Quantitative Ethnobotany of Medicinal Plants Used by Indigenous Communities of Gandhamardan Mountain Chains at Bargarh District of Odisha, India

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Databases and Inventories

Abstract

Background: This study aims to collect the traditional medicinal knowledge among the tribal communities and residents of villages near the Gandhamardan Mountain Chain in the Bargarh District of Odisha, India.

Method: From Dec 2022 to May 2023, ethnobotanical surveys were done using interviews, discussions, and observations. Data from 85 participants included plant names, uses, preparation, and administration methods. The quantitative analysis involved RFC, UV, and ICF. Participants comprised 62 males and 23 females, contributing to diverse knowledge from various communities.

Results: In this area, 70 plants from 65 genera and 36 families are employed for medicinal purposes. The primary families used are Fabaceae, followed by Asteraceae. Leaves are the preferred plant part for medicinal preparations. The most favoured method to extract medicinal properties is obtaining plant juice, succeeded by decoction. The top RFC values are attributed to *Tridax procumbens* (0.54), *Ocimum sanctum* (0.51), *Boerhavia diffusa* (0.38), and *Cynodon dactylon* (0.38). For UV, the leading values are for *Tridax procumbens* (0.67), *Ocimum sanctum* (0.61), and *Cynodon dactylon* (0.54). The highest ICF value pertains to neurological and psychological disorders (1.00), followed by fever, cold, and cough (0.95), and musculoskeletal disorders (0.92), with the lowest in hormonal disorders (0.58).

Conclusion: Maiden ethnobotanical study in this area unveiled novel ethnomedicinal plant uses. Traditional healers and elders participated, offering vital documentation for future drug discovery and research.

Keywords: Traditional medicine, ethnobotanical knowledge, Indigenous uses, RFC, UV, ICF

Background

Since the advent of human civilization, people have been using plant parts for the treatment of different ailments and diseases. In India, obtaining medicine from plant parts is an ancient tradition. This practice is also scripted in the world's oldest literature *Rigveda* and *Atharvaveda*. This ancient knowledge is collectively summarized in Ayurveda which can be considered the world's oldest medical system. Ayurveda is established practical knowledge based on the uses of medicinal plants. Our ancient sage and physician had always been trying to find out the medicinal properties and characteristics of

plants. The whole process can be part of science which presently can be considered as ethnopharmacology or ethnobotany. Since then to now using plant parts as medicine has still been practiced in India and worldwide. The ethnobotanical study has been a fundamental source for the discovery of many herbal and allopathic medicines (Fabricant & Farnsworth 2001).

Ethnobotanical and ethnomedicine are quite significant and popular. In recent years, numerous successful drug screening projects have been initiated using ethnobotanical knowledge as a valuable foundation (Heinrich & Bremner 2006). Presently 50% of all pharmaceutical drugs are the results of ethnomedicinal studies carried out throughout the globe (Van Wyk et al. 1997). In spite of advancements in contemporary medical systems, remote regions in underdeveloped and developing nations continue to lack access to adequate healthcare. In such a situation, a large population of these countries is dependent on the traditional medical system for its basic medical needs (Pandey 2021). Ethnobotanical research contributes to various fields, including medicine, agriculture, and industry. Ethnobotanical studies are crucial for gathering fundamental information about the traditional knowledge and uses of plants by different cultures and communities. These studies involve the documentation and analysis of the relationships between plants and people, particularly in indigenous or local communities.

Ethnobotanical studies provide fundamental information for the production of new drugs, food, pesticides, natural products, gene resources, and chemicals (Prusti & Behera. 2007). The growing interest in ethnomedicine stems from its ability to raise awareness about the limitations of the pharmaceutical industry in addressing major diseases. Ethnomedicines are increasingly recognized as safer, more accessible, and more affordable alternatives to pharmaceutical drugs, especially considering the escalating side effects and irreversible reactions associated with modern medications (Parekh & Chandra 2006). It has been mentioned by previous research that there is no such platform from where ethnobotany skills and knowledge can be transferred to the next generation, only family members of traditional healers get this knowledge if they are willing to learn this practice through oral communication with their elders (Nadembega et al. 2011). There is only one way to learn this knowledge to do this practice or document properly. Most of the ethnobotanical knowledge is still not documented (Asase et al. 2008). Certain reasons such as deforestation, lack of interest in the young generation towards ethnomedicinal practices, availability of modern allopathic drugs, and low income of traditional healers force them to move to another occupation. This will lead to the loss of valuable traditional knowledge (Kadir et al. 2013). In contrast due to the limitation of allopathic drugs, and their side effect after treatment, scientific communities showing their interest in the ethnobotanical and ethnomedicinal fields to counter modern-day challenges (Heinrich 2000).

Due to the presence of a variety of plant species and various ethnic and indigenous communities residing in Gandhamardan Mountain Chains, Odisha, this study has quite a significance. A previous study reported that the Gandhamardan hill range possesses 912 vascular plants belonging to 556 genera under 142 families (Chintala & Pattanaik 2009). Gandhamardan, situated in the Baragarh district of Orissa, is a revered hill known for its rich medicinal herb resources. This hill, which is a part of the Eastern Ghats, holds significant prominence. The tribal people inhabit the hilly tracts, slopes, foothills, and plains areas which include several villages such as Nrusinghanath, Manbhang, Paikmal, Haridatal, Ranjitpur, Pipalkhunta, Patrapali, Georgegarh, Durgapali, Khandijharan and Motipali, The tribal people generally have low incomes and limited livelihood. A large portion of them work as landless labourers, small-scale and subsistence farmers, farm servants, foresters, earthmovers, woodcutters, and hunters. These persons either lack assets or have assets with very low productivity, few applicable skills, and either no regular full-time jobs or jobs with extremely low pay. Improved rice production techniques have been used by those who have settled in the plains. Cereals, minor millets, roots, tubers/rhizomes, bamboo shoots, leafy vegetables, date palms, wild bananas, Mahua (*Madhuca longifolia*) flowers, and wild fruits make up the majority of the basic diet of the interior tribal people. The area is occupied by limited healthcare facilities. The vast diversity of medicinal plants found in Gandhamardan mountain chains, and limited healthcare facilities provide an opportunity for practising ethnomedicine by local healers and medicine men. The present study focuses on the use of ethnomedicine in this particular area. Our objective is to preserve the traditional knowledge of medicinal plants and systematize them through this communication so that the next generation or future researchers can use this knowledge for synthesizing new drugs.

Materials and Methods

Study area

Ethnobotanical study was conducted in two blocks of Bargarh District which are Padampur and Paikamal. Both the blocks are part of Gandhamardan Mountain Chains. In Padampur ethnobotanical survey was conducted in Chandipali, Lambarjuna, Mahulpali, and Judhisthirpur villages whereas in Paikamal Block Haridatal, Ranjitpur, Georgegarh, Pipalkhunta, Manbhang, Sadanandapur, Kermelabahal, Gandpali, Jharmunda, Salhepali, Majhipali, Gourjuri, Tentelkhunti ethnobotanical survey was conducted. Gandhamardan Mountain Chains is situated in western Orissa. The study area lies between 21°00' N latitude and

83°05' E longitude. It stretches over 240 km square area. The hill range is inhabited by a large number of tribal races of which Kondha, Binjhal, Goud, Mirdha, Kumbhar, Dhoba, Teli, and Kulta. They are predominant and they constitute the majority of the population of this region. Paikamal and Padmapur in the Bargarh district have tribal populations of 32,613 and 22,141 respectively. These two blocks are successively the most tribal dominant in the sub-division, making for 45% of the entire tribal population. The tribal people inhabit the hilly tracts, slopes, foothills, and plains such as Nrusinghanath, Manbhang, Paikmal, Haridatal, Ranjitpur, Pipalkhunta, Patrapali, Georgegarh, Durgapali, Khandijharan, Motipali, and other areas. The tribal people generally have low incomes and difficult lives. A large portion of them work as landless labourers, small-scale and subsistence farmers, farm servants, foresters, earthmovers, woodcutters, and hunters. These persons either lack assets or have assets with very low productivity, few applicable skills, and either no regular full-time jobs or jobs with extremely low pay. Improved rice production techniques have been used by those who have settled in the plains. Cereals, minor millets, roots, tubers/rhizomes, bamboo shoots, leafy vegetables, date palms, wild bananas, mahua flowers, and wild fruits make up the majority of the basic diet of the interior tribal people. Figure 1 (a) and (b) show the map of the study area.

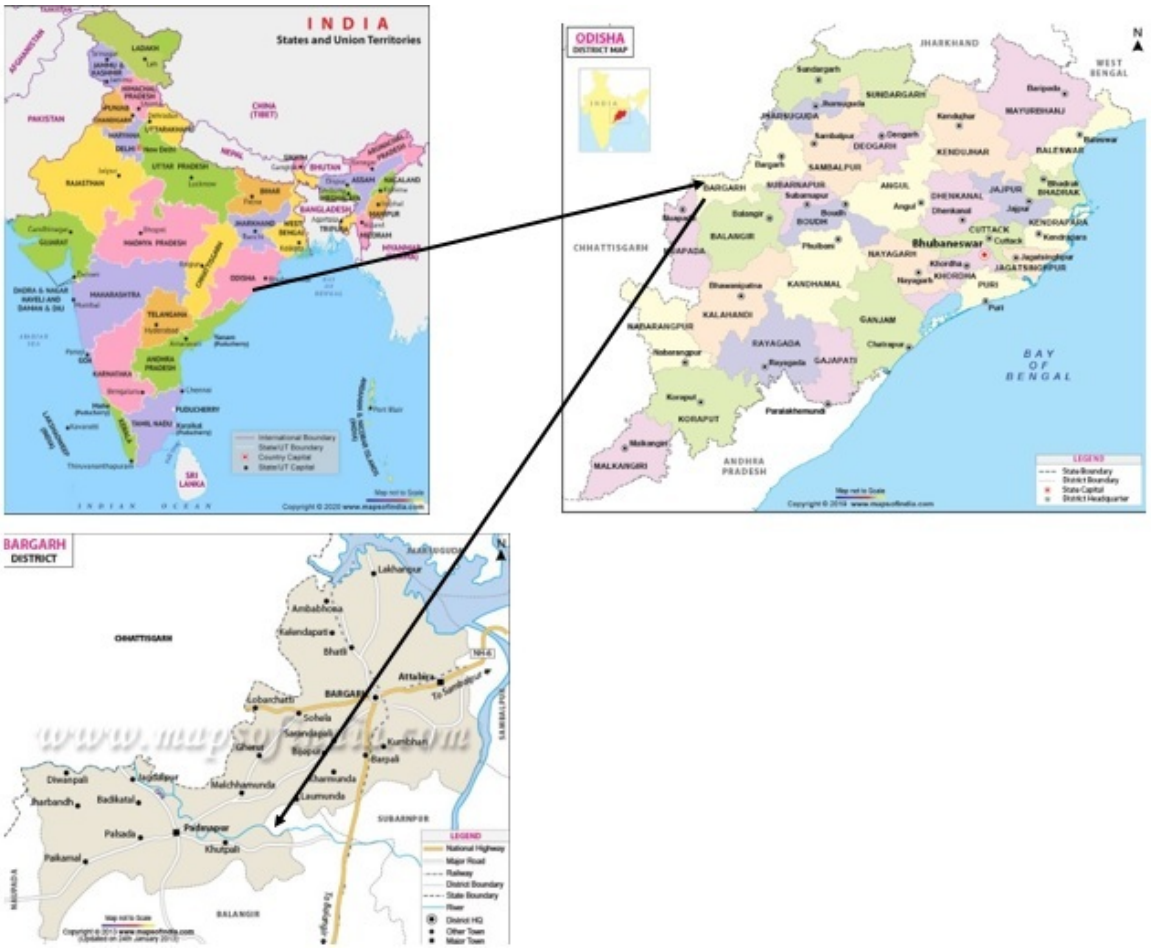

Figure 1. (a) Map of the Study area

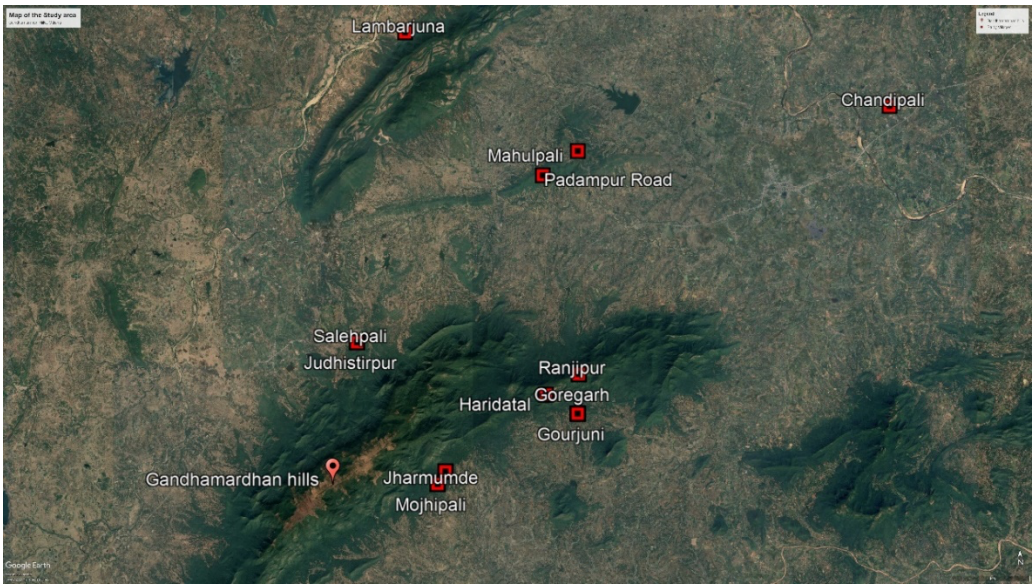

Figure 1. (b) spatial location of the study area

Questionnaire

Various field visit was done by the author to explore the traditional ethnomedicine knowledge. The author used the local language to obtain the maximum information. Healers and medicine men from different communities participated in the interview. Major communities were Kulta, Teli, Goud, Kondha, Binjhal, Dhoba, and Kumbhar. A total of 85 participants participated in the interview. Demographic information was obtained from the participants including age, occupation, sex, and education. Out of 85 participants, 62 are male and 23 are female. Most of the participants are traditional healers. The age groups of informants are divided into three categories. The first belongs to 18-30 years, the second group is 31-55 years and the last group of participants is above 55 years. Three participants belonged to the first group and rest two groups contained 41-41 participants. Out of 85 informants, 60 were literate, 12 participants were high school passed and only 13 were matriculated. All the questions were asked in the Oriya language. A semi-structured questionnaire containing the local name of the plant, parts of the plant, method of drug preparation, administration, precaution during taking the drug, side effects, location of the plant from where they are harvesting, and conservation strategy (Martin 1995, Cotton 1996, Bussmann et al. 2006, Yineger et al. 2007, Holroyd et al. 2008, Rokaya et al. 2010, Wodah et al. 2012). Where possible, the author accompanied the participant to the sites where medicinal plants were being harvested. The longitude and latitudes of the growing site of the plants were recorded. The spatial location of plant collection sites is given in Table 1.

Collection and Identification of Plant materials

A small portion of the plant was taken for herbarium purposes. Collected plant species were pressed using a herbarium press and dried in the field using natural drying techniques (Forman & Bridson 1989). All the plants were given a voucher number before submitting it to the herbarium of the Department of Botany, Kalinga University following the method described by Martin (1995A, 1995B).

Plant species were identified based on their morphological characteristics by the author itself. Anatomical studies were also performed to confirm the identity of plant materials. For confirmation of the identity of plant species, the aid of various taxonomists from different institutions was taken. The help of local flora is also taken for the identification of plant species (Banarjee & Rao 2001). Voucher numbers range from GPKU-1 to GPKU60. Photographs of all plants were obtained from the sites and depicted in Plate-1 and Plate-2.

Table 1. Spatial locations of collected ethnomedicinal plants found in Gandhamardan Mountain Chains

Name of collection site	Latitude (N)	Longitude (E)	Name of collected Plant
Borikel	20.979610 º	83.014951 º	*Cinnamomum tamala* (Buch. Ham.)
Borikel	20.980893 º	83.016606 º	*Dalbergia sissoo Roxb.*
Borikel	20.984748 º	83.019518 º	*Saraca indica L.*
Chandipali	21.036904º	83.116901º	*Ammannia baccifera* Roth.

Chandipali	21.03663º	83.115123º	*Curculigo orchioides* Gaertn.
Chandipali	21.037902º	83.117415º	*Bryophyllum armatum* (Claparède & Lachmann)
Chandipali	21.037886º	83.117194º	*Psidium guajava* L.
Chandipali	21.037909º	83.11701º	*Punica granatum* L.
Chandipali	21.03788º	83.117283º	*Moringa oleifera* Lam.
Chorpali	20.986496 º	83.052788 º	*Vitex negundo* L.
Chorpali	20.983357 º	83.051813 º	*Tinospora cordifolia* (Willd.)
Gandpali	20.974976º	82.977336º	*Clitorea ternatea* L.
Gandpali	20.976319º	82.978873º	*Catharanthus roseus* (L.) G.Don.
Georgegarh	20.935045º	82.852457º	*Madhuca longifolia var. latifolia* (Roxb.) A. Chev.
Georgegarh	20.932890º	82.852592º	*Ocimum sanctum* L.
Georgegarh	20.928217º	82.852770º	*Ricinus communis* L.
Georgegarh	20.928268º	82.848187º	*Lawsonia inermis* L.
Gourjuni	20.962134º	82.944941º	*Albizia lebbeck* (L.) Benth.
Gourjuni	20.961814º	82.944089º	*Euphorbia hirta* L.
Gourjuni	20.960705º	82.945014º	*Cynodon dactylon* (L.) Pers.
Haridatal	20.949925º	82.990713º	*Tridax procumbens* L.
Haridatal	20.950737º	82.982949º	*Justicia adhatoda* L.
Haridatal	20.947916º	82.989467º	*Calotropis gigantea* (L.) W.T. Aiton
Haridatal	20.954512º	82.983703º	*Vachellia nilotica* (L.) P.J.H.Hurter & Mabb.
Haridatal	20.955185º	82.986293º	*Martynia annua* L.
Jharmumde	20.947648º	82.858313º	*Murraya koenigii* (L.) Spreng.
Jharmumde	20.955960º	82.877778º	*Terminalia chebula* Retz.
Jharmumde	20.943474º	82.861424º	*Ficus religiosa* Forssk.
Judhistirpur	20.963355º	83.018740º	*Hygrophila auriculata* (Schumach.) Heine
Judhistirpur	20.962153º	83.019204º	*Ageratum conyzoides* L.
Judhistirpur	20.965371º	83.018099º	*Hibiscus rosa-sinensis* L.
Kermelabahal	20.965691º	82.967255º	*Bougainvillea glabra* Choisy
Kermelabahal	20.966602º	82.968101º	*Alternanthera sessilis* (L.) DC.
Khalipali	20.966874 º	83.054609 º	*Aloe vera* (L.) Burm.f.
Khalipali	20.967797 º	83.057886 º	*Ipomoea carnea* Jacq.
Khemedkhor	21.064853º	83.103069º	*Vernonia amygdalina* Del.
Kholiapali	20.966874 º	83.054609 º	*Trichosanthes dioica* Roxb.
Lamborjuna	21.073233º	83.087698º	*Sida cordifolia* L.
Lamborjuna	21.071247º	83.083918º	*Pergularia daemia* (Forssk.) Chiov.
Lamborjuna	21.070475º	83.084059º	*Jasminum sambac* (L.) Aiton
Mahulpali	21.017543º	83.099640º	*Bauhinia acuminate* L.
Mahulpali	21.016130º	83.099191º	*Phyllanthus emblica* L.
Mahulpali	21.015154º	83.099437º	*Phyllanthus fraternus* G.L.Webster
Mahulpali	21.008577º	83.093182º	*Citrus aurantiifolia* (Christm.) Swingle
Mojhipali	20.953181º	82.886139º	*Ziziphus mauritiana* Lam.
Monbhong	20.899514º	82.828191º	*Syzygium cumini* (L.) Skeels
Monbhong	20.901778º	82.827855º	*Ficus racemose* Willd.
Monbhong	20.900211º	82.824598º	*Sphaeranthus indicus* L.
Monbhong	20.899587º	82.826130º	*Achyranthes aspera* L.
Padampur road	21.006492º	83.089781º	*Aegle marmelos* (L.) Corrêa
Pipalkhunta	20.906048º	82.805831º	*Semecarpus anacardium* Blume
Pipalkhunta	20.902323º	82.805633º	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.
Pipalkhunta	20.901377º	82.805730º	*Termimslia bellirica* (Gaertn.) Roxb.
Pipalkhunta	20.901888º	82.805272º	*Azadirachta indica* A. Juss.
Pipalkhunta	20.907926º	82.804410º	*Holarrhena antidysenterica* (L.) Wall.
Pipalkhunta	20.899589º	82.806254º	*Diospyros melanoxylon* Roxb.
Ranjipur	20.938964º	82.878413º	*Boerhavia diffusa* L.
Ranjipur	20.942888º	82.878401º	*Argemone Mexicana* L.
Ranjipur	20.938904º	82.876416º	*Butea monosperma* (Lam.) Kuntze
Sadonondopur	20.958225º	82.918347º	*Capparis zeylanica* L.s
Sadonondopur	20.960157º	82.922956º	*Pongamia pinnata* (L.) Pierre
Sadonondopur	20.961996º	82.923378º	*Portulaca oleracea* L.

Salhepali	20.949088º	82.857996º	*Cymbopogon citratus* Stapf
Salhepali	20.949088º	82.857996º	*Mentha piperita* L.
Singhenpur	20.973057 º	83.040184 º	*Ficus benghalensis* L.
Singhenpur	20.973484 º	83.037484 º	*Carica papaya* L.
Tentelakhunti	20.943676º	82.979685º	*Tamarindus indica* L.
Tentelakhunti	20.943335º	82.978617º	*Bambusa vulgaris* Schrad. ex. J. C. Wendl.
Tentelakhunti	20.945211º	82.979325º	*Mangifera indica* L.
Tentelakhunti	20.943103º	82.978544º	*Cassia tora* L.

Quantitative Analysis of Ethnomedicinal Data

Relative frequency of citation (RFC):

The RFC citation frequency was utilized to assess the perceived significance of plant species mentioned by participants or sources. A higher RFC value indicates greater local recognition and endorsement of the specific medicinal plant.

The RFC was computed using the formula provided by earlier researchers (Shaheen et al. 2017, Pradhan et al. 2020).

$$\text{RFC}= \frac{FC}{N}$$

In this context, RFC denotes the number of informants who have reported using a particular plant for ethnomedicinal purposes, while **N** represents the total count of informants involved in the study.

Informant Consensus Factor (ICF):

The Informant Consensus Factor (ICF) is a measure used in ethnobotanical studies to assess the level of agreement among informants regarding the use of medicinal plants. The ICF is calculated by comparing the number of use reports for a particular plant or plant category with the number of species reported by informants in that category. It is expressed as a ratio or percentage and ranges from 0 to 1. A higher ICF value indicates a higher level of consensus among informants, suggesting a greater agreement regarding the use of a particular plant or plant category. It is calculated using the following formula (Heinrich et al. 1998, Trotter & Logan 1986, Singh et al. 2012)

$$\text{ICF}= \frac{Nur-Nt}{Nur-1}$$

In this context, "Nur" represents the number of use reports made by informants in a specific illness category, while "Nt" represents the number of taxa or species utilized by informants to treat that particular category. The purpose of employing this formula was to assess the consistency or uniformity within the ethnomedicinal information gathered from traditional informants.

Use Value (UV)

The Use Value (UV) is a quantitative measure used in ethnobotanical studies to evaluate the significance of a plant species within a specific cultural context. It is calculated based on the number of reported uses of a plant by informants (Rokaya et al. 2010, Phillips & Gentry 1993)

$$\text{UV}= \frac{\sum \text{U}}{N}$$

UV represents the use value attributed to each species, U indicates the recorded number of uses for a particular species, and N represents the count of informants reporting that species.

Prior Informed Consent

It is essential to obtain informed consent when documenting and disseminating local knowledge, especially when it comes to ethnobotanical uses of plant species. Informed consent ensures that participants are aware of the purpose, procedures, and potential risks associated with their participation. It also guarantees that they have voluntarily agreed to be part of the project. The aim of this study has been explained to the participants. Before starting the study, consent from the village head was taken. The informants who participated in this study gave their consent. Participants had the opportunity to ask questions and clarify any concerns before giving their consent.

Results

An ethnobotanical survey was started from December 2022 to June 2023. All the plant species and their ethnobotanical uses families are mentioned in Table 1. A total of 85 participants participated in this study. Informants from different communities Kandha, Goud, Dhoba, Kulta, Kumhar, Binjhal, and Teli participated in this study. People of the Gandhamardhan mountain chain are using 70 plants for the treatment of different ailments and diseases. A total of 243 herbal formulations were noted carefully. Taking juice or obtaining juice from plant part is the most favourable method used in making 73 different types of herbal formulations followed by decoction which is used in making 49 herbal formulations. Plant powder and paste are used in the making of 45 and 38 herbal formulations, respectively. Sometimes raw plant parts are used as drugs to treat ailments and diseases, 18 formulations were recommended by the participants consuming fresh parts to treat diseases in this study. Oil from plant parts or seeds was used in 11 formulations. The preparation of curry is used in 4 formulations; three formulations suggest plant parts should be used as cooked vegetables and 1 formulation recommends making chutney to cure pathophysiological conditions as it was already shown in Figure 3. *Terminalia and Ficus* are the most prominent used genera in which 3 species are used in ethnomedicinal formulation followed by *Phyllanthus* (2 species). The leaf is the most favourable part of the plant used for ethnomedicinal preparation (41.98%) followed by fruits (15.46%), root (8.83%), whole plant (8.28%), bark (7.73%) flowers (5.52%), seed (4.41%), stem (4.41%), milky latex (2.76%), and inflorescence (0.55%) respectively. The most popular method of drug administration is oral which contributes 65.72 % and the rest are used as topical medicine 34.28 %.

Table 2 shows the list of plants used for ethnomedicinal preparation. All the plants were arranged alphabetically. Figure 2 reflects the process of gathering information from the participants. In many previous ethnobotanical studies herbs are important habits that contribute majorly to ethnomedical formulation (Faruque et al. 2023, Pradhan et al. 2023, Singh et al. 2012) but in this study trees and herbs equally constitute 36%, followed by shrubs, and climbers which hold 22%, and 5% respectively (Figure 4). One of the vital approaches in herbal therapy is the utilization of raw plant materials to create medicinal preparations (Choudhury & Das 2014). Regarding this matter, the authors have meticulously recorded all drug preparation methods verbatim and conveyed them in this manuscript without any insertions or omissions.

All the plant species were also assessed for frequency of distribution and their status as per the IUCN Red Data List category (IUCN 2022-2). Out of 70 plants, 26 are considered under the Least Concern (LC) category, 1 is considered under the Near Threatened (NT) category, 1 is in the Data Deficient (DD) category, 1 species is under the Vulnerable (VU) category and 41 plant species are Not Evaluated (NE) by IUCN Red List categorization.

The authors asked the participants about the process of collection of plant material, strategy for conservation, and cultivation practices of plants. All the participants were asked whether they knew about the process of plant conservation or whether they followed the cultivation practices of the plants that they were using. Unfortunately, most of them are unaware of the process of plant conservation. It might occur due to the old age of the participants. The authors told them about the sustainable use of plant products how they can use these plants without causing damage to plants and how to cultivate these plants in their surroundings. The authors also collected seeds of many plants for sowing them in the Botanical Garden of Kalinga University.

Figure 2. The author is collecting ethnobotanical information from the participants.

Table 2. List of plants used by tribal communities of Gandhamardan mountain chain for ethnomedicinal purposes

Name of plant Species, IUCN status, Voucher Number	Vernacular Name	Family	Plant parts	Mode of drug administration	RFC	UV	Method of drug preparation
Achyranthes aspera L. Not Evaluated GPKU-1	Aaphamarg, Latkana	Amaranthaceae	Leaf, stem	Powder, paste	0.03	0.12	Stem powder (5-7 grams) **kali mirch** (*Piper nigrum*) (7 seeds) ground and take this powder with cold water in the morning and evening to treat cough. Leave (10-12) is ground, and paste was made. This paste was applied over the joint to treat inflammation. Take 8-10 leaves make a paste and apply it on the insect bite area to treat inflammation and swelling
Aegle marmelos (L.) Correa. Near Threatened GUKU-2	Bael	Rutaceae	Leaf, root	Juice	0.12	0.22	In early diabetic patients drink 2-3 leaves of (*Aegle marmelos*) **bael** grind and make juice and drink 4-5 spoons in the morning and evening on an empty stomach for 3-5 weeks to treat diabetes. Root bark (5-10gm) boil with water and add 2-3 spoon honey and drink 2-3 times a day to treat vomiting. The root bark has a length of 2-3 grow eaten two times a day (after meals). Cure from cold and cough treatment for cold and cough.
Ageratum conyzoides (L.) *Least Concern* GPKU-3	Poka Sungha	Asteraceae	All Plant Part	Decoction, paste	0.03	0.12	Take leaves (5 gm.) + stem(5 gm.) are boiled them with 500 ml water and make decoction Then wait for cool down and use in a hair wash. This remedy helps dandruff-free and hair soft and shiny. Take the whole plant part and make a paste then apply on the inflammation areas for some hours then wash with water. This remedy helps with inflammation. In the early stage of the boil, we take 6-8 leaves and grind and make a thick paste then apply them on the boil areas for some hours then wash them with water. This remedy helps to cure boils.
Albizia lebbeck (L.) Least Concern GPKU-4	Seshuan, Sirisa	Fabaceae	Fruit, Root, Flower	Juice, Oil, Paste	0.09	0.32	Take 1-2 drops of root or fruit juice and apply on the nose for the treatment of migraine pain. A leaf of (*Albizia lebbeck)* **sirish** and a leaf of (*Mangifera indica*) **aam** ground and made juice then warm the juice and apply 1-2 drops on the ear to treat ear pain. Take newly growing leaf 1 gm and fry it with cow ghee and eat to treat cough. Leaf juice (5 ml) + honey (1-2 ml) mix well and drink once a day to cure stomach worms. Leaf (10 gm) grind with water and filter it then add 1-2 gm rock sugar and drink twice a day for the treatment of urinary disease. Take Sirish oil (extracted from seeds) (4-5 ml) and apply on the skin-infected areas and gently massage. Take flowers (8-10 gm) grind them and make a thick paste and then apply on the inflammation areas for some hours for the treatment of inflammation.
Aloe vera (L.) Burm. f Not Evaluated GPKU-5	Ghritkumari	Asphodelaceae	Leaf	Juice	0.50	0.62	Take 15 ml of juice add some black salt and drink twice a day (morning & evening) to treat the cough. Gastric pain: Juice 10 ml + cow ghee (5 grams) + black salt spoon mix well and drink twice a day. Take the *Aloe vera* juice and **giloy** juice (*Tinospora cordifolia*) in equal amounts and mix well drink 5 ml to treat gastric pain on an empty stomach. 20 ml of *Aloe vera* juice is taken twice to treat Jaundice for 10 days.

Alternanthera sessilis (L.) Least Concern GPKU-6	Madranga saga	Amaranthaceae	Stem, Leaf, Flowers	Decoction, Paste	0.03	0.22	Take 5-7 flowers and eat daily in the morning before meals to cure eye disease. Leaf and stem 15-20 grams + Jaggery 10 grams + water 300 ml and make a decoction and then add 10-20 ml of cow milk and drink once a day for the treatment of jaundice and liver disease. Leaves are fried in oil and eaten daily. It helps in weight loss. Take whole plant grind them make a thick paste and then apply on the skin-infected areas for some hours to cure skin diseases. Leaves and stems are grind and make a thick paste then apply on the bite areas. It prevents poison infection of insect bites. Tribal and village peoples are eaten as saga.
Ammannia baccifera L. Least Concern GPKU-7	Agni Kumari	Lythraceae	Stem, leaves, inflorescence	Paste	0.06	0.09	Grind the stem leaves and inflorescence and make a thick paste, then apply externally on the opposite side of the headache
Argemone mexicana L. Not Evaluated GPKU-8	Satyanashi	Papaveraceae	Root, leaf	Powder, juice	0.16	0.26	500 mg- 1mg root powder + hot milk (200 ml) and take once a day before a meal to treat cough. Plant milk (3ml) mixed with ghee (10mg) and taken twice a day after a meal for the treatment of stomach pain. **giloy** (*Tinospora cordifolia*) juice (10ml) + plant oil (8-10 drops) mix well and take 2 times a day to treat jaundice. Plant milk is applied to the injured parts of the body for the treatment of the injury.
Azadirachta indica A. Juss. Least concern GPKU-9	Nimba, Neem	Meliaceae	Bark, Leaves, Fruits	Powder, Oil	0.25	0.35	Old **neem** (*Azadirachta indica*) bark powder 2-3 gm. Mix with 250 ml water and stay for a night then filter and mix 1tea-spoon honey and drink it in the morning to treat skin diseases. Neem oil 5-6 drops drink 1-2 times a day to treat malaria. 5-10 leaves add in curry with cooking and eat every day to treat intestinal worms
Bambusa vulgaris (L.) Not evaluated GPKU-10	Baunsa	Poaceae	Leaf, Bark	Juice, Decoction, Curry	0.03	0.12	Take 1 teaspoonful of juice from the leaves of the *Bambusa vulgaris* plant and drink once a day for 8-10 days for the treatment of piles. Bark (8-10 gm) and make a decoction and drink once a month to treat irregular menstruation. Stems are cut into little pieces cooked in curry and eaten to cure the cough.
Bauhinia acuminata (L.) Not evaluated GPKU-11	Kheer kanchan	Fabaceae	Bark, Root, and fruit	Juice	0.12	0.22	Plant bark is boiled with water and then gargled for 5-10 min daily for the treatment of mouth ulcers. Roots (10-20gm) grind and mixed with water and drunk like tea on an empty stomach to treat liver disease. Dried fruit is crushed and made into powder. Take 5gm of powder mix it with 1 glass of water and drink it on an empty stomach daily to treat urinary disease.
Boerhavia diffusa Linn. Not evaluated. GPKU-12	Gadha purni saga, Punarnava	Nyctaginaceace	All plant parts	Powder, juice	0.38	0.51	Root (2 gm) and rock sugar (2 gm) grind and take 2 times a day to treat dry cough. Root (3gm) + turmeric (5gm) mix well and eat 2 times a day for the treatment of asthma. All parts grind and make juice and take 10-20 ml and mix with **harida** powder (Seed powder of *Terminalia chebula*) (2gm) and take 2 times a day to treat jaundice. Take 10-20 ml of plant juice and drink once a day for 15-20 days to treat kidney disease. Cook leaves and add them to your diet, it is used to treat heart disease.
Bougainvillea glabra Choisy *Not evaluated* GPKU-13	Kagji flower	Nyctaginaceae	Flower	Decoction, Paste	0.09	0.22	Take 7-8 flowers wash them with water and boil with 2 cups water, Add 1-2 cm of ginger piece and boil up to 1 cup decoction rest. Then add 1 spoon of honey and drink after meal to cure the gastric problem. Flowers are grind with water and make a thick

							paste then apply to the skin-infected areas for some hours for the remedy of skin diseases. Flowers tea is used by tribal people
Bryophyllum pinnatum (Lam.) Pers. Not evaluated GPKU-14	Amar poi	Crassulaceae	Leaf	Juice	0.19	0.29	Everyday morning with an empty stomach drink 1 to 2 leaf juice for 30 days to treat kidney stones. 5 to 6 ml leaf juice with 5 grams of sugar taken orally to treat stomach ache. 5 to 10 grams of leaf grind and extracted juice were given to the patient to treat cholera
Butea monosperma (Lam.) Taub. Least Concern GPKU-15	Palsa	Fabaceae	Flower, seed, bark, and leaf	Juice and powder	0.06	0.19	Cold water (100 ml) + flower (7-8) grind and mix then filter it and drink once a day on an empty stomach for the treatment of Apistaxis. Seeds of this plant grind and take one spoon of powder to treat Intestinal worms. The new smooth leaf is dried and made into powder. Take 5 grams of powder in the morning on an empty stomach for the treatment of Diabetes. 10-15 gm of bark juice with a pinch of pepper powder is taken with milk once a month to treat kidney stones.
Calotropis gigantea (L.) Dry and Not evaluated GPKU-16	Arakha	Apocynaceae	Leaf	Juice, powder	0.22	0.32	Mustard oil (2-5ml) has been applied on one side of the leaf, slightly warming that leaf. Apply this leaf for 3-4 hours on the area of inflammation to treat joint pain. Take milk line substance of *Calotropis gigantea* add mustard oil and boil it then add some turmeric and apply it externally treatment for a spot on the skin and eczema. Dried leaf powder is applied to the scorpion bite area on the cut wound area treatment for scorpion bite.
Capparis zeylanica L. Not evaluated GPKU-17	Sughandha	Capparaceae	Leaf, Stem	Paste, Powder	0.03	0.16	Leaf and stem are dried and made of powder then taken (2-4 gm) powder with water once a day for the treatment of fever. Take (10-15 gm) leaf and make a paste then apply it on the cut wound areas for some hours for the treatment of the cut wound. Take (1 gm) leaf + **black pepper** *(Piper nigrum*) (2-3) + **imli (***Tamarindus indica***)** (1) **garlic** (*Allium sativum*) (1-2) and make chutney and eat to increase hunger. Fruits are edible as vegetable curry by the tribal people.
Carica papaya L. *Not evaluated* GPKU-18	Amruta bhanda	Caricaceae	Fruit	Juice	0.22	0.38	Take 2 spoons of juice from the ripened fruit add 1 spoon of sugar and then use it 1 hour before a meal once a day. Daily eat at least half of the ripened fruit. It helps to control gastric diseases
Cassia tora L. Not evaluated GPKU-19	Chakunda	Fabaceae	Leaf	Paste	0.06	0.12	Leaves (10-15 gm) grind and make a thick paste and apply on the affected areas for some hours and then wash with normal water for the treatment of skin diseases. Take some leaves make a smooth paste and apply on the bite areas for some hours for the treatment of honeybee bite.
Catharanthus roseus Not evaluated GPKU-20	Baramasi, Sadabahar	Apocynaceae	Leaf, Flower	Juice, Paste	0.19	0.29	Take 4-5 gm of flower extract juice and apply it on the pimple for some hours and then wash with normal water for the treatment of the pimple. Take 5-10 gm of leaf and make a thick paste then apply on the insect bite areas for some hours to treat insect bite. Take 5 leaves + 5 flowers +5 *Azadirachta indica* leaves grind and make a paste and apply on the skin 3 times a day It cures all types of skin infections.
Cinnamomum tamala (Buch.-Ham.) T. Nees & C.H.Eberm.	Tejpatra	Lauraceae	Leaf	Decoction, Powder			First of all, prepare leaf powder by using 4 to 5 leaves then make decoction to treat cold and fever.

Least Concern GPKU-21							This decoction can be taken 10-15 days to treat kidney stones. 1 spoonful of leaf powder with hot milk is taken to treat respiratory diseases.
Citrus aurantiifolia *Not evaluated* GPKU-22	Kagji lembu	Rutaceae	Fruit	Juice	0.25	0.38	**Lemon** juice (5 ml) + Pure honey (5 ml) + water (300 ml) warm and drink daily in the morning and evening to treat obesity. Lemon juice (5 ml) + Coconut oil (10 ml) and shake well and then apply to treat hair disease. Lemon juice (5 ml) + pepper powder (2 grams) + Rock salt (5 grams) + water (200 ml) mix well and drink on an empty stomach morning & and evening for at least 15 days to treat stomach acidity and gas.
Clitorea ternatea L. Not Evaluated GPKU-23	Aparajita	Papilionaceae	Root	Powder, Juice	0.19	0.32	Take root powder 1-2 gm and mix with ½ spoon of cow ghee and eat every day once a day for the treatment of goitre disease. Take root powder 1-2 gm and boil with water or milk 100 ml and take 2-3 times a day for the treatment of urinary diseases. Take root 10-15 gm grind and add some honey and eat 1-2 times a day for the treatment of cough. Take unripe fruits and grind and extract juice 4-4 drops in each nose. It relieves headaches.
Curculigo orchioides Gaertn. Not Evaluated GPKU-24	Tala muli, Kali musli, Bhumitala	Hypoxidaceae	Tuberous root	Juicy	0.12	0.16	Ingredients: Take 3 pieces of roots having lengths of 3 inches, 100gm (Mishri) rock sugar), 7 **kali mirch** (*Piper nigrum*), and water. Procedure- Grinding all ingredients and make thick juice 25-30 ml juice is prepared and taken this juice for 7 days to 15 days to treat hemorrhoids
Cymbpogon citratus Not Evaluated GPKU-25	Dhanvantari, Lemon grass	Poaceae	Leaf	Decoction	0.06	0.16	Take **lemon grass** (*Cymbpogon citratus*) leaf (2-4) + *Ocimum sanc*tum leaf (1-2) + water (2 cups) and boil it and make tea and drink daily on an empty stomach for better results for the treatment of cough. Take **lemon grass** (2-3 leaves) boil it with water make tea and drink it every morning to cure kidney stones. Take **lemon grass** (2-3 leaves boil it with 300-400 ml water and make tea then add 1 spoon of pure honey and drink twice a day. This remedy helps in weight loss.
Cynodon dactylon L. Not Evaluated GPKU-26	Dooba ghasa, Durba	Poaceae	Leaf, Stem	Decoction, Juice, Paste	0.38	0.54	Take leaves and stem (8-10 gm) + water 2-2.5 lit) and boil and make decoction until ¼ portion then filter it and wait for cooling then add 2- 3 spoons of sugar and 2-3 spoon honey and drink 2-4 spoon daily for the treatment of urinary obstruction. Drink leaf and stem juice 5 ml to cure vomiting. **doob** grass (*Cynodon dactylon*) juice 2 drops apply on the nose and rest for 30 min for the treatment of nose bleeding. Take doob grass and rice grain in a 1:1 ratio and grind and make a thick paste then apply on the headache area of the forehead for some hours to treat the headache. Take 5-10 gm of doob grass + **turmeric** powder 1 spoon + cow urine 1 spoon mix well and grind and apply on the skin for some hours for the treatment of skin disease.
Dalbergia sissoo Roxb. Least Concern GPKU-27	Sishu, Podmi	Fabaceae	Leaf Seed	Juice	0.18	0.36	Daily 10-15 ml leaf juice is taken with an empty stomach to treat acidity. Grams of leaves are taken to prepare decoction in 500 ml water. Drink this decoction in amounts of 20-40 ml to treat constipation. Seed oil is applied twice a day to treat the cut and wound.

Diospyros melanoxylon Roxb. Not Evaluated GPKU-28	Kendu	Ebenaceae	Fruits, Leaves	Juice	0.03	0.12	Fruit is crushed and the juice is applied to the cut wound area in the body.Daily eating 4-5 fruit control high blood pressure and purify our blood.Leaves are used in the making of beedi (A Country cigarette).
Euphorbia hirta L. Not Evaluated GPKU-29	Bada dudhi, Dudhia saga	Euphorbiaceae	All plant parts are used	Powder, Paste	0.16	0.25	Take all plant parts and dried then crust and make powder. Take ½ spoon of powder and mix it with 1 glass of milk and drink in the morning and evening for the treatment of weakness. Take all plant parts make a thick paste and apply on the pimple areas for some hours. This remedy is useful to prevent pimples on the skin. Make a thick paste of leaves and apply on the swelling areas for some hours. This remedy is used to cure swelling.
Ficus benghalensis L. Not Evaluated GPKU-30	Baragocha	Moraceae	Bark, Plant sap	Juice	0.34	0.56	Take 5-6 drops of milky latex + **turmeric** powder (1/2 spoon) + cumin powder (1/2 spoon) mix and eat in the morning and evening with warm water before meals for at least 15-20 days to treat frequent urination. Take some rice-washed water and a piece of bark grind smoothly then add some honey and drink in the morning and evening to treat diarrhoea. Take bark of *F. benghalensis* (25 grams) *Vigna radiata* (25 gm) little grind and boil with 3-4 cups of water then prepare decoction until ½ cup. Then filter it add ½ spoon of honey and drink to treat vomiting.
Ficus racemosa L. Not evaluated GPKU-31	Dimiri, dumer	Moraceae	Leaf, fruit, and stem	Powder, decoction	0.03	0.29	Leaf powder (3gm) + **black pepper** (5) + black salt ½ spoon + curd (100gm) mix well and eat for the treatment of Dysentery. Fruit is used to cure gastric problems. Two leaves and two fruits, grind and drink once a day to treat the urinary disorder. Unripen fruit powder (5gm) + rock sugar (5gm) mix and grind and take twice daily in milk (300ml) to treat diabetes. 10-20 gm unripe fruits + 200ml water + jeer 1-2 gm and boil for some time and add 1-2 grams and take this decoction once a day for the treatment of irregular menstruation. Plant milk is used with a cotton cloth. Dip the cloth in the milk and apply the cotton to the cut area of the body to treat cut wounds. Plant milk 10-20 drops mixed with cold water and drunk once a day for the treatment of piles.
Ficus religiosa L. *Not evaluated* GPKU-32	Pipal, Aswatha, Ostha	Moraceae	Bark, Leaf, Fruit	Powder, Decoction, Juice, Raw	0.12	0.41	Bark (10-20 gm) + Water (200 ml) boil and make decoction then 40 ml drink twice a day for the treatment of dry cough. Bark and fruit are equal amounts used to make powder. Take ½ spoon of powder and eat 3 times a day for the treatment of asthma. Take ripened fruit powder ½ spoon is eaten with water to treat appetite problems. Fruit powder ½ spoon mixed with milk ½ glass and drink once a day for the treatment of body weakness. Take leaves (5-7 newly growing) and eat daily on an empty stomach for the treatment of constipation. Take leaves (3-4 newly growing) grind and add 1-2 gm rock sugar (mishri) and drink with water twice a day for the remedy of jaundice. Take 3-4 leaves and boil with 300 ml of water make a decoction and take 40 ml daily on an empty stomach to cure diabetes. Take newly growing leaves 10-15 gm grind and then mix with wheat flour 50-60 gm to make a paste and apply on the inflammation areas for relief from pain. Take bark powder (4-5) gm mix it with cow ghee (4-5 gm)

							and apply on the wound areas. This remedy helps in wound healing. According to tribal and village people, this tree is sacred.
Hibiscus rosa- sinensis Not Evaluated. GPKU-33	Mandara, Gudhal	Malvaceae	Flower, Leaf, Root	Oil, Juice, Powder	0.09	0.22	Take 50 gm. of flower + 100 gm. Coconut oil + 200 ml water and boil in low flame and make oil. Then filter it and store it in a glass bottle. Then apply oil on the hair once a day for the treatment of hair fall. Take root (2 gm.) + **ground nut oil** (1 spoon) then mix well and take twice a day on an empty stomach for 7 days. This remedy helps to cure irregular menstruation. Take some ripened leaves and dry then make powder. Then wash the cut wound area with neem water (boil). Then the powder is applied to the cut wound area. This remedy helps with the treatment of cut wounds. Take bark (5 gm.) + **mustard** oil (20-25 ml) and boil in low flame then the rest amounts are stored in a glass bottle. Then small drops of oils are applied on the pimple with hand or cotton twice a day for the treatment of the pimple.
Hygrophila auriculata Schumach. Least Concern GPKU-34	Koeli Khia	Acanthaceae	Leaf, Stem, Root	Juice, Powder	0.09	0.32	Take leaf juice (5-10 ml) + ½ spoon honey and mix well and drink once a day on an empty stomach for the treatment of acidity. Take leaf juice (5-10 ml) + raw turmeric juice (5-10 ml) + honey ½ spoon drink once a day to prevent skin disease. Take dried stem and root and make powder then take a pinch of black pepper and mix. Then take 1 spoon of powder in 1 glass of warm water in the morning and evening. It cures arthritis. Take root (25 gm.) + 4 cup water boil at least ¼ cup decoction are make. This decoction is drunk at night and a small piece of root is placed under the pillow while sleeping for the treatment of insomnia.
Ipomoea carnea Jacq Not Evaluated. GPKU-35	Amari	Convolvulaceae	Leaf	Paste	0.16	0.25	Take leaf juice and apply it on the skin infection area for some hours and then wash with normal water to treat the skin infection. Take some leaves and make a paste mix with coconut oil and heat it then apply on the injury area.
Jasminum sambac Linn**.** Not evaluated GPKU-36	Malli, Mogra	Oleaceae	Leaf, Root, flower	Paste, Juice	0.12	0.22	Make a paste of flowers. Apply 10-20 grams of this paste on the head for 1 to 2 hours to treat the headache. Take 10-15 grams of root and make a fine paste. Apply this paste over the injury to treat inflammation. Take 10-20 grams of leaf. Make a fine paste and then apply it over the skin area for 1-2 hours, then wash to treat skin diseases.
Justicia adhatoda L. Not evaluated GPKU-37	Basang	Acanthaceae	Leaf	Juice, powder, and paste	0.12	0.25	Take green leaves, dried and crushed, and make powder. Take 1 spoonful of powder and add 300 ml water and boil it and then mix ½ spoonful of salt and drink like tea to treat headache. In the early stage of the boil, grind the leaves to make a paste and apply it to the boil area for the treatment of the boil. Leaf juice (1 spoon) + ginger juice (1 spoon) + honey (1 spoon) then mix well and take once a day for at least 1 month to

							treat anaemia. Leaves (10 gm) + Raisins (3-4) + rock sugar 5 gm + water 50 ml and boil it and take 10 - 20 ml at decoction 3 times a day after meal to treat cough.
Lawsonia inermis L. Least concern GPKU-38	Mehendi, Heena	Lythraceae	Leaf	Decoction, Juice	0.06	0.16	Take 5-10 grams of leaves and boil with 200-300 ml water. Prepare the decoction and apply it on infected nails or cracked feet to nail infection and crack feet. Take some *Lawsonia inermis* leaves boil them with water prepare a decoction apply on the hair for ½ to 1 hour and then wash with cold water to treat dandruff. Leaf juice 1-2 ml plus mustard oil 1-2 ml mix well and apply and massage on the neck area to treat neck pain.
Madhuca longifolia (J. Konig) J.F.Macbr. Not Evaluated GPKU-39	Mahula	Sapotaceae	Whole plant, Seed	Powder, Juice, Oil	0.25	0.35	Whole plant powder 1-2 grams mix with honey and take once a day to treat dry cough. Bark decoction (30-40 ml) is taken to treat diarrhoea. The seed oil is massaged to treat body pain and skin diseases.
Mangifera indica L. Data Deficient GPKU-40	Aamba	Anacardiaceae	Leaf, Fruit	Juice, Decoction	0.12	0.19	Take 1-2 unripe fruits and burn them in flame extract juice from burned fruits and add some salt and sugar according to taste and drink to cure Sunstroke. *Mangifera* leaves (10-15 gm) +**jamun** leaves (*Syzygium cumini)* (10-15 gm) and make a decoction and mix 2-3 spoons honey and drink 2-3 times to cure acidity and vomiting.
Martynia annua L. *Not evaluated* GPKU-41	Baghnakhi	Martyniaceae	Fruits, Root	Powder, Oil	0.09	0.16	Oil extracted from the seeds and oil applied on the joints of the body for the treatment of joint pain. Roots are dried and made into powder. Take (1-2 gm) powder with warm water in the morning and evening to cure kidney stones and kidney diseases.
Mentha piperita *Not evaluated* GPKU-42	Pudina	Lamiaceae	Leaf	Juice, Chutney	0.09	0.19	Take leaf (5-10) + ½ spoon **lemon** juice + Mishri (1-2 gm) grind and make juice and drink on an empty stomach daily. This remedy helps to cure acidity. Take leaf juice 10-15 ml extract and add 1-2 gm of rock salt and drink. It helps in digestion. Tribal and village people make chutney from leaves and eat it.
Moringa oleifera Lam. Least Concern GPKU-43	Munga, Sajna	Moringaceae	Leaf, Bark	Powder, Juice	0.19	0.29	Dried leaf powder (3-4 grams) mixed with 1 glass of water or milk after breakfast to treat diabetes. Patients having both diabetes and hypertension are recommended to take this drink twice a day (morning and evening), 10 to 20 fresh leaves grind to extract the leaf juice. This juice can be slightly warmed over the flame and then massaged to the inflammatory area or zone.
Murraya koenigii Least Concern GPKU-44	Bhrusanga	Rutaceae	Leaf	Decoction, Juice, Paste	0.25	0.38	Take 10-15 leaves and boil with 200 ml water then wait for cooling and filter it then drink once a day for the treatment for stomach disease. Leaves are dried and powdered take 5-10 gm powder in the morning and evening on an empty stomach daily for the treatment of diabetes. Take 10 -15 leaves make a thick paste and apply on the pimple areas for some hours and then wash with normal water for the treatment of the pimple. Take 10-15 gm leaves and boil with 400 ml water up to rest 100 ml decoction then wait for cooling and filter it and drink two times a day on an empty stomach for the treatment for gastric disease.

Ocimum sanctum L. Not evaluated GPKU-45	Tulsi	Lamiaceae	Leaves	Decoction and Juice	0.51	0.61	Take 6 to 7 leaves to grind with 5 gm ginger and 4 seeds of pepper. After grinding mix 300 ml of water. Drink this preparation empty stomach to treat cold and cough. Take 10 leaves and mix them with 5-10 grams of cumin and honey. Make a fine paste and eat it after a meal once a day to treat diarrhoea. Leaf (2-3 grams) + curd 200 grams mix and eat daily for 10-15 days. Leaf (20) + pepper (10) boil with 500ml water 3 times a day after meal to treat typhoid fever.
Pergularia daemia (Forssk.) Chiov. Least Concern GPKU-46	Dahidia, guras dia	Apocynaceae	Stem, leaf	Paste, powder	0.09	0.19	The plant sap is extracted from stems and leaves and this sap (milk) is applied to the skin for 2-4 hours and then washed to eradicate skin allergies The plant milk (1-2ml) + curd (200-250gm) and eaten once a day. Use this remedy for at least 7 days of treatment for jaundice. Dry leaf grind and make powder. Take 1-2gm of powder after a meal. Once-in-a-day treatment for acidity.
Phyllanthus emblica L. Least Concern GPKU-47	Amla	Phyllanthaceae	Fruit	Juice powder	0.25	0.32	Take 2 spoons of **amla** fruit powder and add 2 spoons of honey and then take 3-4 times a day. Amla powder (1 spoon) + one spoon fried **cumin** seeds) Rock salt + Black pepper (Half spoon) and Ginger powder (half spoon) above-mentioned ingredients and take two times a day after meal to treat indigestion. **amla** juice (20 ml) + honey (10 ml) + Ghee (5 grams) and take this mixture 2-3 times a day before a meal to treat dysentery.
Phyllanthus niruri L. Not evaluated GPKU-48	Badi amla, Bhuen amla	Phyllanthaceae	Leaf, stem, bark, root, and fruit	Juice, powder	0.12	0.22	Fresh leaves (50 gm) + water 200 ml. Boil and wait for cooling and then filter it and gargle with this water twice a day for treatment of mouth disease. All plant parts (50 gm) + water (500 ml) boil and wait for ¼ portion and then wait for cooling and then filter it and take 1 to 2 spoons twice a day after meal for the treatment of cough. All parts are dried and made powdered and taken (15gm) of powder + 10 to 15 black pepper powder mixed and taken 3 times a day after meal to treat diabetes.
Pongamia pinnata (L.) Least Concern GPKU-49	Karanja	Fabaceae	Leaf, Root, Fruit, Seed	Decoction, Juice, Oil	**0.06**	**0.22**	Fruits are ground and mixed with coconut oil and heated filtered and wait to cool down. The oil is then applied to hair daily to prevent hair fall. Take 1-2 grams of seed powder mixed with a few drops of honey and eat once a day for the treatment of cough. Take (10-15 gm) leaf boil with (200-300 ml) of water and prepare decoction then drink only 10-15 ml of the decoction to prevent vomiting. Take root (1 gm) and add cow milk (5-10 ml) and mix with curd then eat once a day for at least 3 days for the treatment of piles. Karanja oil is applied to joint pain areas and massage, this remedy benefits arthritis.
Portulaca oleracea L. Least Concern GPKU-50	Kulfa, Lonika, Luni saga, Balu saga	Portulacaceae	Leaf, Stem	Paste, saga	0.03	0.09	Take 3-4 leaves and eat daily on an empty stomach to control high blood pressure. Paste of leaf and stem are applied on the insect bite areas and then covered with cotton cloth for some hours. This remedy is useful for the treatment of insect bites.
Psidium guajava L. Least Concern GPKU-51	Pijuli, Amrood	Myrtaceae	Leaf and fruit	Juice paste powder	0.19	0.29	Take unripe guava before sunrise rub it on a stone and then apply this paste to the forehead. Patients can wash this paste when they get relief from headaches. Take 10-15 grams of leaves grind and mix them with 500 ml of water and filter. This prepared drink can be used to treat fever. 5 to 10 ml of leaf juice mixed with 2 to 4 grams of honey, take this mixture orally to treat cough.

Punica granatum L. Least Concern GPKU-52	Dalimba	Lythraceae	Leaf, Fruits, Flower, Root	Juice, Powder	0.06	0.16	Extract juice from flower buds and put two to three drops in the nose to treat nasal bleeding. Flower bud (1) + Leaves *of P. granatum* (5 grams) + Tulsi leaves (5 grams) + **kali mirch** (5 seeds) Boil with water (500 ml) and filter it and then drink to treat cough. 6-7 grams shade Dried leaves crushed and mixed with 500 ml of water or milk to treat worms. Slightly warm fruit juice (10 ml) and mix with 5 grams of sugar and drink to stop vomiting.
Ricinus communis L. Not evaluated GPKU-53	Jada	Euphorbiaceae	Leaves, seed	Juice, oil	0.06	0.12	**Castor** oil is extracted from this plant take 1-3 drops of oil and mix with cold water (300-400 ml) and drink once a day. This remedy helps with constipation, flatulence, and indigestion. Take 2-3 leaves and apply cow ghee to the surface of the leaf then a little beat with flame and then warm the leaf tightly. Apply and bandage in the pain area for some hours this cures rheumatic arthritis and inflammation.
Saraca asoca L. (Roxb.) Willd. Vulnerable GPKU-54	Ashoka	Fabaceae	Flower, Seed, Bark	Juice			Take 3-5 grams of flower add some water and grind it and extract the juice. Then drink this juice once a day to treat Dysentery. Seeds 2 grams grind with water and make juice. This juice is used for 10-15 days to treat kidney stones. Bark (20 grams) with 250 ml water is used to make a decoction. 30 ml of decoction is mixed with honey and drunk in the morning and evening to treat nightfall.
Semecarpus anacardium L.f. Least Concern GPKU-55	Bhelua	Anacardiaceae	Leaf, Fruits	Paste, Fruit	0.03	0.12	Three to four fruits + 10 to 12 **kaju** (fruits of *Anacardium occidentale*) + 1-2 spoons honey mix well and take 2 grams of doses 4 times a day to treat rheumatic fever. Bhelua leaves and neem leaves are boiled with water and made a decoction and drunk 60 ml-65 ml once a day. Fruit is edible.
Sida cordifolia Linn Not evaluated GPKU-56	Bajramuli, Bala	Malvaceae	Leaf, root, and bark	Juice and paste	0.03	0.16	4-5 green leaves + 5-7 **grapes** + 1 glass of water and boil it. Drink tea of this mixture once a day for the treatment of cough. Root powder (1-2 grams) + rock sugar (1 gm) + ghee (1ml) + honey (1ml) and eat to treat throat disorder. Root (5gm) + 1 glass of cow milk and boil it and then add a small spoon of castor oil. Once a day (empty stomach) to treat Hernia. Root, leaf, bark grind and make a paste and apply on the injured part to treat injured healing.
Sphaeranthus indicus L Least Concern GPKU-57	Phul futi, Gorakhmundi	Asteraceae	Whole plant parts are used	Powder, juice	0.06	0.16	Whole plant juice 5 to 10 ml plus cow milk 200ml is taken once a day empty stomach for at least 15-20 days to treat jaundice. 1-2 gm powder and cow milk 100-200 ml taken once everyday morning empty stomach to treat diabetes. Whole plant juice is mixed with water and applied to the skin for 30-60 min and then washed with normal water. Also, juice is mixed with coconut oil and applied to the body to treat skin diseases.
Syzygium cumini (L.) Skeels. Least Concern GPKU-58	Jamukoli	Myrtaceae	Leaf, seed, fruit	Decoction, powder	0.03	0.19	**Jamukoli** leaves (5-10gm) + **mango** leaves (5-10gm) mix with water and make a decoction. Then add 2-3 spoonfuls of honey and drink once a day to treat vomiting. Seeds powder 2-3 spoon mix with water and drink once on an empty stomach for the

							treatment of diabetes. Leaves are used as toothpaste powder. Fruits are good for weight loss.
Tamarindus indica L. Least Concern GPKU-59	Tentuli	Fabaceae	Leaf, Flower	Decoction, Paste, Juice	0.03	0.16	Take leaves (5-10 gm) and make a decoction and 1 gm **Hing** (*Ferula asafoetida)* and 1 gm Black salt mix well and drink at least 4-5 days (once a day) to treat dry cough. Flowers (4-5 gm) grind with water and drink once a day for 7-8 days to treat Piles. Leaf (5-10 gm) grind make a thick paste and apply on the burning area for some hours to treat burns. Fruits are edible.
Terminalia arjuna (Roxb.) Wight and Arn Not Evaluated GPKU-60	Arjuna, Kau	Combretaceae	Bark	Powder, Paste	0.9	0.19	Dry bark is ground and made into powder Take 1-2 gm powder mixed with cow milk one cup in the morning and evening to treat heart disease. 5 gm bark is boiled with 300 ml water and drunk two times a day to treat spermatorrhoea. Bark powder mixed with cow ghee and make a paste and apply on the fracture area and bandage with a cotton cloth to treat a bone fracture.
Terminalia bellirica (Gaertn.) Roxb. Least Concern GPKU-61	Bahada, Behera	Combretaceae	Fruit	Powder, Juice	0.12	0.22	Goat milk (200ml) + *Justicia adhatoda* leaves (5-6) + *Terminalia bellirica* fruits cover and boil it. Then filter it wait for cool and drink it in the morning to treat the cough. Fruit cover crushed and make powder and take 1-2 spoons in morning and evening to treat throat disease. Fruit cover powder mixed with water and massaged in hair to treat hair.
Terminalia chebula *Least Concern* GPKU-62	Harida	Combretaceae	Fruit	Powder	0.16	0.29	Seeds are rubbed in stone with water and applied on the head for some hours then washed with water for the treatment of headaches. Fruit powder 2-5 gm eats with water once a day to cure cough. Take fruit powder 2-5 gm and add ½ spoon of honey and eat 2-3 times a day. Take 5 fruits and boil with 2 glass of water and make a decoction of 1 glass then filter it and drink in the morning and evening for the treatment of dysentery. Take fruit powder and add some water prepare a thick paste apply on the hair and wait for 2-3 hours then wash with water. This remedy is used to hair shiny and black.
Tinospora cordifolia (Thunb.) Miers Not Evaluated GPKU-63	Guduchi	Menispermaceae	Stem, leaf	Decoction	0.45	0.68	Take about 20-22 grams of stem grind them and boil with 4 cups of water. When the amount of water remains one-fourth add a pinch of *Piper longum* & *Piper nigrum* seed powder and add half a spoon of honey. Drink one a day for till the fever stops. Stem juice 2 spoons + curd 1-2 cups mix and eat in the morning and evening for at least 1 week to treat jaundice. Leave juice 2 spoons is mix with two spoons of clarified butter or castor oil. This juice has to be drunk in a day for 10-15 days to treat Rheumatoid arthritis. Leave juice 1 spoon is mixed with old jaggery. This mixture has to be taken on an empty stomach once a day for 8 to 10 days.
Trichosanthes dioica Roxb. Not Evaluated GPKU-64	Potalo	Cucurbitaceae	Leaf	Decoction and paste	0.35	0.48	Take some leaves are fry them with cow ghee for some days to cure eye diseases. Take an equal amount of *Trichosanthes dioica* leaves and *Azadirachta indica* leaves in water and boil them for preparation of decoction. And drink once a day for some months to treat leprosy
Tridax procumbens L Not Evaluated	Bisalayakarani	Asteraceae	Leaf, stem	Juice, paste	0.54	0.67	Leaves (5-10 gm) grind and make juice and then apply and bandage with cotton and it stops bleeding and is used in wound healing. Leaf (10-20 gm) grind and take this

GPKU-65							juice 2 spoons after meal twice to treat dysentery. Leaf (20 gm) boil with 400 ml water and when ¼ juice is prepared then take 5-10 ml in the morning and evening to treat malaria. Leaf 5 -10 gm grind make a paste and apply on the face at least for 30 minutes to treat pimples.
Vachellia nilotica (Lam.) Least Concern GPKU-66	Babula	Fabaceae	Leaf, Fruits	Powder	0.06	0.16	Fruits powder 1 spoon swallow with 1 glass of warm water once a day on an empty stomach for 1-2 months for the treatment of joint pain. Take (5-10) leaves and chew and eat every morning on an empty stomach for the treatment of nightfall. Stems are used for toothbrush sticks by tribal peoples.
Vernonia amygdalina Delile Not Evaluated GPKU-67	Tikta patra, pita patra	Asteraceae	Leaf	Juice	0.25	0.32	Take 2-3 leaves (green) and chew and eat in the morning empty stomach daily to treat diabetes. Take 2-4 leaves and boil with water and make a tea. Take this tea daily before meals to treat diabetes.
Vitex negundo L. Least Concern GPKU-68	Nirgundi	Lamiaceae	Leaf	Decoction	0.30	0.51	20 grams of leaves are boiled with 400 ml of water to make a decoction. When the amount of water remains 100 ml filter it and take 10-20 ml each time to treat *Pneumonia* fever. Take some leaves grind and make a paste and then mix with a pinch of turmeric powder and apply on the cut area
Wrightia antidysenterica (L.) Wall. Not Evaluated GPKU-69	Kurei	Apocynaceae	Bark	Powder, paste	0.06	0.16	The bark is grind and made into a paste Take 8-10 gm. Mix with 1 spoon of honey and drink twice a day. 2-4 gm. Dried bark powder is taken with water (250 ml). Tribal people eat rice and curry in these leaves.
Zizyphus mauritiana Lam. *Not evaluated* GPKU-70	Buro, Ber	Rhamnaceae	Bark, Leaf	Paste, Raw	0.25	0.35	Take a small piece of bark and make a paste and then apply it on the head for some hours or till relief from the headache then wash with water for the treatment of headache. Take 10- 15 grams of leaves and fry with ghee and then make a paste and add some salt and eat once a day for the treatment of cough. Daily eating 4-5 Fruits of *Z. mauritiana* can help to improve skin.

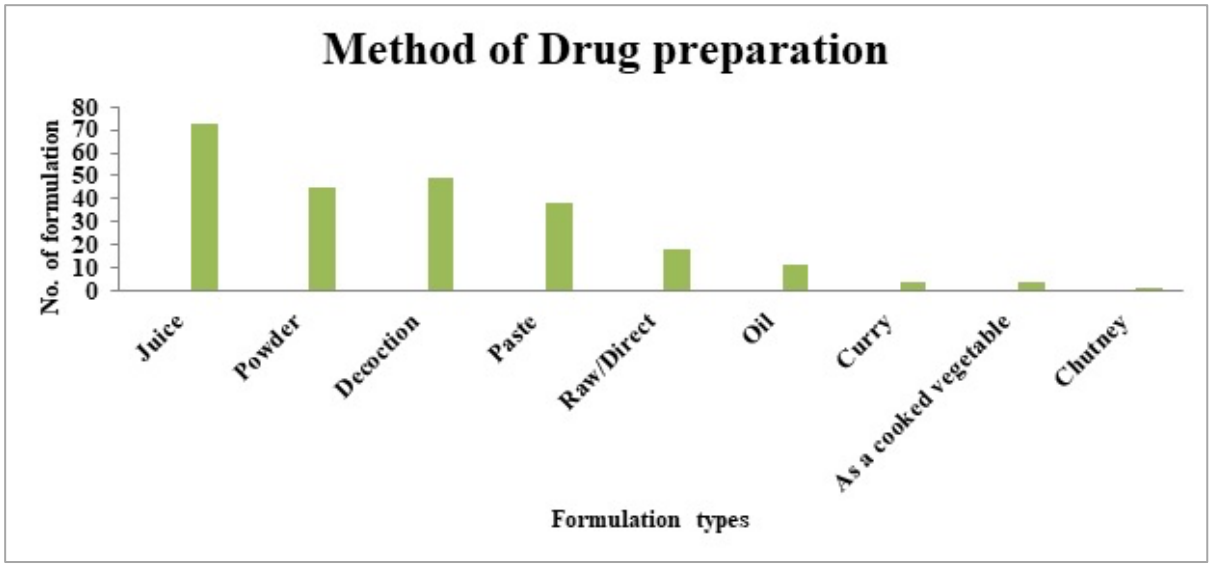

Figure 3. Method of drug preparation

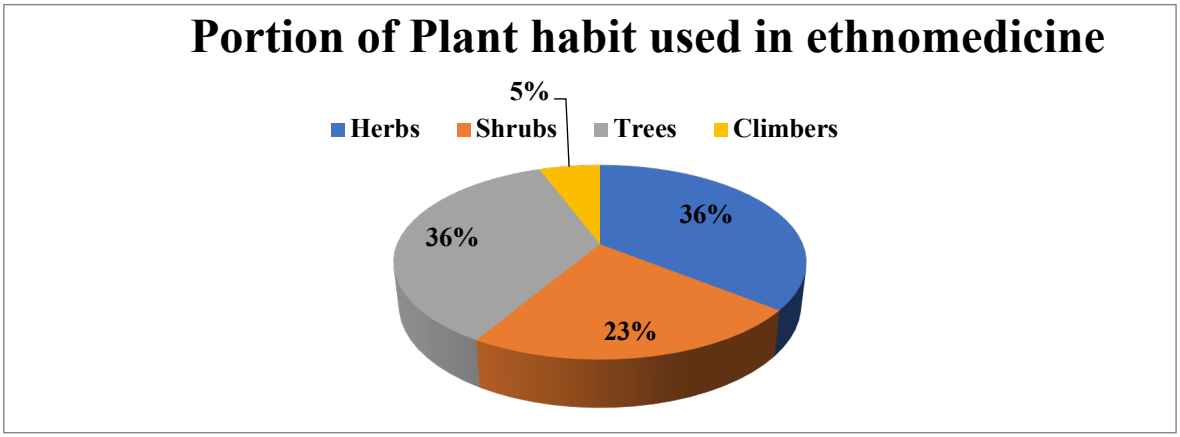

Figure 4. Portion of Plant habit used in ethnomedicine

A total of 60 plants from 31 families are used for ethnomedicinal purposes. Fabaceae was the largest family used for ethnomedicinal purposes holding 13% followed by Asteraceae 6% and Lytheraceae and Poaceae which account for 4% of plants. Fabaceae in other parts of the world also contribute major significance to the ethnomedicinal formulation (Soldad et al. 2012, Macedo et al. 2018). The percentage of contribution of plant families is given in Figure 5. Leaves (41.86%) are the most popular part of plants used in ethnobotanical preparation followed by fruit (14.42), root (9.77%), bark (8.84%), whole plant (7.44%), stem (5.12), flower (4.65%), seed (4.65%), milky latex (2.79%) and inflorescence (0.47%). In previous ethnobotanical studies, leaves are considered a favourable portion of ethnobotanical practices similar to the work of previous ethnobotanists (Faruque et al. 2018, Pradhan et al. 2020). Leave can be available throughout the year, and can be easily harvested so it may be also one of the reasons that healers prefer to leave more than any other plant part (Giday 2009). Ghorbani (2005) highlighted that leaves possess active compounds and are relatively easier to study for their phytochemical and pharmacological properties, making them a popular choice for the preparation of herbal medicines. Additionally, leaves play a significant role in the production of food and metabolites. Fruit is another popular choice for making ethnobotanical formulations. Several studies showed that fruit possess various polyphenols, flavonoids phenolic compounds, and anthocyanins (Banerjee et al. 2017, Yalcin & Çapar 2017, van Breda & de Kok 2018, Fidelis et al. 2019, Kelly et al. 2019, Karasawa & Mohan, 2018, Marli et al. 2018). It is also noted that various antioxidant and antimicrobial agents are present in seeds, flesh, peels, or pulp waste which can promote human health and well-being (Park et al. 2014, Chougui et al. 2015, Chen et al. 2017, Zafra-Rojas et al. 2018, Saleem & Saeed, 2020). Although the residents and tribal people do not know this reason still they believe that fruit is an important food material to maintain good human health. After fruit, the higher percentage was carried by root. It was found in previous research roots accumulate more bioactive compounds than the other parts of the plant (Basualdo et al. 1995). Adding rock sugar, honey, and jaggery in an ethnobotanical formulation was recorded. The main objective is to reduce the bitterness of the drug so that patients can take medicine easily this practice

has also been reported in previous studies (Balangcod & Balangcod 2011, Chander et al. 2014, Silambarasan & Ayyanar 2019). In this study, it has been observed that tribes sometimes add two herbs or plant parts to increase the efficacy of the drug. The same result was also reported in previous studies (Tripathi & Sikarwar, 2013).

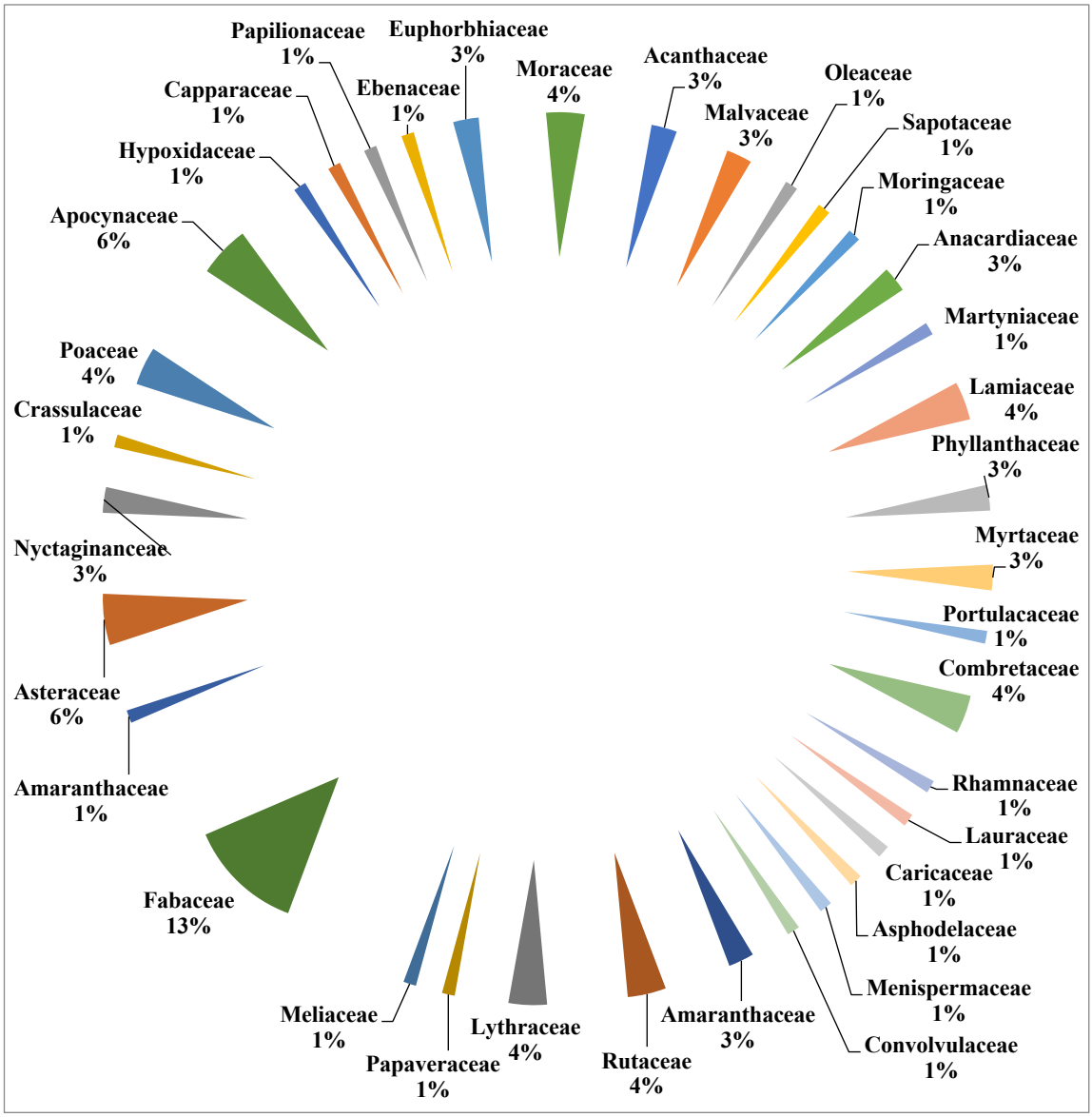

Figure 5 Distribution of plant families used in ethnobotanical drug preparation

Relative Frequency of Citation (RFC)

The relative frequency of citation of any plant species shows the popularity of that particular plant. It also denotes the availability, and effectiveness against ailments with zero or fewer side effects (Kayani et al. 2015, Vitalini et al. 2013). The relative frequency of citations ranges from 0.03 to 0.54. The highest relative frequency of citation was reported for *Tridax procumbens* (0.54) followed by *Ocimum sanctum* (0.51), *Boerhavia diffusa* (0.38), *Cynodon dactylon* (0.38), *Azadirachta indica* (0.25), *and Citrus ourantifolia* (0.25) whereas minimum RFC reported in *Achyranthes aspera (0.03), Alternanthera sessilis* (0.03)*, Ageratum conyzoides* (0.03), and *Capparis zeylanica* (0.03).

Use value (UV)

The use value (UV) indicates the frequency of use reports cited by respondents. A higher use value for a plant species signifies its greater prevalence in a specific area, making it more familiar and likely to be gathered compared to plants that are rarely encountered (Giday et al. 2003, Kunwar et al. 2019). The highest UV was recorded for *Tridax procumbens* (0.67), *Ocimum*

sanctum (0.61), and *Cynodon dactylon* (0.54) whereas the lowest *Ammania baccifera* (0.09), *Portulaca oleracea* (0.09) and *Acyranthes aspera* (0.12).

Informant Consensus Factor (IFC)

The Informant Consensus Factor (ICF) is a measure used in ethnobotany and ethnomedicine to assess the degree of agreement among informants regarding their knowledge of plants and their uses in a particular community or culture. It provides a quantitative estimate of the shared knowledge and consensus within a group of informants (Madikizela et al. 2012, Raghupathy et al. 2008). The highest ICF value was recorded in Neurological and Psychological disorders (1.00) followed by Fever cold and cough category (0.95), musculoskeletal disorders (0.92), and the minimum ICF value was recorded in Hormonal disorder (0.58). Table 3 shows the categorization of diseases. The value of ICF of each disease category is given in Table 4.

Table 3. Categorization of diseases and their associated symptoms

Name of Category	Associated Diseases and Symptoms
Circulatory System and Cardiovascular Disorders	Blood pressure, Blood purification, Heart diseases, Blood clotting in Vessels, Anemia
Cut and Wounds	Sprain, Injury Wound, Joint Pain,
Dental	Gingivitis, Pyorrhea, Bleeding gums, Mouth ulcer
Dermatological disorders	Pimple, Boil, spots on the skin, Hair fall, Skin allergy, skin disease, skin infection
Ear, Nose, and Throats problems	Earache, Nose-bleeding, Goitre
Fever, Cough, and Cold	Cold and cough, Nasal Congestion, Sore pain, Decongestants, Headache,
Gastro-intestinal Disorders,	Anorexia-nervosa Abdominal pain, Constipation, Piles, Indigestion, Stomach Cramps, Vomiting, Liver diseases, Obesity, Stomach pain, Stomach worms, Hernia, Acidity, stomach disease, flatulence
General Problem	Snakebite, insect and animal bite, General debility, Memory Boosting, Sleeping problems, vomiting, Scorpion bite, body pain, Heatstroke, weakness, Burn, Hunger increase
Hormonal Disorder	Diabetes
Inflammation	Migraine, Swelling
Microbial Infection	Malaria, Typhoid, Kidney Infection, Dysentery, Cholera, Jaundice, Diarrhea
Musculoskeletal disorders (MSDs)	Joint Pain, Neck Pain, Back Pain, Arthritis, Bone fracture
Neurological and Psychological Disorders	Insomnia
Ophthalmological Diseases	Night Blindness
Respiratory Disorder	Asthma, Bronchitis, Pneumonia,
Urogenital Disorders	Sexual disease, boosting of sexual stamina, Frequent urination, bleeding, Gonorrhea, Kidney stone, Frequent urination, urinary disease, irregular mensuration

Table 4. Categorization of diseases and their associated symptoms

Name of Category	Use report	Number of Taxa	ICF Value
Circulatory System and Cardiovascular Disorders	17	5	0.75
Fever, Cough, and Cold	134	32	0.77
Cut and Wounds	111	7	0.95
Ear, Nose, and Throats problems	17	5	0.75
Dermatological disorders	131	23	0.83
Urogenital Disorders	114	12	0.90
Ophthalmological Diseases	41	8	0.83
Respiratory Disorder	43	6	0.64
Dental	42	5	0.83
Musculoskeletal disorders (MSDs)	90	8	0.92

Gastro-intestinal Disorders,	124	25	0.80
General Problem	105	23	0.79
Microbial Infection	161	16	0.91
Hormonal Disorder	51	22	0.58
Inflammation	89	16	0.83
Neurological and Psychological Disorders	17	1	1.00

Majorly tribes use plants for fever colds and coughs, gastro-intestinal and dermatological ailments. *Tridax procumbens* is used for the treatment of cuts and wounds and previously it was reported by Silambarasan & Ayyanar (2015) who reported the same thing with 17 use reports and 0.85 RFC value of that plant. The first-time new uses of *Saraca asoca* were recorded during the study which were not reported earlier. A previous study that was conducted in Gandhamardan mountain hills only listed ethnobotanical uses of 33 plant seeds found in this area (Misra 2003). Another study which was conducted in this region is also concise and reported 30 medicinal plants used in ethnobotany (Karmee et al. 2020)

Plates 1 and 2 show pictures of plants used for ethnobotanical purposes in this region. The documented ethnobotanical evidence was compared with previously published ethnobotanical studies. All the listed plants were collected from home gardens, crop fields, farms, river shore roadside, hilly areas and forest areas. The distribution of ethnomedicinal plants in different locations is given in Figure 5. Majorly plants are collected from the roadside and the least from home gardens. *Saraca asoca* was listed as the Vulnerable category found in the home garden whereas *Aegle marmelos* was listed as Near Threatened category found in the roadside**.** Roadside vegetation often faces significant stress due to construction and various anthropogenic activities including pollution, soil compaction, habitat fragmentation, physical damage, reduced water availability, invasive species and soil erosion. Residents of these villages and sites are quite literate but they know the importance of plants. From time to time, traditional healers tell people about the medicinal uses of these plants, but due to awareness, people do not pay attention to these things.

Presently, ethnomedicinal knowledge is on the verge of extinction. Due to increasing modern-day healthcare facilities, the low income of traditional healers is the main reason behind it. In many cases, traditional healers are hesitant to disclose the preparation methods and uses of plants, fearing that it could negatively impact their income or job. Similar challenges were encountered during this study, but after the author's persuasion, the healers eventually shared this valuable information. Unfortunately, vital ethnomedicinal knowledge often remains concealed due to the lack of sharing. This trend is prevalent in numerous ethnomedicinal studies, including the current one, where the primary custodians of such knowledge are elderly individuals who may pass away due to age-related factors or illnesses. This study also observed and documented these concerning trends. Preserving this knowledge through ethnobotanical studies is essential to ensure that the medicinal benefits of plants are accessible to future generations.

Conclusion

The present study communicates ethnobotanical practices popular among the resident and tribal people of several villages of the Gandhamardan mountain chain. Several ethnomedicinal uses of plant communities found here were recorded. Most of the participants were old and some of them had been doing this job for more than 30 years. As modernization goes on people prefer allopathic medicine because of quick response. Their offspring are not willing to do this job due to low income so it may be possible ethnobotanical knowledge may be eradicated. This manuscript provides detailed information about the ethnomedicinal uses of plants found in this region with the proper inventory. To the best of our knowledge, this is the first quantitative ethnobotanical study in this study area indicating UV, ICF, and RFC. If future researchers want to explore the pharmacological activities of the listed plant, an inventory of ethnomedicinal preparation in this manuscript will be helpful in their drug discovery method or they will find some clue or evidence on the basis they can perform their study well. By documenting and storing this valuable information, we can guarantee that our descendants can continue to harness the healing potential of these plants or extract biomolecules from these plants of therapeutic importance for treatments of different ailments and diseases.

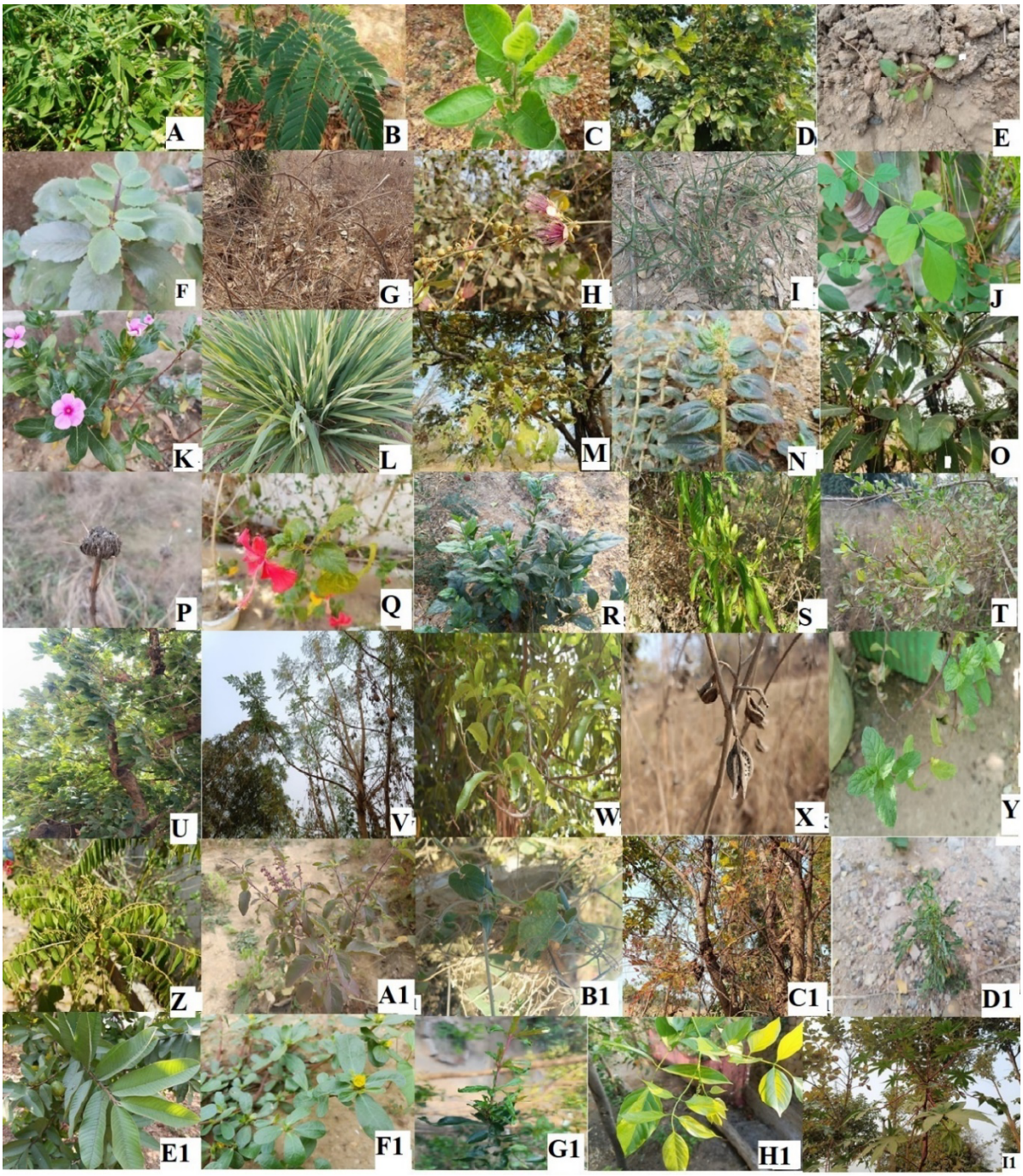

Plate 1. Pictures of a plant used in ethnomedicinal preparation

(A)*Alternanthera sessilis*, (B) *Albizia lebbeck*, (C) *Ageratum conyzoides*, (D) *Bauhinia acuminate*, (E) *Boerhavia diffusa*, (F) *Bryophyllum pinnatum* (G) *Cassia tora* (H) *Capparis zeylanica* (I) *Cynodon dactylon*, (J) *Clitorea ternatea*, (K) *Catharanthus roseus*, (L) *Cymbopogon citratus*, (M) *Diospyrus melanoxylon*, (N) *Euphorbia hirta*, (O) *Ficus racemosa*, (P) *Hygrophila auriculata*, (Q) *Hibiscus rosa-sinensis*, (R) *Jasminum sambac*, (S) *Justicia adhatoda*, (T) *Lawsonia inermis*, (U) *Madhuca longifolia*, (V) *Moringa oleifera*, (W) *Mangifera indica*, (X) *Martynia annua*, (Y) *Mentha piperita*, (Z) *Murraya koenigii* (A1) *Ocimum sanctum*, (B1) *Pergularia daemia*, (C1) *Phyllanthus emblica*, (D1) *Phyllanthus niruri*, (E1) *Psidium guajava*, (F1) *Punica granatum*, (G1) *Portulaca oleracea*, (H1) *Pongamia pinnata* (I1) *Ricinus communis*

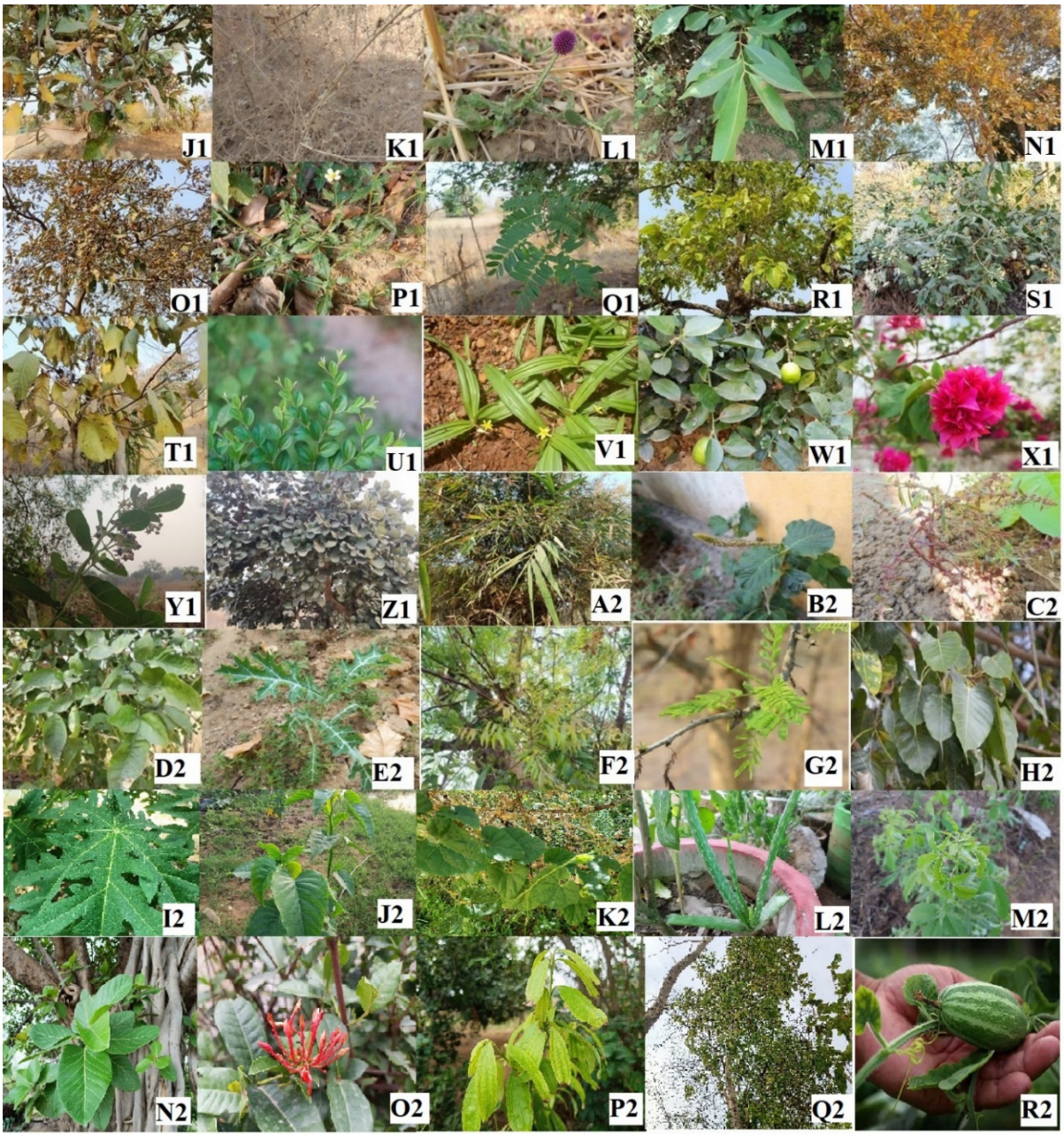

Plate 2. Pictures of a plant used in ethnomedicinal preparation

(J1) *Semecarpus anacardium*, (K1) *Sida cardifolia*, (L1) *Sphaeranthus indicus*, (M1) *Syzygium cumini*, (N1) *Terminalia arjuna*, (O1) *Terminalia bellirica*, (P1) *Tridax procumbens*, (Q1) *Tamarindus indica*, (R1) *Terminalia chebula*, (S1) *Vernonia amygdalina*, (T1) *Wrightia antidysenterica*, (U1) *Zizyphus mauritiana*, (V1) *Curculigo orchiodes* (W1) *Citrus aurantifolia*, (X1) *Bougainvillea glabra* , (Y1) *Calotropis gigantea*, (Z1) *Butea monosperma*, (A2) *Bambusa vulgaris* (B2) *Achyranthes aspera*, (C2) *Ammannia baccifera* (D2) *Aegle marmelos*, (E2) *Argemone mexicana* (F2) *Azadirachta indica*, (G2) *Vachellia nilotica*, (H2) *Ficus religiosa,* (I2) *Carica papaya,* (J2) *Ipomoea carnea,* (K2*) Tinospora cordifolia* (L2)*Aloe vera,* (M2) *Vitex negundo,* (N2) *Ficus benghalensis,* (O2) *Saraca asoca,* (P2) *Cinnamonum tamala,* (Q2) *Dalbergia sissoo* (R2) *Trichosanthes dioica*

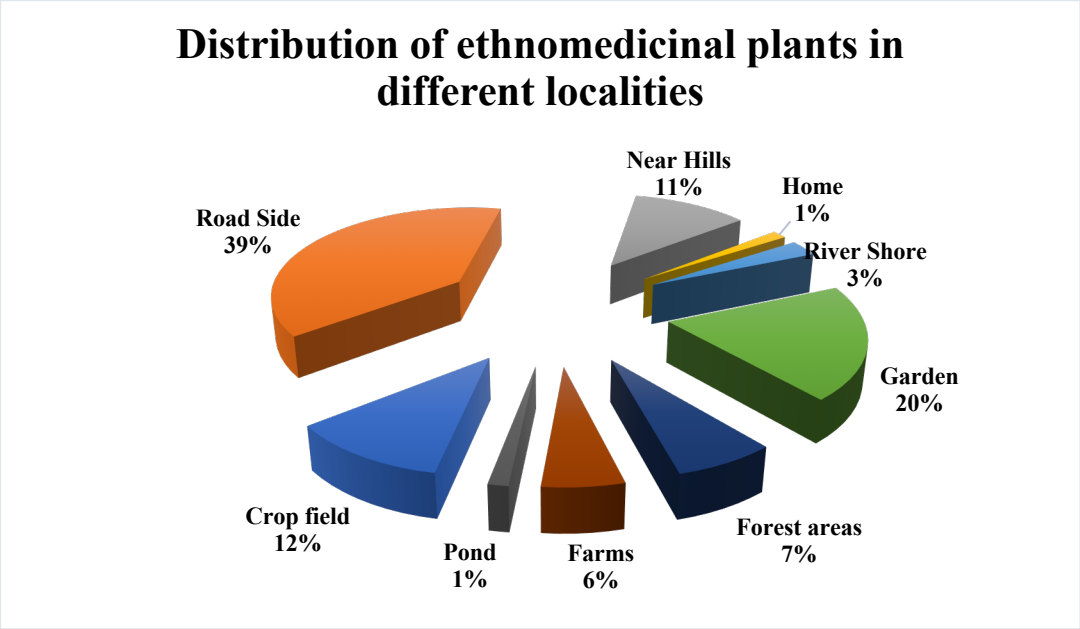

Figure 6. Distribution of ethnomedicinal plants in different localities

Declarations

List of abbreviations: ENT: Ear nose and threat, IFC: Informant consensus factor, UV: Use value, RFC: Relative frequency of Citation, IUCN: International Union for Conservation of Nature

Ethics approval and consent to participate: A permission letter was taken from the Divisional Forest Officer Bargarh District, Odisha India before data collection. All the informants were given oral consent for publishing their information.

Consent for publication: Not applicable

Competing interest: Authors have no conflict of interest between them.

Availability of data and materials: The voucher specimen and ethnobotanical questionnaire form were submitted to the Department of Botany, Kalinga University Raipur Chhattisgarh, India. The corresponding author can provide the data upon a specific request.

Authors' contribution: AKP designed the research. SP collected the data from the field, semi-structured interviews, and preparation of voucher specimens done by SP. Analysis of data and writing of the manuscript were performed by AKP. FB performed a critical analysis and revised the manuscript.

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