



Ethnomedicinal Documentation of Folk Medicinal Plants Used by Tribal Communities Living in the Selected Villages of Pushprajgarh Block of Anuppur District, Madhya Pradesh, Central India

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Abstract

The present work documents indigenous knowledge of plants as a natural remedy by the inhabitants of Pushprajgarh tehsil, District Anuppur in Madhya Pradesh, Central India. This study was conducted by following standard ethnobotanical methods. Questionnaires, informal meetings, and group conversations with pre-identified informants were used to collect knowledge on medicinal plants. The present investigation documented 98 plant species belong to 51 families and 90 genera. The Fabaceae family, which includes 10 species, comprises the most of medicinal plants. Habit analysis of medicinal plants uncovered that trees represented the most proportion of 39 plant species (39.79%) and that decoction (boiling) was the most popular technique of preparing traditional medicines from plant material (44.34%). The highest informants' consensus factor (ICF) was accounted for the urinary disorder (0.60), and the highest outcome was recorded for the microbial infection (20.25%). The fidelity level (FL) results for 10 significant plant species were ranged from 40.86% to 75.00%. Most of the plants have had a use value, ranging between 0.25 to 1, hence a constant use value for the most referred species is one. The frequency of citation (FC) of the selected plant species was found to be in the range of 1.85 to 6.48 and the relative frequency of citation (RFC) was found to be in the range of 0.04 to 0.12. Statistical analysis shows that current knowledge is still viable and facilitates conserving important plant species before much is lost. This study will provide basic information for further phytochemical/ pharmacological research to explore potential lead molecules for new drug development and discovery process from natural products.

Keywords: Folk medicinal plants; Traditional healers; Pushprajgarh block; Documentation; Field data

Introduction

For millennia, ethnic medicinal plants have been used for therapeutic purposes, and knowledge about therapeutic plants has been amassed over many years in various classical medicinal systems like Unani, Siddha and Ayurveda [1]. The Rig-Veda is a text that represents the oldest human knowledge of medicinal

plant applications in India, dating from 4500 BC to 1600 BC. A medicinal plant has been employed several times, both in rural and metropolitan regions. There are more than 2500 medicinal plant species employed by traditional practitioners in India [2].

As per the World Health Organization, practically 80% of the total population, particularly in rural and

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backward tribal regions, relies on naturally occurring medication for healthcare. In the development of indigenous medicines, using medicinal plants to treat both acute and chronic ailments offers a significant economic advantage [3]. Because they are the easiest link in the medicinal plant trade, most people, particularly in rural areas, are still driven to use traditional remedies for their everyday requirements due to a lack of information, poverty, ignorance, and the absence of modern facilities [4].

In emerging nations, traditional medicinal plants offer a valuable primary health care because of the absence of advanced technological infrastructure and resources for health facilities [5]. Traditional medicinal plants are currently vital for mending individuals' lives and wellbeing in ethnic minority districts, particularly in rural and impoverished areas [6]. Ethnomedicine can be characterized as "the interdisciplinary scientific investigation of therapeutically active compounds that have historically been used". Consequently, the ethnomedicinal and pharmacological methodology is a combination of a few disciplines, like chemistry, botany, and pharmacology [7]. This incorporates field explorations, images of folk medicinal plants and their bioactivities, botanical identification, and phytochemical and pharmacological research. Many scholars have been interested in indigenous medicines and their potential advantages for a long time [8,9].

Proper exploitation of ethnobotanical knowledge may lead to the development of a potential lead molecules from natural sources. Natural products such as plants, minerals and animals, have long been used to heal a range of ailments. Pharmacognostic, phytochemical, and pharmacological investigations of folk medicinal plants have recently received a lot of attention [10]. Furthermore, several preclinical and clinical examinations have explored the therapeutic potency of several medicinal plants, in the past. Medicinal plants containing biodynamic compounds are gaining popularity in ethnomedicine [7]. As a result, several pharmaceutical firms have re-evaluated their natural product research methods to find new sources of biologically active agents for drug discovery process. Ethnopharmacological knowledge, along with modern experimental techniques, might support the discovery and improvement of new biomolecules as a safe, and acceptable medicines [11]. Therefore, ethnomedicinal features of medicinal plants, as well as the plant-based therapeutic preparation techniques and significant problems associated with their use, will be addressed in this study. Because this geographical region is rich in plant diversity and tribal people, we chose several villages in the Pushprajgarh block, Anuppur district, and surrounding areas for ethnomedicinal study [12]. Furthermore, other plant applications, such as the use of oral traditions for the management of health issues of so-

cial and domestic pet animals utilizing ethnomedicine are most common among the local tribal people of this study region [13]. They have a wealth of knowledge about therapeutically important medicinal plants and their utility, which are mostly unwritten and passed down orally from one generation to another. Hence, recording ethnic and outdated traditional knowledge is crucial for future research leading to sustainable natural resource utilization and overcoming challenges like bio-piracy and patenting of traditional knowledge by others. Therefore, in light of these factors, the main objectives of the preset study is (A) Identification and documentation of traditional medicinal plants that are utilized by the local tribes for the treatment of various diseases, in the study region. (B) Statistical analysis of the most well-known therapeutic plant species used to treat and manage various diseases by local tribes. (C) To determine the degree of agreement among the participants on the utilization of specific/selected medicinal plant(s) for their therapeutic purpose.

Materials and Methods

Study area

The current study region includes selected villages of Pushprajgarh tehsil of Anuppur District of Madhya Pradesh, Central India. It lies between 22° 56' 9.38" N and 81° 36' 1.99" E geographical limits with 1,652 km² area. The Pushprajgarh block is surrounded by the district of Umaria in the northwest; Shahdol region in the north upper east; Jaithari tehsil in the east; Chhattisgarh in the southeast; and Dindori in the south, south-west, and west (Figure 1). The main purpose of the present study is to identify and document the traditional knowledge of ethnic medicinal plants used by 15 tribal villages in the Pushprajgarh area. Most of the people, in this region, belongs to tribal communities and have excellent knowledge on the uses of therapeutically important medicinal plants. Most prominent tribes living in this area are the Baiga tribes and the Gond tribes, who depends on forest or forest products for their daily lives [16]. In the Anuppur district, the normal annual rainfall is 1235.0 mm. The south-west monsoon, which lasts from June to September, brings the most rain to this area. The monsoon season receives around 89.3% of the annual rainfall. The usually recorded normal minimum temperature of this region was 8.4° C during the month of December, and the maximum temperature is 41.3° C during the month of May [17].

Ethnic data collection

A field study was conducted during January to April, 2021 to gather the ethnobotanical data of medicinal plants utilized by tribal communities living in the villages in the Pushprajgarh tehsil of District Anuppur,

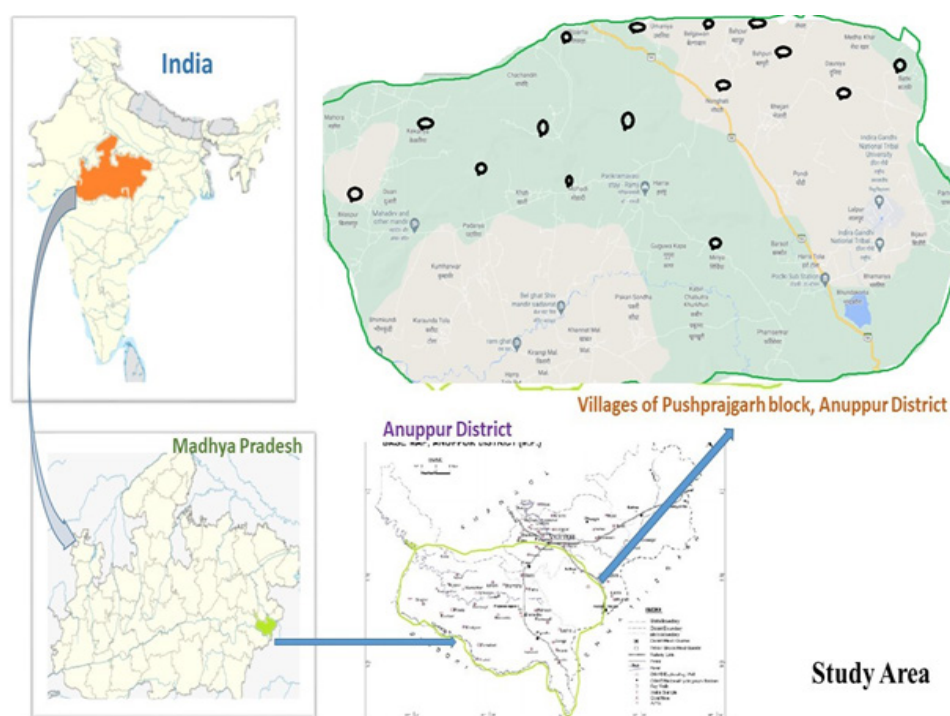


Figure 1. Map of the study area

Madhya Pradesh, Central India [14,18]. The study was conducted by means of semi-structured interview with the participants or informants who have ethnic information related to traditional medicinal plants [19]. The information recorded during the interaction with tribal people includes the names, ages, and educational qualifications of informants, tribal and vernacular names of utilized plants, part of the plants used, disease treated, and mode of administration, including duration of treatments etc., We additionally recorded the geographical region and date of the meeting with the informants [20]. Purposive sampling was applied to the field investigation, where local residents and shop keepers of the villages have assisted in recognizing local health care practitioners (vidyas) in 15 villages, namely Bahpur (Dadra tola), Bahpuri, Basti Bandha, Batki, Belgawan (Thurki), Bhalva tola, Bilaspur, Dakiya tola, Haveli, KerhaJaitarhi, Khajurvar, Khurkhuri Dadar, Mircha Dadar, Miriya, and Umaniya belongs to study area. Group discussion was conducted with the local tribes of this region, for the preservation of traditional knowledge of medicinal plants as well as threats to them [1]. The informants were selected randomly who were living in different villages and gram panchayats of Pushprajgarh tehsil of District – Anuppur [21]. An aggregate of 57 participants, including men and women, were met in the current study. Among these, most traditional practitioners have key information on the utilization of medicinal plants, some of these were local village heads, agricultural workers, medicinal plant collectors and

others in the study region [14]. The informants were local dwellers of the age between 20 to 80 years old and were interviewed in the local language only. Before conducting interviews with the informants, ethical permissions were obtained from the district forest and other regulatory bodies [22].

Plant specimen collection and identification
With the assistance of traditional healers, field investigators have conducted field observations to classify each medicinal plant species based on morphological characteristics. The habits and habitats of folk medicinal plants were captured using photographs in the field and/or from home nurseries [23]. Voucher specimens were created for the same and stored in the “Department of Pharmacy, Indira Gandhi National Tribal University, Amarkantak,” India, for future reference. According to the approach proposed by Elton & Fairthorne, 1937 and updated by Brown, 1977, the plant life forms were grouped into trees, shrubs, herbs, and grasses (annual, biennial or perennial) [24]. The medicinal plants were identified/confirmed on the basis of photographs and voucher specimens, and also according to Flora of India. The botanical websites like the plant list (www.theplantlist.org), the international plant name index (<http://www.ipni.org>) and the GRIN taxonomy site (<http://www.ars-grin.gov/cgi-bin/npgs/html/queries.pl>) were also used for the identification and documentation, and the families of plant follow the A.P.G. system [25]. At last, the identified plant specimens were reconfirmed by plant specialists from

the department of Botany, IGNTU.

Data analysis

To evaluate the importance of folk medicinal plants that were identified in the present investigation, statistical methods such as Informant Consensus Factor, Fidelity Level, Jaccard's Similarity Coefficient, Use Value, Frequency Citation and Relative Frequency Citation were used.

Informant consensus factor (ICF)

According to Heinrich et al., 1998 the ICF was computed to assess the efficacy of therapeutic plants in each illness category. The formula is provided below [26]:

$$ICF = (Nur - Nt) / (Nur - 1)$$

Nur, = the numeral of a single report of a plant used for a specific disease category, and
Nt, = the total number of species utilized for disease categories by all informants [1].

The range of ICF value are between 0.00 to 1.00, where low ICF value indicates that informants differ on which medicinal plant to employ in the event of a certain ailment, whereas a high ICF value suggests that a big number of limited plant species are utilized for the treatment of a specific disease condition by a considerable number of informants [14,27].

Fidelity Level (FL)

The FL was computed for each of the 10 preferred plant species based on the number of key informants who mentioned them in treating specific illnesses [27,28]. The formula is provided below:

$$FL = N_p / N * 100$$

N_p, is the total number of informants cited using a specified plant species for a particular disease and N is the total number of informants who used a specific plant as a medicine [29].

Jaccard's coefficient of similarity (JCS)

JCS is a comparative statistical analysis; in this study, similarity values with other areas previously examined by other researchers in other regions are calculated and compared to the current study [30]. The formula for calculating JCS is as follows:

$$JCS = c / (a + b - c)$$

'a' is the number of species found in area A, 'b' is the number of species found only in area B and 'c' is the number of common species found in areas A and B [31].

Use Value (UV)

Use value is a statistical quantitative measure used to determine the relative importance of plant species applications [32]. The formula used to calculate the UV, as given below:

$$UV = \sum U_i / N$$

Where, U_i = the number of recorded use for a given plant species, and N = the all informants who reported that plant species [33].

Frequency Citation (FC) and Relative Frequency Citation (RFC)

For better relative expression of citation of medicinal plant species, FC was obtained using the following formula [34].

FC = (Number of times a particular species was cited / total number of times that all species were cited) × 100. The Relative Frequency Citation (RFC) was determined by the following formula-

$$RFC = FC / N \quad (0 < RFC < 1).$$

This index is calculated by dividing the number of informants stating the frequency of citation of a useful species by the total number of informants in the survey [35].

Results

Demographics of the informants

A total of 57 informants, including 56 men (98.25 %) and 1 woman (1.75 %) belonging to different villages of Pushprajgarh block, Anuppur district, agreed to participate in the present study. Table 1 indicates the data of informants regarding their age, gender, and educational level. The local vidyas hold a good command on the uses of medicinal plants for the treatment or management of various ailments. The youngest informant's age was found to be 20, and the eldest informant's age was found to be 80 years old. The other age informant's frequency classes include, 20-30 (3.51 %), 31-40 (26.32 %), 41-50 (19.30 %), 51-60 (24.56 %), 61-70 (21.05 %), 71-80 (5.26 %), as shown in figure 2. A much information related to the uses of traditional medicinal plants and their preparation techniques were collected from the informants whose age range were 30 to 70 years of old, and most of them have had only secondary school education or less, and they frequently speak either Hindi or their local tribal language. Young informants between the ages of 20 and 30 provided little or no information. Most of the informants were illiterate (36.84 %) followed by primary education (29.82%), traditional education (15.79 %), secondary education (14.04 %), and higher education (3.51 %), were recorded as shown in figure 3. This suggests that illiterates provided more information about the application of traditional medicinal plants than educated informants. This may be related to lifestyle changes due to modernization, lack of interest in youths to learn traditional skills, increased use of modern medicines, and imitation of urban lifestyles [14,36].

Medicinal plant species information

In the present investigation, a total of 98 plant species from 90 genera and 51 families were recorded. Traditional information for each species of medicinal plant, which includes its scientific name, local name, family, No. of species and Genera, % ratio of species, habits, habitat, and use value are presented in table 2. The maximum percentage of medicinal plants belong to Fabaceae family, represented by 10 species, followed by Asteraceae 6 species, Moraceae 5 species, Apocynaceae, Vitaceae, and Zingiberaceae 4 species each, Combretaceae, Cucurbitaceae, Euphorbiaceae, Liliaceae, and Malvaceae with three species each. Further, plants from other families were also presented either two or only one species. Finally, the results reveals that plant species belonging to Fabaceae family represent the highest percentage (10.20%) in the management or

treatment of various diseases and followed by Asteraceae (6.12%), Moraceae (5.10%), Apocynaceae, Vitaceae and Zingiberaceae (4.08%), and other families, which were less than 3.06 % of their percentage ratio [37].

Habit analysis of Medicinal Plants

The habit analysis of medicinal plants in the study region reveals that the majority of the medicinal plants belongs to trees with 39 plant species (40%), followed by herbs (species) 36 (37%), shrub (species) 13 (13%) and climber species with 10 (10%). Figure 4 represents the distribution pattern of numerous medicinal plant species in different villages of Pushprajgarh tehsil, District Anuppur, Madhya Pradesh, Central India. Consequently, a wide variety of plant parts like stems, roots, rhizomes, fruits, flowers, barks and leaves were used for medicinal purposes [14,21].

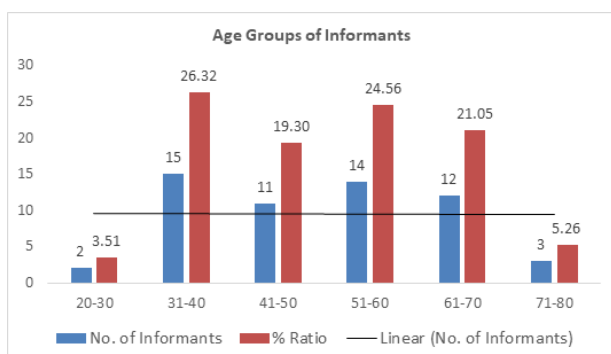


Figure 2. Different age groups of informants

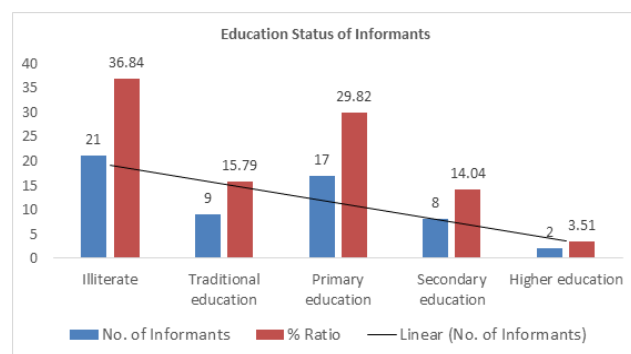


Figure 3. Education status of informants

Table 1. Demographic data of the informants in the study area

Indicator	Sl. No.	Description	Count	%	Expected Mean Observation
Gender	1	Male	56	98.25	28.5
	2	Female	1	1.75	28.5
Age	1	20-30	2	3.51	9.5
	2	31-40	15	26.32	9.5
	3	41-50	11	19.30	9.5
	4	51-60	14	24.56	9.5
	5	61-70	12	21.05	9.5
	6	71-80	3	5.26	9.5
Education	1	Illiterate	21	36.84	11.4
	2	Traditional education	9	15.79	11.4
	3	Primary education	17	29.82	11.4
	4	Secondary education	8	14.04	11.4
	5	Higher education	2	3.51	11.4

Table 2. Plant Species information in the study area

Sl. No	Family	Species	Genera	% Ratio of species	Name of the plants in local language	Scientific name/ Family	Habit	Use Value (UV)
1	Acanthaceae	1	1	1.02	Bhuneem	<i>Andrographis paniculata</i> (Burm.f.) Nees	H	1
2	Amaranthaceae	1	1	1.02	Chirchira	<i>Achyranthes aspera</i> L.	H	1
3	Anacardiaceae	2	2	2.04	Aam/Amba	<i>Mangifera indica</i> L.	T	0.25
					Bhelma/Bhelva	<i>Semecarpus anacardium</i> L.f.	T	1
4	Apocynaceae	4	4	4.08	Akwan	<i>Calotropis gigantea</i> (L.) R. Br. exait.	S	1
					Dudhiya	<i>Hemidesmus indicus</i> (L.) R.Br.	C	1
					Sarpgandha	<i>Rauvolfia serpentine</i> (L.) Benth. ex Kurz	H	1
					Koraya/Kuruchi	<i>Holarrhena pubescens</i> Wall. & G. Don	T	1
5	Araceae	2	2	2.04	Vache	<i>Acorus calamus</i> L.	H	1
					Suran/Jamikand	<i>Amorphophallus campanulatus</i> Decne.	H	1
6	Arecaceae	1	1	1.02	Chheer Jad	<i>Phoenix sylvestris</i> (L.) Roxb	T	1
7	Asparagaceae	1	1	1.02	Shatavari/Jogilati	<i>Asparagus racemosus</i> Willd	C	
8	Aspidiaceae	1	1	1.02	Jatashankari	<i>Dryopteris</i> sp.	H	1
9	Asteraceae	6	6	6.12	Utkanta	<i>Echinops echinatus</i> Roxb.	H	1
					Vanjeer	<i>Baccharoides anthelmintica</i> (L.) Moench	H	0.5
					Ghameera	<i>Eclipta alba</i> Hassk	H	1
					Vanramtila	<i>Guizotia abyssinica</i> Cass.	C	1
					Gorakhmundi	<i>Sphaeranthus indicus</i> L.	H	1
					Genda	<i>Tagetes erecta</i> L.	H	1
10	Begoniaceae	1	1	1.02	Pathar Chati	<i>Begonia picta</i> Sm.	H	1
11	Bignoniaceae	1	1	1.02	Garun Phal	<i>Radermachera xylocarpa</i> (Roxb.) Roxb. ex K.Schum.	T	1
12	Boraginaceae	2	2	2.04	Lal jadi	<i>Arnebia benthamii</i> Wall. ex G. Don	S	1
					Dahiman	<i>Cordia macleodii</i> Hook.f. & Thomson	T	1
13	Burseraceae	1	1	1.02	Sal	<i>Boswellia serrata</i> Roxb ex Colebr	T	1
14	Caesalpiniaceae	1	1	1.02	Chakaura	<i>Senna tora</i> (L.) Roxb.	H	1
15	Celastraceae	1	1	1.02	Jamrashi	<i>Elaeodendron glaucum</i> Pers.	T	1
16	Combretaceae	3	1	3.06	Arjun	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	T	1
					Bahera	<i>Terminalia bellirica</i> Roxb.	T	1
					Harra	<i>Terminalia chebula</i> Retz.	T	0.66
17	Convolvulaceae	1	1	1.02	Amarbel	<i>Cuscuta reflexa</i> Roxb.	C	1
18	Cucurbitaceae	3	3	3.06	Kareliya	<i>Momordica charantia</i> L.	C	1

					Bagdor	<i>Trichosanthes tricuspidata</i> Lour	T	1
					Indrawan	<i>Citrullus colocynthis</i> Schrad.	H	1
19	Cyperaceae	1	1	1.02	Gangarua	<i>Cyperus rotundus</i> L.	H	1
20	Dilleniaceae	1	1	1.02	Karkat/Kurkut	<i>Dillenia pentagyna</i> Roxb.	T	0.5
21	Dipterocarpaceae	1	1	1.02	Sarai	<i>Shorea robusta</i> Gaertn.	T	0.66
22	Ebanaceae	2	1	2.04	Patwan/Haldu	<i>Diospyros montana</i> Roxb.	T	1
					Tendu	<i>Diospyros melanoxylon</i> Roxb.	T	1
23	Euphorbiaceae	3	3	3.06	Arandi	<i>Ricinus communis</i> L.	S	1
					Kasee	<i>Bridelia retusa</i> Spreng	T	1
					Thua	<i>Euphorbia royleana</i> Boiss.	S	1
24	Fabaceae	10	9	10.20	Khair (Kaththa)	<i>Acacia catechu</i> Willd.	T	1
					Mohline	<i>Bauhinia vahlii</i> (W. & A.)	C	1
					Palas	<i>Butea monosperma</i> Lamk.	T	1
					Tinsa/Sadhn	<i>Desmodium oojeinense</i> (Roxb.) H. Ohashi	T	1
					Semi Jangali	<i>Dolichos spp.</i>	C	1
					Urda	<i>Phaseolus aureus</i> Roxb.	H	1
					Baboor	<i>Acacia nilotica</i> (L.) Willd. ex Delile	T	1
					Gataran	<i>Caesalpinia bonduc</i> (L.) Roxb.	S	1
					Goda	<i>Pterocarpus marsupium</i> Roxb.	T	1
					Bhalbhusari	<i>Cassia fistula</i> L.	T	1
25	Flacourtiaceae	1	1	1.02	Kakai	<i>Flacourtia indica</i> (Burm.f.) Merr.	T	1
26	Hypoxidaceae	1	1	1.02	Kali Mushali	<i>Curculigo orchoides</i> Gaertn.	H	1
27	Lamiaceae	2	2	2.04	Vantulsi	<i>Hyptis suaveolens</i> (L.) Poit.	H	1
					Tulsi	<i>Ocimum sanctum</i> L.	H	1
28	Liliaceae	3	2	3.06	Jangali Pyaj	<i>Urginea indica</i> (Roxb.) Kunth	H	1
					Pyaj Patta	<i>Allium cepa</i> L.	H	1
					Lehsun	<i>Allium sativum</i> L.	H	1
29	Malvaceae	3	3	3.06	Semar	<i>Bombyx ceiba</i>	T	1
					Bariyari	<i>Sida rhombifolia</i> L.	H	1
					Charmuhi	<i>Thespesia lampas</i> (Cav.) Dal- zell	S	1
30	Meliaceae	2	2	2.04	Neem	<i>Azadirachta indica</i> A.Juss.	T	1
					Hathil	<i>Murraya paniculata</i> (L.) Jack	S	1
31	Menispermaceae	2	2	2.04	Gurij	<i>Tinospora cordifolia</i> Willd.) Miers	C	1
					Padhin	<i>Cissampelos pareira</i> L.	C	0.86
32	Moraceae	5	2	5.10	Akjeera	<i>Ficus carica</i> L.	T	1
					Pakri	<i>Ficus infectoria</i> L.	T	1
					Dumar (Vada)	<i>Ficus racemosa</i> L.	T	1
					Peepal	<i>Ficus religiosa</i> L.	T	1
					Athut	<i>Morus alba</i> L.	T	1

33	Moringaceae	1	1	1.02	Munga	<i>Moringa oleifera</i> Lam.	T	1
34	Musaceae	1	1	1.02	Kela	<i>Musa paradisiaca</i> L.	S	1
35	Myrtaceae	2	2	2.04	Amrud	<i>Psidium guajava</i> L.	T	1
					Jamun	<i>Syzygium cumini</i> (L.) Skeels	T	0.6
36	Nyctaginaceae	1	1	1.02	Gulbans	<i>Mirabilis jalapa</i> L.	H	1
37	Oleaceae	1	1	1.02	Harsidhari	<i>Nyctanthes arbor-tristis</i> L.	T	0.5
38	Orchidaceae	1	1	1.02	Banda	<i>Vanda tessellata</i> (Roxb.) Hook. ex G. Don	H	1
39	Papaveraceae	1	1	1.02	Katilli	<i>Argemone mexicana</i> L.	H	0.83
40	Plumbagina- ceae	1	1	1.02	Chitawar	<i>Plumbago zeylanica</i> L.	H	1
41	Poaceae	1	1	1.02	Dubi	<i>Cynodon dactylon</i> (L.) Pers.	H	1
42	Polygonaceae	1	1	1.02	Gondila	<i>Polygonum hydropiper</i> L.	H	1
43	Ranunculaceae	1	1	1.02	Mameera/Pili Jadi	<i>Thalictrum foliolosum</i> DC.	H	0.66
44	Rutaceae	1	1	1.02	Bel	<i>Aegle marmelos</i> (L.) Corrêa	T	1
45	Sapotaceae	2	2	2.04	Mahua	<i>Madhuca indica</i> J.F. Gmel.	T	1
					Girsali	<i>Mimusops elengi</i> L.	T	1
46	Scrophularia- ceae	1	1	1.02	Brahmi	<i>Bacopa monnieri</i> L.	H	1
47	Solanaceae	1	1	1.02	Bhatkataiya	<i>Solanum xanthocarpum</i> Schrad.	H	1
48	Sterculiaceae	1	1	1.02	Ainthe	<i>Helicteres isora</i> L.	S	1
49	Verbenaceae	2	2	2.04	Khamhar	<i>Gmelina arborea</i> Roxb.	T	0.5
					Barmasiya	<i>Lantana camara</i> L.	S	1
50	Vitaceae	4	4	4.08	Amlollam	<i>Ampelocissus latifolia</i> (Roxb.) Planch.	S	1
					Tinpatiya	<i>Cayratia trifolia</i> (L.) Domin.	C	1
					Vajraganth	<i>Leea indica</i> (Burm. f.) Merr.	S	0.5
					Hadjod	<i>Cissus quadrangularis</i> L.	S	1
51	Zingiberaceae	4	4	4.08	Kevkand	<i>Costus speciosus</i> (J.Koenig) Sm.	H	1
					Haldi	<i>Curcuma longa</i> L.	H	1
					Gulbakawli	<i>Hedychium coronarium</i> Koen.	H	1
					Jangali adrak	<i>Zingiber montanum</i> (J.Koenig) Link ex A.Dietr.	H	1

Abbreviations: T: Tree, H: Herb, S: Shrub, C: Climber

Method of medicinal plants preparation and their application

Medicinal plants may be prepared in a wide variety of ways to treat or manage human diseases. In the present study area, the most preferred method of medicinal recipe preparation from medicinal plant material was decoction 47 (44.34%), followed by grinding or powdered form 43 (40.57%), maceration and extraction form 11 (10.38%), and natural form 5 (4.27%) as indicated in table 3 and figure 5 [38].

The method of application (route of administration)

is the way to deliver medicament inside the body to cure illness. In the present study, traditional medicine was used in four different ways, as shown in figure 6, namely oral administration of 83 plant species (78.30%), external application of 17 plant species (16.04%), medicated baths or rinsing of 4 plant species (3.77%), and chewing of 2 species (1.89%) are the most popular methods [8].

Parts of plant species used

The present investigation reveals that roots are used

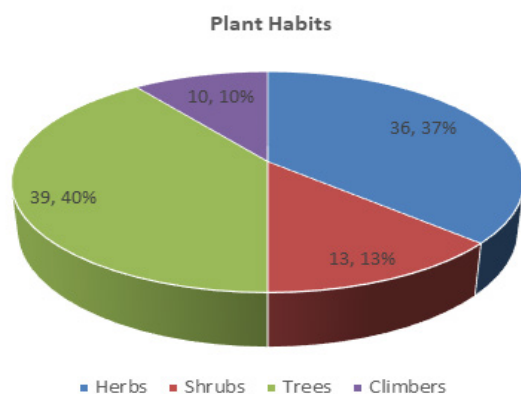


Figure 4. Percentage of medicinal plants habits

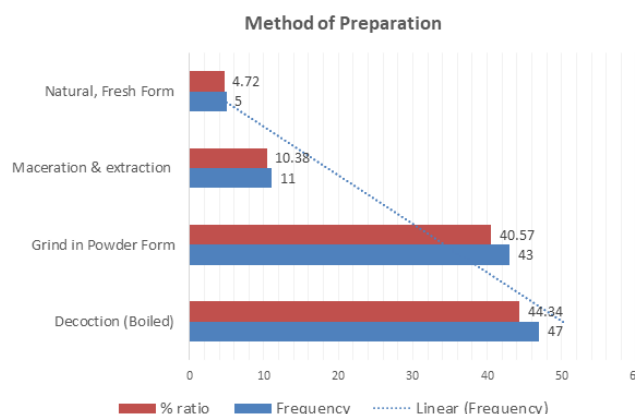


Figure 5. Different methods used for medicinal preparation

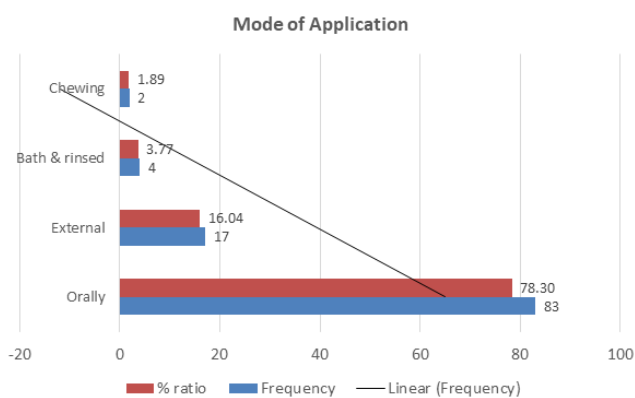


Figure 6. Mode of medicinal plants application.

as the highest medicinal plant parts with 34 plant species (32.08%), followed by leaves 11 (10.38%), bark 14 (13.21%), fruits 7 (6.60%), seeds 2 (1.83%), stem 3 (2.83%), rhizome 2 (1.89%), and whole plants 3 (1.82%), seeds 1 (0.94%) out of 129 and combining 23 (21.70%), as showed in table 3 and figure 7. Even though, the active chemical compounds are present in every part of the plant, the local population prefers to use root parts in their medicinal recipe preparations, which may be clarified by the fact that the majority of the information gained by the people of this area is

Table 3. Disease categories used for Informant Consensus Factor (ICF)

Sl. No.	Groups of Disease Categories	Specific Disease Conditions	Nur	Total Percentage of Species	Nt	ICF
1	Urinary Disorder	Burning in urination, Urine infection, Kidney stone	11	6.75	5	0.6
2	Animals Bite Disorder	Snake bite, Scorpion bite,	6	3.68	4	0.4
3	Metabolic Disorder	Diabetes, Jaundice	30	18.40	19	0.38
4	Skin Disorder	Skin disease, Skin cuts, Dermatitis, Burning, wounds	7	4.29	5	0.33
5	Gastrointestinal Disorder	Diarrhoea, Vomiting, Digestion, Gastric	11	6.75	8	0.3
6	Miscellaneous Disorder	Baldness, Eye problems, Cancer, Hypertension, Paralysis, Weakness	8	4.91	6	0.29
7	Respiratory Disorder	Cough, Cold	5	3.07	4	0.25
8	Microbial Disorder	Piles, Fever, Malaria	33	20.25	26	0.22
9	Erectile Dysfunction Disorder	Impotence, Heat, Energy, Erectile problem	11	6.75	9	0.2
10	Bone Disorder	Bone fracture, Bone disease, Bone joint, Arthritis	16	9.82	13	0.2
11	Gynaecological Disorder	Delivery issue, Labour pain, Child problem, Menstrual problem, Milk deficiency	12	7.36	10	0.18
12	Ache Disorder	Tooth pain, Body pain, Ear pain, Back pain, Cyst, Headache	13	7.98	11	0.16

Abbreviations- Nur: Number of use reports; Nt: Number of species used; ICF: Informant Consensus Factor

traditional and passed down from generation to generation orally, in addition, the availability of root parts are plenty, and their collection and processing is very easy [8].

Medicinal plants informant’s consensus factor

According to the informants’ usage notes, the recorded ailments were grouped into 12 different categories of diseases conditions to measure the ICF value, as shown in table 4. The following are the outcomes of the recorded conditions: microbial disorder (20.25%), metabolic disorder (18.40%), bone disorder (9.82%) and other fewer common categories were mentioned. Within the three main disease groups, microbial disorders (piles, fever, and malaria) had 33 use reports, metabolic disorders (diabetes, jaundice, and liver problems) had 30 use reports, and bone disorders (bone fracture, bone disease and arthritis) had 16 use reports. The ICF was calculated for each disease category was found to be in the range of 0.16 to 0.60 as shown in table 4. The maximum ICF (0.60) was reported for urinary disorders, followed by animal bites disorder (0.40), metabolic disorder (0.38), skin disorders (0.33) and other disorder had less IFC value as shown in figure 8 [39].

Fidelity levels of medicinal plants

In this study, FL for the 10 most widely used medicinal plant species were ranked by key medicinal practitioners to measure their significance in treating a significant ailment. The results of FL for 10 signif-

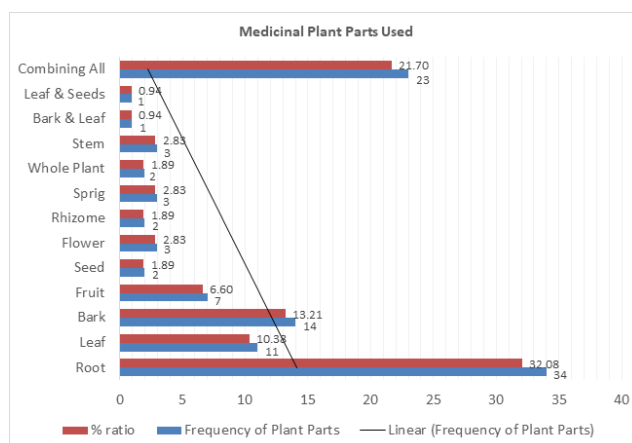


Figure 7. Percentage of medicinal plant parts used for treatment

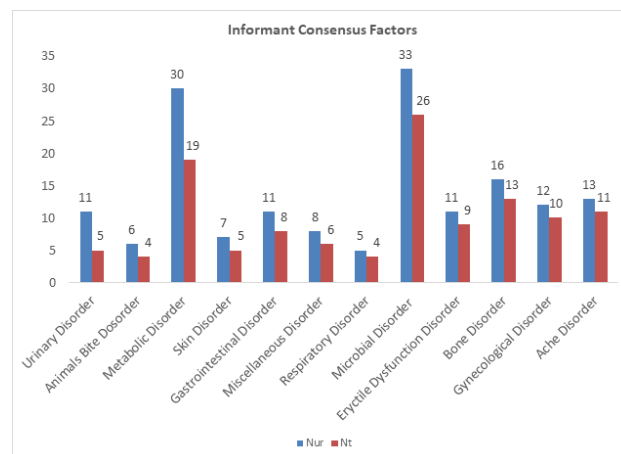


Figure 8. Categories of ailments treated by the local tribes

Table 4. Highly utilized traditional medicinal plants in the study area (FL).

Sl. No.	Species Frequently Used	Vernacular Name/ Local Name	Part Used	Popular Use	Np	N	FL%
1	<i>Thalictrum foliolosum</i> (Ranunculaceae)	Mameera/Pili jadi	Root	Jaundice	3	4	75.00
2	<i>Baccharoides anthelmintica</i> (Asteraceae)	Vanjeer	Seed, Leaf	Malaria	3	4	75.00
3	<i>Mangifera indica</i> (Anacardiaceae)	Aam	Bark	Jaundice	3	4	75.00
4	<i>Mirabilis jalapa</i> (Nyctaginaceae)	Gulbans	Rhizome	Erectile dysfunction	2	3	66.67
5	<i>Shorea robusta</i> (Dipterocarpaceae)	Sarai	Bark	Diarrhoea	2	3	66.67
6	<i>Urginea indica</i> (Liliaceae)	Jangali Pyaj	Rhizome	Arthritis	2	3	66.67
7	<i>Terminalia chebula</i> (Combretaceae)	Harra	Fruit	Cold and Cough	2	3	66.67
8	<i>Argemone mexicana</i> (Papaveraceae)	Katilli	Root	Jaundice	2	4	50.00
9	<i>Asparagus racemosus</i> (Asparagaceae)	Jogilati/Shatavri	Root	Digestion	2	4	50.00
10	<i>Cissampelos pareira</i> (Menispermaceae)	Padhin	Root	Fever	3	7	42.86

Abbreviations- Np: Number of use-reports; N: Total number of use report; FL: Fidelity Level

icant plant species were in the range of 42.86 % to 75 % are shown in table 5. According to the reports documented in the study region, *Thalictrum foliolosum*, *Baccharoides anthelmintica* and *Mangifera indica* wild represented the highest FL of 75 % respectively against jaundice and malaria as the most commonly treated diseases. *Mirabilis jalapa*, *Shorea robusta*, *Urginea indica*, and *Terminalia chebula* represents FL of 66.67 % for erectile dysfunction, diarrhea, arthritis, and cold cough respectively. *Argemone mexicana* and *Asparagus racemosus* denotes 50.00% of FL to treat jaundice and digestion. Followed by *Cissampelos pareira* with FL of 42.86% for the treatment of fever [40].

Jaccard Coefficient of Similarity for plant species

The traditional applications of 98 folk medicinal plants which were used by tribal communities living the villages of Pushprajgarh block, District Anuppur, Madhya Pradesh, have been scientifically recorded, according to JCS. Table 6 depicts a comparison of ethno medicinal plant uses in the present research with those in previous studies performed in other parts of India. It was found that New Delhi, India (12.84 %) [41], Chhattisgarh, India (12.98 %) [42], Uttarakhand, India (10.49 %) [43], Haryana, India (21.29 %) [44], Uttar Pradesh, India (17.27 %) [45], Karnataka, India

(8.03%) [46], Punjab, India (11.28%) [47], Madhya Pradesh, India (29.82%) [48], Jammu& Kashmir, India (14.74%) [49], and Gujrat, India (7.27%) [50] had the greatest JCS value in each of the forms.

Use Value of plant species

In the current study UV was calculated for 98 medicinal plant species, it was discovered that the majority of the plants have UV between 0.25 to 1, a constant usage value such as 1, like *Acacia catechu*, *Acacia nilotica*, *Achyranthes aspera*, *Bacopa monnieri*, *Caesalpinia bonduc*, *Datura metel*, *Echinops echinatus*, *Ficus religiosa*, *Guizotia abyssinica*, *Helicteres isora*, *Indigofera tinctoria*, *Lantana camara*, *Musa paradisiaca*, *Ocimum sanctum*, *Pterocarpus marsupium*, *Radermachera xylocarpa*, *Tagetes erecta*, etc. This suggests that these medicinal plant species were the most commonly utilized for the treatment or management of various ailments, followed by *Cissampelos pareira* (0.86), *Argemone mexicana* (0.83), *Shorea robusta*, *Terminalia chebula*, and *Thalictrum foliolosum* (0.66), *Syzygium cumini* (0.6) and *Baccharoides anthelmintica* (0.5) and many more species have a UV less than 0.5 as shown in table 2 [51].

Frequency citation and relative frequency citation of plant species

FC and RFC were calculated only for the most cited

Table 5. Present study medicinal plants data comparison with other researchers (JCS)

Sl. No.	Study Area	Year of Study	Total No. of Species	Common Species	JCS	Total similarity (%)	References
1	New Delhi, India	2016	25	14	0.1284	12.84	[41]
2	Chhattisgarh, India	2015	50	17	0.1298	12.98	[42]
3	Uttarakhand, India	2020	60	15	0.1049	10.49	[43]
4	Haryana, India	2020	90	33	0.2129	21.29	[44]
5	Uttar Pradesh, India	2019	31	19	0.1727	17.27	[45]
6	Karnataka, India	2020	50	11	0.0803	8.03	[46]
7	Punjab, India	2020	50	15	0.1128	11.28	[47]
8	Madhya Pradesh, India	2017	50	34	0.2982	29.82	[48]
9	Jammu& Kashmir, India	2020	120	28	0.1474	14.74	[49]
10	Gujrat, India	2016	20	8	0.0727	7.27	[50]

Abbreviation- JCS: Jaccard's coefficient of similarity

species, FC was in the range of 1.85 to 6.48, whereas RFC was found to be 0.04 to 0.12 as shown in table 7.

The maximum values of RFC were observed for *Cissampelos pareira* (0.12), followed by *Thalictrum folio-*

Table 6. List of most medicinal plants cited and currently used by informants (RFC)

Sl. No.	Scientific name/ Family	Number of interviews where the species is cited	FC	RFC
1	<i>Cissampelos pareira</i>	7	6.48	0.12
2	<i>Thalictrum foliolosum</i>	4	3.70	0.07
3	<i>Baccharoides anthelmintica</i>	4	3.70	0.07
4	<i>Mangifera indica</i>	4	3.70	0.07
5	<i>Argemone mexicana</i>	4	3.70	0.07
6	<i>Asparagus racemosus</i>	4	3.70	0.07
7	<i>Mirabilis jalapa</i>	3	2.78	0.05
8	<i>Shorea robusta</i>	3	2.78	0.05
9	<i>Urginea indica</i>	3	2.78	0.05
10	<i>Terminalia chebula</i>	3	2.78	0.05
11	<i>Calotropis gigantea</i>	2	1.85	0.04
12	<i>Holarrhena pubescens</i>	2	1.85	0.04
13	<i>Dillenia pentagyna</i>	2	1.85	0.04
14	<i>Ocimum sanctum</i>	2	1.85	0.04
15	<i>Vanda tessellata</i>	2	1.85	0.04

Abbreviations- FC: Frequency Citation; RFC: Relative Frequency Citation

Table 7. Medicinal Plant species data in the study area.

Sl. No.	Name of the plants in local language	Scientific name/ Family	Plants' Parts Used	Diseases Treated (uses)	Preparation and mode of administration of medicinal plants
1	Aam/Aamb	<i>Mangifera indica</i> L. (Anacardiaceae)	Bark	Jaundice	Boil the bark with water, and the boiling water is used to bathe once a day for three days.
2	Ainhi/ Marorphalli	<i>Helicteres isora</i> L. (Sterculiaceae)	Fruit	Stomach ache	The fruit part of the plant is ground and dissolved in the liquor. A small cup of this mixture is to be taken once a for three days.
3	Akjeera	<i>Ficus carica</i> L. (Moraceae)	Fruit	Energy	The fruit part has to be put in water at night, then it is ground and made into rabri, and a small cup of this is drunk for three days.
4	Akwan/Madar	<i>Calotropis gigantea</i> (L.) R. Br. exait. (Apocynaceae)	Flower	Malaria	In case of malaria fever, boil the fresh flower of the plant with water, then it is consumed orally along with black pepper and honey, a little spoon three times per day for one week.
			Root	Bone fracture	To treat the bone fracture, the fresh root is heated along with water and consumed orally once a day with black pepper and honey until the improvement.

5	Amarbel	<i>Cuscuta reflexa</i> Roxb. (Convolvulaceae)	Stem	Menstrual problem	A fresh stem is squashed and consumed orally with black pepper and honey twice/day in case of a menstrual issue.
6	Amlollam	<i>Ampelocissus latifolia</i> (Roxb.) Planch. (Vitaceae)	Root	Piles	The fresh root is heated with water; then consumed orally along with black pepper and honey once a day for one week to treat piles.
7	Arandi	<i>Ricinus communis</i> L. (Euphorbiaceae)	Seed	Baldness	Oil is extracted from its seeds and applied to hair once a day for 21 days.
8	Arjun	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn. (Combretaceae)	Bark	Diabetes	The bark is dried and ground into powder, consumed with water twice a day.
			Bark	Fever	The bark is crushed, and the juice is extracted, then it is consumed twice a day for three days during the fever.
9	Athut	<i>Morus alba</i> L. (Moraceae)	Root	Jaundice	The fresh root is cut into small pieces and then boiled with water. This extract is mixed with black pepper and honey in equal proportions. Consumed it two times per day for one week, treat jaundice.
10	Banda	<i>Vanda tessellata</i> Hook. ex G. Don (Orchidaceae)	Root	Jaundice	To treat jaundice, the root powder is consumed orally twice a day in a small cup for one week.
			Root	Piles	Fry the root in a fire and take it three times per day for one week in the event of piles.
11	Barmasiya	<i>Lantana camara</i> L. (Verbenaceae)	Leaf	Diabetes	The fresh leaf is heated with water and then consumed orally in a small cup with black pepper and honey twice a day.
12	Bel	<i>Aegle marmelos</i> (L.) Corrêa (Rutaceae)	Stem	Thinness in Children (Anemia)	The stem is boiled in water and then consumed orally for 15 days with black pepper and honey, a small spoon three times every day.
13	Bhalbhusari	<i>Cassia fistula</i> L. (Fabaceae)	Bark	Stomach	Grind its root, extract the juice, filter it, and drink it twice a day for three days.
14	Bhatkataiya	<i>Solanum xanthocarpum</i> Schrad. (Solanaceae)	Fruit	Malaria	the squashed fruit is heated and then taken it orally three times per day for three days.
15	Bhelma/Bhelva	<i>Semecarpus anacardium</i> (L.) f. (Anacardiaceae)	Fruit	Cancer	The fruits are boiled with water and concentrated to one-fourth of volume. Consume it orally along with black pepper and honey daily.
16	Bhuneem	<i>Andrographis paniculata</i> (Acanthaceae)	Whole Plant	Fever	The entire plant is boiled using water and then consumed orally with honey, a small cup twice a day.
17	Charmuhi	<i>Thespesia lampas</i> (Cav.) Dalzell, (Malvaceae)	Root	Jaundice	Its root is ground and dissolved in water, then consumed orally twice a day for three days
18	Chitawar/Chitrak	<i>Plumbago zeylanica</i> L. (Plumbaginaceae)	Root	Jaundice	To treat jaundice, boil the root using water and drink a small cup three times a day for a week.

19	Dahiman	<i>Cordia macleodii</i> Hook.f. & Thomson (Boraginaceae)	Sprig	Hypertension	Garland is prepared from its wood and worn around the neck for three days to reduce blood pressure.
20	Dudhiya	<i>Hemidesmus indicus</i> R.Br. (Apocynaceae)	Leaf	Heat	It is pulverized, mixed with sugar, and consumed in the morning and evening for 3 to 5 days.
21	Gangarua	<i>Cyperus rotundus</i> L. (Cyperaceae)	Root	Burning in urination	Grind its root and extract the juice, then drink it on an empty stomach two times per day for three days.
22	Garun Phal	<i>Radermachera xylocarpa</i> (Roxb.) Roxb. ex K.Schum. (Bignoniaceae)	Fruit	Snake Bite	Squeezed the root and boil it with water, the decoction has to be consumed three times per day for fourteen days.
23	Ghameera	<i>Eclipta alba</i> Hassk. (Asteraceae)	Leaf	Skin disease	The juice of its leaves are extracted and applied to the wound twice per day for one week.
			Leaf	Dermatitis	The leaves are squashed and extract the juice. Then the concentrated juice is applied on site of dermatitis two times per day until it is cured.
24	Goda	<i>Pterocarpus marsupium</i> Roxb. (Fabaceae)	Root	Headache	The root (fresh) is heated with water and consumed orally thrice/day for one week to relieve headache.
25	Gondila	<i>Polygonum hydropiper</i> L. (Polygonaceae)	Root	Scorpion Bite	The root has to be chewed and consumed the juice once a day.
26	Gorakhmundi	<i>Sphaeranthus indicus</i> L. (Asteraceae)	Sprig	Kidney Stone	The fresh plant (branch part) is boiled using water and consumed orally, one table spoon twice a day for six days.
27	Gulbakawli	<i>Hedychium coronarium</i> Koen. (Zingiberaceae)	Flower	Eye Problem	Fresh flowers are subject to distillation process, the distillate collected (Ark) is used for treating eye problem two times per day for one week.
28	Gulbans	<i>Mirabilis jalapa</i> L. (Nyctaginaceae)	Flower	Impotence	Heated the flower with water and consumed a little cup twice per day for one week to treat impotence.
			Root	Piles	The fresh roots are boiled and consumed orally with black pepper and honey two times/day to treat piles.
29	Gurij/Giloye	<i>Tinospora cordifolia</i> (Willd.) Miers (Menispermaceae)	Stem	Fever	To treat fever, the stem is boiled using water and then consumed orally along with black pepper and honey, a little spoon three times per day for one week.
30	Harra	<i>Terminalia chebula</i> Retz. (Combretaceae)	Fruit	Cough	The fruit powder is mixed with jaggery and consumed two times per day for three days.
31	Harsidhari	<i>Nyctanthes arbor-tristis</i> L. (Oleaceae)	Root	Bone joint	The root is pulverized, and mixed with cow ghee and consumed once a day for one week.

32	Hathil	<i>Murraya paniculata</i> (L.) Jack (Meliaceae)	Leaf	Arthritis	The leaves are pulverized and mixed with jaggery, make a small pill and consumed it morning and evening until the patient is cured.
33	Jamun/Jamali	<i>Syzygium cumini</i> (L.) Skeels (Myrtaceae)	Bark	Jaundice	The bark is boiled using water and then the boiled water is used for bathing two times a day, for three days.
34	Jangali Pyaj	<i>Urginea indica</i> (Roxb.) Kunth (Liliaceae)	Rhizome	Body Pain	The fresh rhizome is heated with water, then it is consumed orally along with black pepper and honey two times/day, in the cases of body ache.
35	Jogilati/Shatavri	<i>Asparagus racemosus</i> Willd (Asparagaceae)	Root	Digestion	To improve digestion, boiled the root using water and then consumed orally, a table spoon per day in an empty stomach for three days.
			Root	Arthritis	The root is boiled using water and then consumed orally, a small cup three times a day for three days.
			Root	Piles	Pulverize the root, and mix with jaggery. A Small quantity is to be consumed every morning and evening for 15 days.
			Root	Weakness	Squashed the root into a powder, then consumed orally along with honey, two times per day for one week, in the case of weakness.
36	Kali Mushali	<i>Curculigo orchoides</i> Gaertn. (Hypoxidaceae)	Root	Heat	The root is squashed into a powder, then it is consumed orally along with jaggery two times/day for one week.
37	Kareliya	<i>Momordica charantia</i> L. (Cucurbitaceae)	Leaf	Headache	The juice is extracted from its leaves then applied on the head in case of a headache.
38	Karkat/Kurkut	<i>Dillenia pentagyna</i> Roxb. (Dilleniaceae)	Bark	Stomach ache	Boiled the root using water, then it is consumed orally thrice a day for three days in case of stomach ache.
			Bark, Leaf	Skin cuts	The fresh bark is ground and applied to the cut surface on the skin
39	Katilli	<i>Argemone mexicana</i> L. (Papaveraceae)	Root	Heat	Squashed the root with water and extract the juice. A small quantity of this juice is taken orally once a day on an empty stomach up to three days.
			Root	Scorpion Bite	The fresh roots juice is extracted and two drops of juice is applied into the ear, both morning and evening for three days.
			Root	Jaundice	For the treatment of jaundice, the root is heated using water and consumed orally, one small cup thrice a day for three days.
40	Korea/Kuruchi	<i>Holarrhena pubescens</i> Wall. & G. Don (Apocynaceae)	Bark	Diabetes	Powder the bark and small quantity of this powder should be taken for 15 to 21 days in the morning and evening.

			Bark	Snake-bite	Powder the bark and a small cup of powder should be taken with hot water, twice a day for three days.
41	Mameera/Pili Jadi	<i>Thalictrum foliolosum</i> DC. (Ranunculaceae)	Root	Jaundice	The root is boiled using water and then consumed orally a little cup three times a day for one week to treat jaundice.
42	Neem	<i>Azadirachta indica</i> A.Juss. (Meliaceae)	Bark	Fever	In case of fever, the bark is heated using water and then it is consumed orally along with black pepper and honey, a little spoon thrice a day for one week.
			Sprig	Tooth Pain	When there is a toothache, its twig is used as a brush to reduce pain.
43	Padhin	<i>Cissampelos pareira</i> L. (Menispermaceae)	Root	Fever	Crushed the root with small quantity of water and extract the juice. a small cup of this juice consumed twice per day for three days.
			Root	Diarrhea	Crushed the root using small quantity of water and extract the juice. Consume a small cup of this juice once/day on an empty stomach up to three days.
			Root	Body pain	Crushed the root using small quantity of water and extract the juice. Consume a small cup of this juice three times per day for two days.
44	Pakri	<i>Ficus infectoria</i> L. (Moraceae)	Root	Backache	The fresh root is heated using water, then it is consumed orally along with fresh honey once a day until the person recuperate from back pain.
45	Pathar Chati	<i>Begonia picta</i> Sm. (Begoniaceae)	Root	Vomiting	In the case of vomiting, boiled the root using water and consumed it orally a small quantity.
46	Patwan/Haldu	<i>Diospyros montana</i> Roxb. (Ebanaceae)	Bark	Jaundice	Grind its bark and extract the juice, then it is given to the patient two times per day for three days.
47	Pyaj Patta	<i>Allium cepa</i> L. (Liliaceae)	Root	Impotence	The fresh root is boiled using water and then consumed orally with honey thrice a day for one week.
48	Sal	<i>Boswellia serrata</i> Roxb ex Colebr (Burseraceae)	Bark	Menstrual problem	Grind its bark using water, a little cup of this juice should be consumed by the patient multiple times for two days.
49	Sarai	<i>Shorea robusta</i> Gaertn. (Dipterocarpaceae)	Bark	Diarrhea	Its bark is dried and made into powder, and then it is consumed two times per day for three days.
			Bark	Wound	Its dried bark is finely ground and applied to the wound.
50	Sarpgandha	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz (Apocynaceae)	Root	Diabetes	Squashed the root into powder and consumed orally along with honey, two times per day for one week.

51	Semi Jangali	<i>Dolichos</i> spp. (Fabaceae)	Root	Menstruation	The fresh root is heated using water, then it is consumed orally along with honey thrice a day in the cases of menstrual issues.
52	Suran/Jami-kand	<i>Amorphophallus campanulatus</i> (Roxb.) Bl. (Araceae)	Rhizome/Tuber	Piles	On account of piles, the fresh tuber is heated with water, then it is consumed orally with black pepper and honey two times a day.
53	Tendu	<i>Diospyros melanoxylon</i> Roxb. (Ebenaceae)	Whole Plant	Scorpion Bite	The complete plant is squashed and boiled using water and then taken it orally, little spoon thrice a day for only three days.
54	Thua	<i>Euphorbia royleana</i> Boiss. (Euphorbiaceae)	Leaf	Ear Pain	Boiled the leaf using water and consumed it orally, one table spoon two times per day for one week.
			Root	Increase milk secretion	The root is heated with water, then it is consumed orally one little cup two times per day for one week.
55	Tinpatiya	<i>Cayratia trifolia</i> (L.) Domin. (Vitaceae)	Root	Cyst	The root is ground and consumed with liquor, a little cup 2 times/day for two days.
56	Tinsa/Sadhn	<i>Desmodium oojeinense</i> (Roxb.) H. Ohashi (Fabaceae)	Bark	Diarrhea	The small pieces of bark are heated using water and then consumed orally a little cup thrice per day for three days to treat diarrhea.
57	Tulsi	<i>Ocimum sanctum</i> L. (Lamiaceae)	Leaf	Digestion	The leaf is heated with water; then it is consumed orally, one little cup three times per day for three days, to improve digestion.
			Leaf	Cold	Decoction of its leaves are prepared using water and given one small cup of it two times a day for five days.
58	Utkanta	<i>Echinops echinatus</i> Roxb. (Asteraceae)	Root	Jaundice	The fresh roots are heated using water and then consumed orally along with black pepper and honey two times/day for six days, in the cases of jaundice.
59	Vajraganth	<i>Leea indica</i> (Burm. f.) Merr. (Vitaceae)	Root	Arthritis	The powder form of the dried root is consumed orally one little cup twice a day for one week to relieve arthritis.
			Root	Body Pain	The fresh root is heated using water and consumed orally along with black pepper and honey two times/day, in the case of body ache.
60	Vanjeer/Vanjeera	<i>Baccharoides anthelmintica</i> (L.) Moench (Asteraceae)	Fruit	Malaria	The fresh root is heated using water and consumed orally along with honey two times per day for one week to treat malaria.
			Leaf/Seed	Malaria	Grind the leaves and seeds, mix them with water, and take them orally on an empty stomach two times per day for one week.
			Seeds	Fever	The seeds powder is consumed orally in one small cup twice a day to treat fever.

61	Vanramtila	<i>Guizotia abyssinica</i> Cass. (Asteraceae)	Leaf	Skin cuts	The leaves are squashed, and juice is separated, then applied to the cut region once/day for three days.
62	Vantulsi	<i>Hyptis suaveolens</i> (L.) Poit. (Lamiaceae)	Leaf	Cold, fever	Boil the leaves and twigs with water and the decoction is taken two times/day for three days.
The crudes drug used in combination forms					
1	Amarbel + Amrud + Chakaura	1. <i>Cuscuta reflexa</i> Roxb. (Convolvulaceae), 2. <i>Psidium guajava</i> L. (Myrtaceae), 3. <i>Senna tora</i> (L.) Roxb. (Caesalpiniaceae)	Stem + Fruit + Root	Malaria	They all have to grind together, dissolve it in water, and take it in one small cup thrice a day for three days.
2	Dahiman + Baboor + Jamun + Aam	1. <i>Cordia macleodii</i> (Griff.) (Boraginaceae), 2. <i>Acacia nilotica</i> (L.) Delile (Fabaceae), 3. <i>Syzygium cumini</i> (L.) (Myrtaceae), 4. <i>Mangifera indica</i> (L.) (Anacardiaceae)	Bark	Jaundice	All the barks are boiled and the boiled water is used for bathing once a day for three days.
3	Dumar (Vada) + Dudhiya	1. <i>Ficus racemosa</i> L. (Moraceae), 2. <i>Hemidesmus indicus</i> R.Br. (Apocynaceae)	Gum + Milk	Milk deficiency	The gum and latex portion are mixed and consumed orally with milk or warm water, one little cup twice a day for three days.
4	Gataran + Padhin	1. <i>Caesalpinia bonduc</i> (L.) Roxb. (Fabaceae), 2. <i>Cissampelos pareira</i> L. (Menispermaceae)	Fruit + leaf	Fever	Grind and fry its fruits and leaves, powder it and consume orally with water twice a day for three days.
5	Girsali + Jhilmili/ pili jadi	1. <i>Mimusops elengi</i> (Sapotaceae), 2. <i>Thalictrum foliolosum</i> DC. (Ranunculaceae)	Leaf + Root	Malaria	Grind these two together, extract their juice, and take a little cup 2 times per day for three days.
6	Hadjod + Dubi	1. <i>Cissus quadrangularis</i> (Vitaceae), 2. <i>Cynodon dactylon</i> (Poaceae)	Root + leaf	Bone Joint	The root and leaf portion are powdered together; a small cup of this powder is consumed once a day for seven days.
7	Harra + Bahera	1. <i>Terminalia chebula</i> (Combretaceae), 2. <i>Terminalia bellirica</i> Roxb. (Combretaceae)	Fruit	Cough	Both these fruits are ground to powder form, and then this powder is consumed two times per day for three days to get relief from cough.
8	Jamun + Aam	1. <i>Syzygium cumini</i> (L.) (Myrtaceae) 2. <i>Mangifera indica</i> (L.) (Anacardiaceae)	Bark	Jaundice	The bark of both these plants are boiled with water and the boiled water is used for bathing twice a day for 3 days to treat jaundice.
9	Jatashankari + Jangali adrak + Kevkand + Hathil + Jangali pyaj + Brahmi + Vache	1. <i>Dryopteris</i> sp. (Aspidiaceae), 2. <i>Zingiber montanum</i> (Zingiberaceae), 3. <i>Costus speciosus</i> (Zingiberaceae), 4. <i>Murraya paniculata</i> (Meliaceae), 5. <i>Urginea indica</i> (Liliaceae), 6. <i>Bacopa monnieri</i> L. (Scrophulariaceae), 7. <i>Acorus calamus</i> L. (Araceae)	Leaf + Leaf + Leaf + Leaf + Leaf + Root + Root	Arthritis	All these are boiled in mustard oil, then apply the oil where there is pain, two times per day for four days.
10	Kakai + Mohline	1. <i>Flacourtia indica</i> (Burm.f.) Merr, (Flacourtiaceae), 2. <i>Bauhinia vahlii</i> (W. & A.) (Fabaceae)	Bark	Laboure Pain	These two are heated with water and sieved, and then it is taken a little cup thrice a day for three days.

11	Kasee + Tinpatiya + Bariyari + Gunjan + Dahiman	1. <i>Bridelia retusa</i> Spreng (Euphorbiaceae), 2. <i>Cayratia trifolia</i> (L.) Domin. (Vitaceae), 3. <i>Sida rhombifolia</i> L. (Malvaceae), 4. <i>Cordia macleodii</i> (Griff.) (Boraginaceae)	Root + Root + Root + Bark	Body pain	These are ground and extracted the juice, and then a small cup is consumed with water or liquor once a day for five days.
12	Katilli + Chirchira + Bariyari + Palas	1. <i>Argemone mexicana</i> L. (Papaveraceae), 2. <i>Achyranthes aspera</i> L. (Amaranthaceae), 3. <i>Sida rhombifolia</i> L. (Malvaceae), 4. <i>Butea monosperma</i> Lamk. (Fabaceae)	Root	Piles	All these roots must be mixed, cooked with cow's ghee, and then eaten on an empty stomach in the morning and evening.
13	Kela + Khair (Katha)	1. <i>Musa paradisiaca</i> L. (Musaceae), 2. <i>Acacia catechu</i> Willd. (Fabaceae)	Fruit + Stem	Piles	The banana is ripped from the middle, and the powder of catechu is added to it, then it is eaten two times per day for three days.
14	Lal jadi + Mameera + Katilli	1. <i>Arnebia benthamii</i> Wall. ex G. Don (Boraginaceae), 2. <i>Thalictrum foliolosum</i> DC. (Ranunculaceae), 3. <i>Argemone mexicana</i> L. (Papaveraceae)	Root	Jaundice	All these roots are ground with water and taken on an empty stomach two times per day for two days.
15	Lehsun + Urda	1. <i>Allium sativum</i> L. (Liliaceae), 2. <i>Phaseolus aureus</i> Roxb. (Fabaceae)	Bulb + Seed	Paralysis	Each plant's part is ground and consumed orally, on an empty stomach two times per day for 30 days.
16	Mahua + Bagdor	1. <i>Madhuca indica</i> J.F. Gmel. (Sapotaceae), 2. <i>Trichosanthes tricuspidata</i> Lour (Cucurbitaceae)	Root	Arthritis	The roots are heated with water and baked in the morning and evening for one month.
17	Munga + Bahera + Harra + Aam + Janun + Khamhar	1. <i>Moringa oleifera</i> Lam. (Moringaceae), 2. <i>Terminalia bellirica</i> Roxb. (Combretaceae), 3. <i>Terminalia chebula</i> (Combretaceae), 4. <i>Mangifera indica</i> (L.) (Anacardiaceae), 5. <i>Syzygium cumini</i> (L.) (Myrtaceae) 6. <i>Gmelina arborea</i> (L.) (Verbenaceae)	Bark	Severe Jaundice	All of these barks are boiled with water, the boiled water is used to bathe once a day for three days.
18	Munga + Peepal	1. <i>Moringa oleifera</i> Lam. (Moringaceae), 2. <i>Ficus religiosa</i> L. (Moraceae)	Bark	Piles	The bark powder is mixed with jaggery, consumed orally a little spoon two times/day for one week.
19	Sarai + Jamun	1. <i>Shorea robusta</i> , Gaertn. (Dipterocarpaceae), 2. <i>Syzygium cumini</i> (L.) (Myrtaceae)	Bark	Diarrhea	The bark of these two are mixed in equal proportion and the juice is extracted, A small spoon of this juice is consumed orally two times per day for three days.

20	Semar + Padhin + Potar + Katil- li + Gulbas	1. <i>Bombyx ceiba</i> (Malvaceae), 2. <i>Cissampelos pareira</i> L. (Menispermaceae), 3. <i>Smilax zeylanica</i> L. (Smilacaceae), 4. <i>Argemone mexicana</i> , L. (Papaveraceae), 5. <i>Mirabilis jalapa</i> L. (Nyctaginaceae)	Sprig + Root + Root + Stem + Rhizome	Erectile dysfunction	The dried parts of these plants are made into powder and eaten with jaggery two times a day for three days.
21	Sera Lal/ Potar + Chheer Jad + Jamrashi	1. <i>Smilax zeylanica</i> L. (Smilacaceae), 2. <i>Phoenix sylvestris</i> (L.) Roxb, (Arecaceae), 3. <i>Elaeodendron glaucum</i> Pers. (Celastraceae)	Root	Menstrual problem	All the roots are ground with water and the juice is extracted, this juice is taken an empty stomach with water or alcohol or milk in the morning for five days.
22	Padhin + Haldi + Ba- hera + Jamun + Genda + Khamhar + Chirchira + Bariyari + Indrawan	1. <i>Cissampelos pareira</i> L. (Menispermaceae), 2. <i>Curcuma longa</i> L. (Zingiberaceae), 3. <i>Terminalia bellirica</i> Roxb. (Combretaceae) 4. <i>Syzygium cumini</i> (L.) (Myrtaceae), 5. <i>Tagetes erecta</i> L. (Asteraceae), 6. <i>Gmelina arborea</i> (L.) (Verbenaceae), 7. <i>Achyranthes aspera</i> L. (Amaranthaceae), 8. <i>Sida rhombifolia</i> L. (Malvaceae), 9. <i>Citrullus colocynthis</i> Schrad. (Cucurbitaceae)	Root + Rhizome + Root + Bark + Root + Bark + Root + Root + Root	Urine infection	Grind them all together and extract the juice, then it has to be consumed with liquor once a day for three days in a small cup.
23	Padhin + Vanjeer	1. <i>Peucedanum nagpureense</i> (Apiaceae), 2. <i>Baccharoides anthelmintica</i> (L.) Moench (Asteraceae)	Root + Seed	Malaria	These plants parts are ground together and consumed with water, a small cup to be consumed twice a day for three days.

losum, *Baccharoides anthelmintica*, *Mangifera indica*, *Argemone Mexicana* and *Asparagus racemosus* (0.07) and *Mirabilis jalapa* (0.5) which almost all respondents listed. It seems that these two taxa are the most commonly known and familiar in the study region [33].

Discussion

Our study included several men and only one woman as general and key informants, who had enough traditional medicinal plant knowledge. The majority of informants are only aware of a small number of medicinal plants that may be utilized to treat various ailments. The bulk of the primary informants were males since indigenous women typically do household and farm work. In accordance with the expected practices of inheritance, local traditional medical knowledge is generally passed down from a senior practitioner to a male successor rather than a female successor [1]. It was also observed that some of the tribes having medicinal knowledge are unwilling to disclose their knowledge, if more informants are contributed in sharing their expertise, the number and techniques of

medicinal plants usage recorded in the present study would have been increased [52].

According to our study, local herbalists believe that harvesting medicinal plants from midday to evening in the fall or winter is much more preferable since many medicinal plants may become dormant and have relatively dry bodies with the highest efficacy [1,53]. Regarding information about the informants' demographics, a total of 57 informants from different villages of Pushprajgarh block, Anuppur district, agreed to participate in this report. The most information about the application of medicinal plants was gathered from informants aged between 30 to 70 years old, who did not have primary and secondary school education level. Even the most illiterate and traditional knowledge individuals frequently speak Hindi or their indigenous tribal languages [14]. Traditional medicinal data for each species, including its local name, vernacular name, botanical name, family, plant parts utilized, habit, habitat, cited sources, and preparation, are listed [1]. The highest percentage of medicinal plants belong to the Fabaceae family, represented

by 10 species [54,55].

Medicinal plants may be prepared in several ways to treat human diseases. In this study area, the highest preferred method of preparation of traditional recipe from plant material was decoction (boiling) with 47 plant species (44.34%). Followed by oral administration of 83 plant species (78.30%) and our findings reveals that roots are used as the most 34 (32.08%) of single plant components [56,57].

In this study, we calculated different statistical analyses, such as ICF and FL. The highest ICF was reported as 0.60 for urinary disorder and the FL was determined for each of the 10 most widely used plant species as ranked by key informants to measure their significance in treating a major ailment [1]. The UV for 98 medicinal plant species was recorded. It was discovered that the majority of the plants are having UV between 0.25 to 1. This study compares ethnomedicinal plants used in the current research with those in previous studies performed in other parts of India in JCS. The FC and RFC were calculated only for the most cited species. The range was between 1.85 to 6.48 for FC and 0.04 to 0.12 for RFC [27,30,58]. Therapeutic and medicinal effects of herbal and aromatic plants are applied through their active ingredients and antioxidants [59-61]. It is necessary to find medicines that are synthesized from medicinal plants and used as conventional medicine [62-65]. Effective compounds and herbal antioxidants can be used as effective drugs for medicinal purposes [66-69].

Conclusion

The present study allowed us to prepare an inventory on the uses of medicinal plant species used by local tribal communities living in different villages of the Pushprajgarh tehsil of District Anuppur, Madhya Pradesh (Central India). The valuable information collected via our research clearly demonstrates that the local community possesses vital expertise, as evidenced by a huge number of listed species that are utilized and prepared in a variety of ways to treat a wide variety of diseases. These plant species might serve as a natural repository for novel biomolecules with therapeutic potential. As a result, documentation and scientific research are necessary for the protection and study of this legacy. Half of the therapeutic herbs utilized are natural species, some of which are illegally gathered by the local community. Even if we have not considered this aspect in the context of this work, it must be borne in mind that the over exploitation of these species poses a genuine threat of shortages or extinction. It became important to devise a strategy to conserve the region's biodiversity and safeguard it from over-exploitation by humans.

Conflict of Interest Statement

There are no conflicts of interest declared by the authors.

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