Conclusion

Ethnic communities have been found to possess traditional knowledge of the utilization of various plants that yield potential medicinal benefits. Our study has documented 91 plant species from 53 families belonging to 87 genera that have been traditionally used for treating up to 29 different ailments. By utilizing the expertise of existing traditional healers, we can ensure that important plant species are identified and conserved while also supporting the local economy. This approach recognizes the value of traditional knowledge and fosters a sense of community ownership over conservation efforts. Ultimately, it will lead to more sustainable and effective conservation practices. Furthermore, formulations and research on each of these species can direct the discovery of new medicinal products with significant therapeutic potential for the future. Hence to promote the conservation of biological diversity and enhance the livelihoods of people, it is crucial to consider the traditional knowledge, skills, and motivations of ethnic communities.

Table 3. list of Ethnomedicinal species along with vernacular name, Family and ethnobotanical index analytics

Species	Vernacular name (Kokborok)	Family	URs	UV	CI	FC	RFC
Achyranthes aspera L.	-	Amaranthaceae	1	0.04	0.04	1	0.04
Acmella paniculata (Wall. ex DC.) R.K.Jansen	Usundwi	Asteraceae	4	0.16	0.16	3	0.12
Aegle marmelos (L.) Corrêa	Bhel	Rutaceae	2	0.08	0.08	2	0.08
Ageratum conyzoides Hieron.	-	Asteraceae	1	0.04	0.04	1	0.04
Aloe vera (L.) Burm.f.	Alovera	Asphodelaceae	3	0.12	0.12	3	0.12
Allium sativum L.	Risum	Amaryllidaceae	1	0.04	0.04	1	0.04
Alpinia galanga (L.) Willd.	Lairu dom	Zingiberaceae	1	0.04	0.04	1	0.04
Alstonia scholaris (L.) R.Br.	Chethuwang	Apocynaceae	2	0.08	0.08	2	0.08
Alternanthera brasiliana (L.) Kuntze	Kwsa kwthang	Amaranthaceae	1	0.04	0.04	1	0.04
Ananas comosus (L.) Merr.	Aanaros	Bromeliaceae	3	0.12	0.12	3	0.12
Andrographis paniculata (Burm.f.) Wall.	Shii lota	Acanthaceae	5	0.2	0.2	5	0.2
Artocarpus heterophyllus Lam.	Thaipong	Moraceae	1	0.04	0.04	1	0.04
Averrhoa carambola L.	Kamaranga	Oxalidaceae	1	0.04	0.04	1	0.04
Azadirachta indica A.Juss.	Neem	Meliaceae	9	0.36	0.36	6	0.24
Bombax ceiba L..	Borchu	Malvaceae	1	0.04	0.04	1	0.04
Cajanus cajan (L.) Millsp.	Mui-maising	Fabaceae	1	0.04	0.04	1	0.04
Callicarpa arborea Roxb.	Chamathwi	Lamiaceae	1	0.04	0.04	1	0.04
Calotropis gigantea (L.) Dryand.	Anngon	Apocynaceae	1	0.04	0.04	1	0.04
Canavalia gladiata (Jacq.) DC.	Baikang	Fabaceae	2	0.08	0.08	2	0.08

Carica papaya L.	Kuwaifal	Caricaceae	2	0.08	0.08	2	0.08
Catharanthus roseus (L.) G.Don	Khum boiragi (kufur)	Apocynaceae	2	0.08	0.08	1	0.04
Centella asiatica (L.) Urb.	Sham shotta	Apiaceae	10	0.4	0.4	7	0.28
Hellenia speciosa (J.Koenig) Govaerts	Maluma kothoma	Zingiberaceae	1	0.04	0.04	1	0.04
Chromolaena odorata (L.) R.M.King & H.Rob.	Mukri	Asteraceae	1	0.04	0.04	1	0.04
Cissus quadrangularis L.	Hab jura	Vitaceae	2	0.08	0.08	2	0.08
Citrus aurantiifolia (Christm.) Swingle	Jami	Rutaceae	3	0.12	0.12	3	0.12
Clerodendrum infortunatum L.	Kwkhwima yarung	Lamiaceae	2	0.08	0.08	2	0.08
Coccinia grandis (L.) Voigt	Telakuchi	Cucurbitaceae	1	0.04	0.04	1	0.04
Cocos nucifera L.	Narikra	Arecaceae	1	0.04	0.04	1	0.04
Cucumis sativus L.	Sosa	Cucurbitaceae	1	0.04	0.04	1	0.04
Cucurbita moschata Duchesne	Chakumra	Cucurbitaceae	1	0.04	0.04	1	0.04
Curcuma longa L.	Shwtwi	Zingiberaceae	2	0.08	0.08	2	0.08
Cuscuta reflexa Roxb.	Soino lota	Convolvulaceae	1	0.04	0.04	1	0.04
Datura stramonium L.	Jutra	Solanaceae	2	0.08	0.08	2	0.08
Dillenia indica L.	Thaiplok	Dilleniaceae	1	0.04	0.04	1	0.04
Enydra fluctuans Lour.	Elengcha	Asteraceae	1	0.04	0.04	1	0.04
Euphorbia neriifolia L.	Shishu	Euphorbiaceae	1	0.04	0.04	1	0.04
Ficus hispida L.f.	Khamta	Moraceae	2	0.08	0.08	2	0.08
Flemingia macrophylla (Willd.) Kuntze ex Merr.	Bomlai	Fabaceae	1	0.04	0.04	1	0.04
Galinsoga parviflora Cav.	Gairing bura	Asteraceae	1	0.04	0.04	1	0.04
Hibiscus macrophyllus Roxb. ex Hornem.	Lambak	Malvaceae	1	0.04	0.04	1	0.04
Hibiscus rosa-sinensis L.	Joba	Malvaceae	2	0.08	0.08	2	0.08
Holarrhena pubescens Wall. & G.Don	Khwichang; Berma khwichang	Apocynaceae	2	0.08	0.08	2	0.08
Hyptis suaveolens (L.) Poit.	Tukhma	Lamiaceae	2	0.08	0.08	2	0.08
Jatropha curcas L.	Keron (Kwchag)	Euphorbiaceae	3	0.12	0.12	3	0.12
Justicia adhatoda L.	Basog	Acanthaceae	4	0.16	0.16	4	0.16
Kaempferia rotunda Don	Khumtoya	Zingiberaceae	3	0.12	0.12	3	0.12
Kalanchoe pinnata (Lam.) Pers.	Pathor kuchi	Crassulaceae	2	0.08	0.08	2	0.08
Lasia spinosa (L.) Thwaites	Gantha	Araceae	1	0.04	0.04	1	0.04
Lawsonia inermis L.	Mehendi	Lythraceae	1	0.04	0.04	1	0.04
Leucas aspera Link.	Don kolosho	Lamiaceae	2	0.08	0.08	2	0.08
Litsea glutinosa (Lour.) C.B.Rob.	Boshrap	Lauraceae	3	0.12	0.12	3	0.12
Ludwigia adscendens (L.) H.Hara	-	Onagraceae	1	0.04	0.04	1	0.04
Luffa acutangula Roxb.	Jinga	Cucurbitaceae	1	0.04	0.04	1	0.04
Mangifera indica L.	Thaichuk	Anacardiaceae	2	0.08	0.08	2	0.08
Markhamia stipulata Seem.	Chorongi shitai	Bignoniaceae	2	0.08	0.08	1	0.04
Microcos paniculata L.	Pisla	Malvaceae	2	0.08	0.08	2	0.08
Mimosa pudica L.	Sham sunduru	Fabaceae	2	0.08	0.08	2	0.08
Morinda citrifolia L.	Nuni	Rubiaceae	1	0.04	0.04	1	0.04
Morus alba L.	Mwkhwi Yonggak	Moraceae	1	0.04	0.04	1	0.04
Musa Sp.	Thailig aithiya	Musaceae	2	0.08	0.08	2	0.08
Nyctanthes arbor-tristis L.	Shipalikha	Oleaceae	1	0.04	0.04	1	0.04
Ocimum tenuiflorum L..	Tulsi (kosom)	Lamiaceae	9	0.36	0.36	8	0.32
Oroxylum indicum (L.) Benth. Ex Kurz	Tokha rung	Bignoniaceae	3	0.12	0.12	2	0.08
Oryza sativa L.	Mai	Poaceae	2	0.08	0.08	2	0.08
Paederia foetida L.	Sham khupui; Dhuk khupui	Rubiaceae	2	0.08	0.08	2	0.08
Phlogacanthus thyrsiformis (Roxb. ex Hardw.) Mabb.	Basog	Acanthaceae	1	0.04	0.04	1	0.04
Phyllanthus emblica L.	Amlai	Phyllanthaceae	4	0.16	0.16	4	0.16
Piper nigrum L.	Gol morich	Piperaceae	5	0.2	0.2	4	0.16
Psidium guajava L.	Goyam	Myrtaceae	4	0.16	0.16	4	0.16
Pueraria montana (Lour.) Merr.	Bamphai	Fabaceae	1	0.04	0.04	1	0.04
Raphanus raphanistrum subsp. sativus (L.) Domin	Mulai	Raphanus	1	0.04	0.04	1	0.04
Rauvolfia serpentina Benth. ex Kurz	Chandoma	Apocynaceae	1	0.04	0.04	1	0.04
Ricinus communis L.	Leetok	Euphorbiaceae	2	0.08	0.08	2	0.08
Saccharum officinarum L.	Kurug	Poaceae	2	0.08	0.08	2	0.08
Santalum album L.	Chandan	Santalaceae	1	0.04	0.04	1	0.04
Breynia androgyna (L.) Chakrab. & N.P.Balakr.	Pressure bufang	Phyllanthaceae	1	0.04	0.04	1	0.04
Senna occidentalis (L.) Link	Mui-taphi	Fabaceae	2	0.08	0.08	1	0.04
Sida acuta Burm.f.	Morong	Malvaceae	3	0.12	0.12	2	0.08
Syzygium aromaticum (L.) Merr. & L.M.Perry	Long	Myrtaceae	2	0.08	0.08	2	0.08
Syzygium cumini (L.) Skeels	Jamuk	Myrtaceae	1	0.04	0.04	1	0.04
Tamarindus indica L.	Thentwrwi	Fabaceae	3	0.12	0.12	3	0.12
Terminalia arjuna (Roxb. ex DC.) Wight & Arn.	Arjun	Combretaceae	1	0.04	0.04	1	0.04
Terminalia bellirica (Gaertn.) Roxb.	Boira	Combretaceae	3	0.12	0.12	3	0.12
Terminalia chebula Retz.	Bakhla	Combretaceae	2	0.08	0.08	2	0.08
Thuja occidentalis L.	Thuja	Cupressaceae	1	0.04	0.04	1	0.04
Tinospora cordifolia (Willd.) Miers ex Hook.f. & Thomson	Duksha sondari	Menispermaceae	5	0.2	0.2	3	0.12
Wendlandia tinctoria DC.	Kenchor	Rubiaceae	1	0.04	0.04	1	0.04
Zanthoxylum rhetsa (Roxb.) DC.	Muching	Rubiaceae	1	0.04	0.04	1	0.04
Zingiber officinale Roscoe	Haching	Zingiberaceae	1	0.04	0.04	1	0.04
Ziziphus jujuba Mill.	Boroi	Rhamnaceae	3	0.12	0.12	3	0.12

Table 4: Fidelity Level % of each plant species used for treating various diseases

Disease Categories	Various Ailments	List of plant species along with its Fidelity Level (%)
Dental issues	**Dental**	*Acmella paniculata* (100), *Ludwigia adscendens* (100), *Mimosa pudica* (100), *Sida acuta* (100), *Jatropha curcas* (66.67), *Ziziphus jujuba* (66.67), *Mangifera indica* (50), *Syzygium aromaticum* (50), *Tinospora cordifolia* (33.33), *Azadirachta indica* (16.67), *Ocimum tenuiflorum* (12.5)
Flu/Infectious diseases	**Bodyache**	*Calotrophis gigantea* (100), *Ficus hispida* (100), *Lawsonia inermis* (100), *Hyptis suaveolens* (50), *Paederia foetida* (50), *Ricinus communis* (50)
	Headache	*Cuscuta reflexa* (100), *Raphanus sativus* (100)
	Fever	*Terminalia chebula* (50), *Terminalia bellerica* (33.33), *Phyllanthus emblica* (25)
Gastrointestinal diseases	**Acidity**	*Citrus limon* (33.33)
	Constipation	*Dillenia indica* (100), *Galinsoga parviflora* (100), *Markhamia stipulata* (100), *Tamarindus indica* (66.67), *Hyptis suaveolens* (50), *Psidium guajava* (50), *Citrus limon* (33.33), *Terminalia bellerica* (33.33), *Tinospora, cordifolia* (33.33), *Andrographis paniculata* (20)
	Diarrhoea	*Achyranthes aspera* (100), *Alstonia scholaris* (100), *Hibiscus macrophyllus* (100), *Nyctanthes arbortristis* (100), *Rauwolfia serpentina* (100), *Wendlandia tinctoria* (100), *Andrographis paniculata* (60), *Aegle marmelos* (50), *Clerodendrum infortunatum* (50), *Holarrhena pubescens* (50), *Aleo vera* (33.33), *Jatropha curcas* (33.33), *Litsea glutinosa* (33.33), *Tinospora cordifolia* (33.33), *Piper nigrum* (25), *Psidium guajava* (25), *Azadirachta indica* (16.67), *Centella asiatica* (14.29), *Ocimum tenuiflorum* (12.5)
	Gastric	*Callicarpa arborea* (100), *Morinda citrifolia* (100), *Clerodendrum infortunatum* (50), *Holarrhena pubescens* (50), *Terminalia chebula* (50), *Terminalia bellerica* (33.33), *Centella asiatica* (28.57), *Phyllanthus emblica* (25)
	Intestine infection	*Azadirachta indica* (33.33)
	Laxative	*Artocarpus heterophyllus* (100), *Oryza sativa* (50), *Saccharum officinarum* (50), *Ananas comosus* (33.33), *Litsea glutinosa* (33.33)
	Stomach ache	*Cocos nucifera* (100), *Enhydra fluctuans* (100), *Aegle marmelos* (50), *Carica papaya* (50), *Musa sp.* (50), *Paederia foetida* (50), *Centella asiatica* (42.86), *Psidium guajava* (25)
Gynecological diseases	**Breast inflammation**	*Markhamia stipulata* (100)
	Gynecological	*Canavalia gladiata* (50), *Carica papaya* (50), *Acmella paniculata* (33.33)
Dermatological issues	**Dermatological**	*Alpinia galanga* (100), *Bombax ceiba* (100), *Hibiscus rosa-sinensis* (100), *Santalum album* (100), *Thuja occidentalis* (100), *Oryza sativa* (50), *Aleo vera* (33.33), *Azadirachta indica* (33.33), *Kaempferia rotunda* (33.33), *Phyllanthus emblica* (25), *Piper nigrum* (25), *Centella asiatica* (14.29)
	Wounds and cuts	*Ageratum conyzoids* (100), *Alternanthera brasiliana* (100), *Catharanthus roseus* (100), *Chromolaena odorata* (100), *Pueraria montana* (100), *Canavalia gladiata* (50), *Kalanchoe pinnata* (50), *Microcos paniculata* (50), *Aleo vera* (33.33)
	Allergy	*Ziziphus jujuba* (33.33)
Hepatic disorder	**Jaundice**	*Averrhoa carambola* (100), *Cajanus cajan* (100), *Cheilocostus speciosus* (100), *Saccharum officinarum* (50), *Kaempferia rotunda* (33.33)
	Malaria	*Oroxylum indicum* (50), *Tinospora cordifolia* (33.33), *Andrographis paniculata* (20)
Metabolic disorder	**Diabetes**	*Allium sativum* (100), *Catharanthus roseus* (100), *Coccinia grandis* (100), *Morus alba* (100), *Syzygium cumini* (100), *Curcuma longa* (50), *Azadirachta indica* (33.33), *Tamarindus indica* (33.33), *Tinospora cordifolia* (33.33), *Centella asiatica* (28.57), *Phyllanthus emblica* (25)
	Excess urination	*Flemingia macrophylla* (100), *Senna occidentalis* (100), *Terminalia arjuna* (100)
	High blood pressure	*Sauropus androgynus* (100), *Curcuma longa* (50), *Musa sp.* (50), *Oroxylum indicum* (50), *Azadirachta indica* (16.67)
	Low pressure	*Ocimum tenuiflorum* (12.5)
Respiratory diseases	**Cold and Cough**	*Euphorbia neriifolia* (100), *Justicia adhatoda* (100), *Leucas aspera* (100), *Phlogacanthus thyrsiformis* (100), *Zingiber officinale* (100), *Piper nigrum* (75), *Ananas comosus* (66.67), *Ocimum tenuiflorum* (62.5), *Kalanchoe pinnata* (50), *Syzygium aromaticum* (50), *Citrus limon* (33.33)
	Pneumonia	*Cucumis sativus* (100), *Cucurbita moschata* (100), *Luffa acutangula* (100), *Senna occidentalis* (100), *Mangifera indica* (50)
	Asthma	*Kaempferia rotunda* (33.33)
Musculoskeletal diseases	**Broken bones**	*Cissus quadrangularis* (100), *Microcos paniculata* (50), *Sida acuta* (50), *Litsea glutinosa* (33.33), *Ocimum tenuiflorum* (12.5)
	Joint pain	*Datura stramonium* (100), *Lasia spinosa* (100), *Ricinus communis* (50)
Others	**Appetizer**	*Zanthoxylum rhetsa* (100)
	Blood purifier	*Centella asiatica* (14.29)

Table 5. List of disease categories and Plant-based remedies for various ailments

Disease Categories	Various Ailments	Formulation using various plants species (Traditional medicine grade)
Dental issues	**Dental disease/care**	1. The branch of *A. indica* is used as a toothbrush. 2. The twig of *J. curcas* is traditionally used as a toothbrush to reduce toothache. 3. The roots of *L. adscendens* are crushed with a pinch of baking soda powder and used to brush teeth to cure toothaches. 4. The root of *M. pudica* is chewed on for toothache. 5. The paste of ground leaves and seed of *O. tenuiflorum* is used as toothpaste. 6. Roots of *S. acuta*, *S. paniculata*, *T. indica*, the bark of *M. indica* and *Z. jujuba* are boiled together in equal proportion. The boiled water is used as mouthwash in case of toothache. 7. During toothache, the stem of *A. paniculata* is chewed. 8. The dried inflorescence of *S. aromaticum* is used as a remedy for toothache. 9. The fruit peels of *Z. jujuba*, Bothai and Thaitwi are dipped overnight in water. The water is collected and used as a mouthwash. 10. The plant's stem is also used as a toothbrush to reduce toothache.
Flu/Infectious diseases	**Bodyache**	1. 4-5 inflorescence of *C. gigantean* is heated in oil or ghee and applied all over the body. 2. 250-300 gm of fresh leaves of *F. hispida* and 100 gm of seeds of *H. suaveolens* are mixed and its paste is applied all over the body. 3. Juice from the roots of *F. hispida* is all over the body once daily. 4. 200 gm of fresh leaves of *L. inermis* are boiled for 15-20 minutes. The juice is drunk for 3 days in a row. 5. Freshly plucked leaves of *P. foetida* are cooked in a dish called 'gudok' and eaten for 3 days in a row.
	Headache	1. The whole plant of *C. reflexa* is crushed and the paste is applied on the forehead and rubbed in case of light headaches.
	Fever	1. The fruits of *T. bellerica*, *T. chebula* and *P. emblica* are cut into small pieces and dried. The dried fruits are crushed to form a powder. The powder is administered to be taken with water for 7 days straight.
	Acidity	1. Juice of *Citrus* fruit is squeezed out by hand. The juice is mixed with water and sugar and consumed to treat acidity.

Gastrointestinal diseases	**Constipation**	1. Raw leaves of *A. paniculata* are eaten during constipation. 2. A paste prepared from the leaves of *A. paniculata* is consumed to control loose bowel movements. 3. The fruits of *D. indica* are consumed for more effortless bowel movements. 4. A paste of 3 leaves of *G. parviflora* is taken to prepare a single pill. 1 pill per day is administered to children during constipation. 5. 100 gm seeds *H. suaveolens* are soaked in water and left overnight. The water is drunk until cured. 6. The leaves of *T. cordifolia* are also eaten raw to relieve constipation.
	Diarrhoea	1. Pills are prepared from the fruits of *A. marmelos* and *P. guajava* in equal proportion to treat diarrhea. Dosage: For adults- 1 pill in the afternoon and for kids- ½ pill in the afternoon. 2. The bark of *A. scholaris* is collected in odd numbers (3 or 5 slices) and enchanted to cure loose motion in children. 3. Leaves juice of *A. scholaris* is used in treating diarrhea in children. 4. The bark of *A. indica* is eaten raw in odd number patterns to treat dysentery. 5. The roots of *C. infortunatum* are crushed with *P. nigrum* to prepare juice. It helps to cure blood dysentery. 6. Fresh stem juice of *H. macrophyllus* is consumed when one is suffering from painful dysentery. 7. Soft bark of *H. pubescens* is peeled off and eaten empty stomach in the morning to heal dysentery. 8. Juicy extracts of *J. curcas* stems are drunk to reduce the pain from infection. 9. The soft bark of *L. glutinosa* is soaked overnight in water and drank the following day. 10. The bark of *N. arborists*, the whole plant of *A. aspera*, and the leaves of *O. tenuiflorum* is crushed together in equal proportion, and the extract is prepared. The extract is diluted with equal parts of water. The decoction can be taken 1 tablespoon daily until cured. 11. The roots of *R. serpentine* are ground, and the sick person drinks the juice. 12. Leaf paste of *W. tinctoria* is consumed to treat dysentery.
	Gastric	1. Roots of *C. infortunatum* (Kwkhwima yarung) and bark of *C. arborea* (Chamthwi kufur) are crushed and soaked in water and left overnight. The water is consumed early morning to cure gastric issues. 2. Young twigs of *H. pubescens* are cooked with chilies and fermented fish and eaten early morning to treat gastritis issues. 3. The fruit of *M. citrifolia* is consumed either in raw or juice form. It is advised to eat early morning empty stomach. 4. 50 gm *T. bellerica* + 50 gm *T. chebula* + 50 gm *P. emblica*= 150 gm. The fresh fruits are rinsed in water and left overnight; the mixture is drank empty stomach in the morning daily to cure gastric.
	Intestine infection	1. To those suffering from Tapeworm, eating 3-4 leaves of *A. indica* is recommended on an empty stomach. 2. Pills are prepared from the dried leaf of *A. indica*. Dosage for adults- 2 pills a day for 3 days.
	Laxative	1. *E. fluctuans* and *C. asiatica* are cooked together and eaten in case of stomach problems. 2. The bark of *L. glutinosa*, along with the leaf of *O. sativa*, *A. comosus*, *A. heterophyllus* and *S. officinarum* is used in equal proportion to prepare laxatives. 3. The pulp of *T. indica* is extracted and mixed with half a glass of water and drank for easy bowl movements. 4. For easier bowel movement young bark of *P. guajava* is eaten. 5. Various parts of *P. guajava*, such as young inflorescence and twigs, are chewed raw for more effortless bowel movement. 6. The fruit of *T. bellerica* is eaten raw as a laxative. Other citrus fruits like lime, tamarind can also be eaten along with it.
	Stomach ache	1. To treat Stomach ache, juice extracted from the fruit of *A. marmelos* is mixed with equal parts of water and 2 tablespoon sugar is added. 2. *C. asiatica* is consumed as food to relieve stomach cramps from gastric. 3. Coconut water is consumed when suffering from stomach problems. 4. Root paste of *Musa* sp is used to cure stomachache. 5. The fruit of *P. foetida* is cooked along with *C. asiatica* and consumed to cure stomach ailments. 6. The stem of *T. cordifolia* is boiled in water and consumed after cooling down to cure stomachache.
Gynecological diseases	**Breast inflammation**	1. Young flower buds of *M. stipulata* is paste and applied on the area of inflammation (Mastitis).
	Gynecological	1. The fruit of *C. gladiata* is consumed as a vegetable and cooked with fermented fish. 2. The fruit of *C. papaya* is eaten raw to reduce stomachache. The seeds are used as abortifacient in dogs (veterinary). 3. Leaf and twigs of *A. paniculata* are taken after pregnancy (mainly obstetrics depression) to ease pain.
Dermatological issues	**Dermatological**	1. The leaves of *A. indica* reduce the redness caused by pimples. 2. The thorns of *B. ceiba* are crushed along with a piece *of S. album* wood and applied to active pimples as a face mask. 3. *D. stramonium* leaves are fried in oil and coarsely ground. Oil is applied 2 times a day (morning & night) to cure pimples and vitiligo. 4. The leaves of *D. stramonium* and snail (*Bellamya* sp) are used to cure leprosy. 5. Juice of the flower/buds of *H. rosa-sinensis* is used to treat a skin condition called vitiligo. 6. The dried flower of *H. rosa-sinensis* is ground into a powder used to treat excessive hair falls. 7. *P. emblica* (fruit) is crushed with its seeds and mustard oil. It is applied on hair roots to combat hair fall. 8. The leaves of *T. occidentalis* are ground and strained in alcohol. The obtained remains are used to cure warts, lipoma cysts or any abnormal skin issues.
	Wounds and cuts	1. The clear sap from *A. vera* is directly applied over light burns. 2. Burnt wounds are treated with the sap of *A. vera*. 3. The leaves of *A. brasiliana* are crushed and applied to wound to stop bleeding. 4. Fresh paste of the stem of *C. gladiata* is applied to the wounds. 5. Root of *C. roseus* and a leaf of *A. conyzoides* (Sham berma) is ground to a paste and applied on the wounds. 6. The leaves of *C. odorata* are coarsely ground and applied on the wounded part by wrapping them with the leaf of *Musa* sp. 7. Juice is squeezed out from the leaves of *K. pinnata* and applied to the wounded area. 8. Paste is prepared from the stem of *M. paniculata* and applied to the wounds. 9. Paste of *P. montana* is used to stop bleeding.
	Skin Allergy	1. The sap of *A. galanga* is collected and applied directly to the irritated skin area. 2. The leaves of *A. indica* are boiled, and the boiled water is used as bathing water to soothe skin irritations. 3. The rhizome of *C. longa* is eaten along with fish to produce anti-allergic effects. 4. The flower sap of *K. rotunda* is applied to the infected area around the fingers and wrapped in a white cloth. 5. The leaves of *O. sativa* are used in case of insect bites. 6. The leaves of *T. cordifolia* are boiled and drank to reduce fever; the boiled water can also be mixed with bathing water to cure skin fungal infection. 7. The fruits of *Z. jujuba* are consumed to combat the allergic reaction.
Hepatic disorder	**Jaundice**	1. Patients consume the fruits of *A. carambola* during febrile jaundice. 2. The leaf of *C. cajan* is grounded to a fine paste and applied on the forehead while a *spell* is cast on the sick person. 3. Flowers of *H. speciosa* and *k. rotunda* are ground together, and the paste is applied to the forehead. 4. The bark of *O. indicum* is dipped in water and left overnight. The clear water was drunk early every morning to treat jaundice. 5. The stem juice of *S. officinarum* is drunk to cure jaundice.
	Malaria	1. The leaf of *A. paniculata* is eaten raw in small amounts to treat malaria. 2. The leaf of *A. paniculata* is ground, and the juice is consumed 2 tablespoons a day after food. 3. The fruit of *O. indicum* is consumed in the traditional delicacy "Gudok" for malarial fever. 4. Juice obtained from the crushed leaves and stem of *T. cordifolia* is drunk every morning 2 tablespoons on an empty stomach.
Metabolic disorder	**Diabetes**	1. *A. indica* leaves are eaten as a food to keep the sugar level in check.

		2. The leaves of *C. roseus* (white) and *C. asiatica* are ground to a paste in equal proportion. 2 tablespoons are consumed daily on an empty stomach. 3. The leaves of *C. asiatica* are consumed raw. The leaves should be taken only in odd numbers and on empty stomachs to cure diabetics. 4. Leaf of *C. grandis* and *A. indica* is ground along with rhizome of *C. longa* to prepare paste (2:2:1). The mixture is diluted with water in equal part and administered 2 tablespoons daily. 5. The rhizome of *C. longa* and the inflorescence of *Musa* are cooked together and eaten by diabetes patients. 6. The young leaves and ripe fruits of *M. alba* are consumed raw early morning on an empty stomach. 7. The fruit of *P. emblica* is consumed by diabetes patients. 8. Consumption of the fruit of *S. cumini* is a good cure for controlling diabetes. 9. The fruit of *T. indica* is boiled along with the bulb of *A. sativum*. The mixture can be stored at low temperature, and 1 tablespoon should be consumed daily.
	Excess urination	1. The root of *B. ceiba* is used to prepare a decoction and is taken during excessive urination. 2. The roots of *F. macrophylla* are dried and powdered to a fine grain. The powder is consumed one tablespoon daily. 3. Seeds of *S. occidentalis* are ground into a paste and drank. Dosage: 2 tablespoons thrice times a day. 4. The fruits of *T. arjuna* are cut into small pieces and left in water overnight. The water is strained and collected. The water is drunk early in the morning, empty stomach for 2 weeks straight.
	High blood pressure	1. *A. indica* leaves are fried and consumed to treat high blood pressure. 2. The fruit juice of *O. indicum* is consumed half glass a day. 3. Bulb of *R. raphanistrum* is consumed to ease hypertension. 4. The leaf of *S. androgyna* is consumed by people suffering from pressure.
	Low pressure	1. The leaves of *O. tenuiflorum* are used as a remedy in case of low-pressure patients.
Respiratory diseases	**Cold and Cough**	1. Tender leaves of *J. adhatoda*, *O. tenuiflora*, *A. comosus* are ground with honey and heated. It is consumed 3 times a day. Juicy sap from crushed leaves is applied externally around the throat areas. 2. The *J. adhatoda* leaves, and *P. nigrum* are boiled and consumed twice daily for 7 days. 3. Leaves of *J. adhatoda* and *O. tenuiflorum* are boiled together and drank at Luke-warm temperature. 4. *Z. officinale* and *A. comosus* leaves are ground to a fine paste with 2 tablespoons of honey. It is consumed until cured. 5. Leaves of *E. neriifolia* are boiled in water and are drank to cure prolonged cough. 6. The bark of *F. macrophylla* is mixed with soil collected from mud dauber (*Sceliphron* sp) and applied externally on the throat area. 7. The leaf juice of *K. pinnata* is squeezed out and drank to relieve cough. 8. Young twigs of *L. aspera* and flowers are boiled, and their water is drunk in semi-Luke temperatures. 9. Whole plant of *L. aspera* is consumed as food with fermented fish to relieve cough. 10. Leaves of *O. tenuiflorum* are chewed raw or ground before consumption. 11. Leaves of *O. tenuiflorum* (Tulsi kosom) are ground and mixed with honey. It is consumed to relieve the burning sensation from prolonged coughing. 12. The tulsi leaves are mixed with honey, *zingiber*, and *P. nigrum*, and the paste are eaten. 13. Young twigs of *P. thyrsiformis* are cooked with fish to reduce coughing. 14. The fruit of *P. nigrum* and inflorescence of *S. aromaticum* is burned and inhaled.
	Pneumonia	1. The seeds of *C. moschata*, *C. sativus*, *M. indica*, *L. acutangula*, and *S. occidentalis* are crushed together in equal proportion, and its paste is applied on the chest area to treat coughing. 2. Juice of *Citrus* fruit is mixed with 1 tablespoon honey and heated mildly before consumption to treat coughing.
	Asthma	1. The rhizome of *K. rotunda* is boiled to prepare a bitter decoction. Dosage: 1 tablespoon after breakfast in alternative days.
Musculoskeletal diseases	**Broken bones**	1. A paste is prepared from the aerial parts of *C. quadrangularis* and applied to where the bone broke. 2. *L. glutinosa* (bark) and *C. quadrangularis* (whole plant) are crushed and made into a paste. The paste is warmed over burned charcoal in an earthen pot and applied over the broken area. 3. Tender stem of *M. paniculata*, leaves of *O. tenuiflorum* and *S. acuta* are grinded together to prepare a paste. It can be applied over the broken area.
	Joint pain	1. The inflorescence of *D. stramonium* is fried in mustard oil. The oil is collected and stored in bottles, which can be applied to areas of discomfort. 2. The stem of *L. spinosa* is boiled and eaten as a traditional delicacy, "Gudok". It relieves joint pain. 3. Whole plant of *L. spinosa* is boiled, and the sappy remains are applied to the joint area for 4 days and afterward washed with water in a ritual. 4. The seeds of *R. communis* are crushed to a fine paste, and oil is extracted from it. The oil is heated and applied over the area of discomfort and is traditionally used in making oil. 5. *R. communis* is used to make a paste, which is applied on joints or the area of discomfort.
Others	**Appetizer**	1. The fruits of *Z. rhetsa* are traditionally used to increase appetite after prolonged fever.
	Blood purifier	1. 2-3 leaves of *C. asiatica* are consumed and act as a blood purifier. 2. The leaves of *C. asiatica* are eaten raw together with jelly sap from *A. vera*.

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Authors contributions

MR, BB and SD conducted field work, statistical analysis and preparation of draft manuscript. BKD conceptualized the idea, contributed in research design and finalization of manuscript

Conflict of interest

The authors have no conflict of interest.

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