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Ethno-botanical Survey on Medicinal plants used by Tribes of Karanja (Ghadge) Tahsil of Wardha District, Maharashtra, India

Research Article

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Abstract

Introduction: Tribals or forest dwellers have much knowledge of the drugs growing around them. Most of this treasure of knowledge has been passed orally without any written documents. It is therefore very important to preserve and protect the traditional knowledge and also to prepare a digital data base of traditional medicine. Aim & Objectives: Ethno-botanical survey on medicinal Plants used by the Tribes of Karanja (Ghadge) Tahsil of Wardha District, Maharashtra, India and to prepare the ethno-botanical database of study area. Material & Methods: Ethno-botanical study was conducted through field surveys. Data was collected using questionnaire, interviews and discussions. The collected data was investigated using specific quantitative parameters including Informant Consensus Factor (ICF), Relative popularity level (RPL), Use value (UV), Fidelity level (FL), Relative frequency citation (RFC) and Rank order priority (ROP). Observations & results: Total 7 local informants were interviewed for Ethno-botanical data. Total 65 plants associated to 46 families were verified, authenticated and then recognized with ethno medicinal uses. Informants used 10 types of parts of plant from 6 kind of habitat and do the management of the patients with 6 type of medicinal preparations through 5 routes of administrations. Values obtained by calculating ICF, UV, RFC, FL, RPL and ROP were suggestive of informant's knowledge regarding particular plant species in treating the particular ailment. Conclusion: The present work would be useful in identification of newer species and their therapeutic applications.

Key Words: *Ethnobotany, Ethnomedicine, Informants, Survey, Plant species.*

Introduction

The importance of *Aushadhi* (drug) and its use as a medicine is well known since Vedic period. Indian systems of medicine are part of our cultural heritage and have rendered cost effective and efficient patient management through the ages. The very first description of medicine can be found in *Rigveda* which is one of the oldest literatures that describes the significance of 67 medicinal plants (1). *Charaka Samhita and Sushruta Samhita* holds commendable knowledge on therapeutic applications of near about 500 medicinal plants described in various chapters. *Acharya Charaka* has explained the significance of herbal plants in *Sutrasthana* 26th chapter. Acharya *Charaka* has opinion that in this world there is not a single herb which does not have therapeutic value, unless it is used in apt conditions and after proper processing. *Charaka* also mentioned about the habitat of medicinal plants (2).

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It is well known that the forest dwellers including the cattle grazers etc. have had a sound known knowledge of the morphology and properties of the drugs growing around them (3). Tribals even now have much knowledge of the drugs, a knowledge which they have inherited traditionally through ages. This fact has also been fully supported by the following reference in *Atharvaveda*, where it has been mentioned that the Kirata (one of the tribals) used to collect drugs.

Acharya Sushruta also mentioned the source of knowledge about medicinal plants. To his opinion, curative herbs and plants should be identified and approved with the help of cattle grazers, Goatherds, shepherd, hunters, forest-dwellers who roam in forest and collect the useful parts such as fruits, roots, stem etc. of plants (4). Thus traditional healers have been the major source of protecting rich heritage of understanding on medicinal plants and their therapeutic usage. They have both the know-how and do-how for preparation and administration of medicine. In India, it is estimated that traditional healers use 2500 plant species grow around them as regular source of medicine to treat various disease conditions (5-6). Most of this treasure of knowledge is transferred to next generation orally without any written documents and is still retained by them (7). Thus people throughout the globe use medicinal herbal plants as a medicine for treating the majority of their ailments. Increase in side effects with modern drugs, high cost for treating the general

diseases, increasing population are some of the reasons for growing interest in the use of herbs as source of medicine (8). Plants, animal and mineral products are major source for the basic conventional knowledge of Ayurvedic medicine. Ethno-botanical studies have been augmented in recent times at the regional, national and international platform. Literature searches reveal that there is still a massive gap in awareness of ethno-medicine and its scientific authentication. It is therefore very essential to preserve and protect the traditional knowledge and also to establish a digital data base of traditional medicine. If this information is yet to be collected systematically and comprehensively and maintained in databases would be a big contribution. Considering this fact, present work was undertaken to explore and prepare the ethno botanical and ethno medicinal database on medicinal plants used by the tribal people of Karanja (Ghadge) tahsil in Wardha district of Maharashtra, India. Most of the tribal population resided in various villages of this tahsil and prefer traditional healers for their treatment.

Material & Methods

Study area

Karanja (Ghadge) town is the head quarter of Karanja tahsil which is located 59 Km towards North from District head quarter Wardha, 76 km away from Nagpur and 79 km away from Amravati. Karanja Taluka is bounded by by Arvi Taluka towards South, Ashti Taluka towards west , Katol Taluka towards East, Narkhed Taluka towards North. Karanja consist of 101 Villages and 60 Panchayats. Karanja is located at coordinates 21°10′58.38″North Latitude and 78°22’52.75 East Longitude and 415 meters above sea level. It is too hot in summer the highest day temperature is in between 31° C to 47.5° C. Most of the regions in Karanja tahsil areas are covered with Semi evergreen forest inhabited by the rural population of tribal people. In this forest region number of herbal plants rich with medicinal properties are found which are used by the tribal people for curing various ailments.

Sampling Informants

In Karanja Ghadge tahsil tribal communities dwell in the villages like Belara tanda, Borgaon godi, Brahmanwada, Dhamkund, Dhanoli, Garpit, Hetikundi, Hararasi, Hiwara Tanda, Khairwada, Ladgad,Linga, Methiwari, Manjara, Masod and Chopan. Most of the tribes have thorough information of medicinal plants and collect plants from adjacent forest to cure their ailments and diseases.

Fig 1: Map of Districts of Vidarbha Region

Fig 2: Map of Wardha district

Ethnobotanical Data collection

Ethno-botanical study was conducted through field surveys during September 2018- April 2019 in different remote villages of the Karanja (Ghadge) tahsil in Wardha district where the tribal communities lived with their customs and rituals. The purpose of the study was obviously explained and verbal consent was taken from each informant.

Data was collected using questionnaire, personal interviews and discussions in their local language. Samples of traditional medicines were collected from the tribal and experienced individuals practicing indigenous medicines. Meeting with tribal were arranged by local people, forest department personnel who were familiar and could communicate with them in their own language. The questionnaires used included the following information: Common name, habit, useful parts of plant, type of preparation, mode of application, dose and their medicinal uses. The actual field photographs of the wild plants with their surroundings were taken. The herbal drugs utilized by the traditional healers were authenticated with the help of taxonomist, forest range officer and database on medicinal plants used in Ayurveda. Their specific medicinal values were verified with the help of literature review. Few specimens were collected and prepared according to standard herbarium procedures. Data was analyzed by descriptive statistics.

Quantitative analysis of ethno botanical data

The collected data was investigated using specific quantitative parameters including Informant Consensus Factor (ICF), Relative popularity level (RPL), Use value (UV), Fidelity level (FL), Relative frequency citation (RFC) and Rank order priority (ROP). Obtained values are depicted in numbers and percentages.

Informant consensus factor (ICF)

It was developed by Trotter and Logan which tests the consistency of informant’s knowledge regarding plants species for treating a particular illness category. This parameter accounts for the degree of agreement among the different informants interviewed concerning the use.

The ICF value is calculated by using the formula (9).

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

Where, N*ur* is the total number of use reports for each disease category and N*t* indicates the number of species used in said category.

Use value (UV): Use Value counts the importance of each plant on the basis of the number of different uses reported. Use value gives an idea about the important species used by a community. It is calculated using the formula (10).

$$UVi = \frac{\sum Ui}{N}$$

Where, UV indicates use value of individual species, ∑U*i* is the sum of the uses recoded for that species and N represents the number of informants who reported that species.

Relative frequency of citation (RFC)

Relative frequency of citation (RFC) signifies the local importance of each species in a study area. The most popularly used plant species will get the highest number for the citation/frequency among the community members. This index is determined by dividing the number of informants citing a useful species (FC) by total number of informants in the survey (N). RFC is calculated by the formula (11).

$$RFC = \frac{FC}{N} \quad 0 < RFC < 1.$$

Theoretically, it varies from zero to 1. When few informants quote the species a value close to zero is obtained. The upper limit one is seldom obtained, it is possible only when all the informants quote a particular species.

Fidelity level (FL)

FL is the percentage of informants who claim the uses of certain plant species to treat a particular ailment in a study area. The FL index is calculated using formula (12).

$$FL\ (\%) = \frac{Np}{N} \times 100$$

Where, `Np' is the number of informants who claimed a use of certain plant species for a particular disease and `N' is the total number of informants citing the species for any given disease. The maximum FL indicates the frequency and high use of the plant species for treating a particular ailment by the informants of the study area.

Relative popularity level (RPL)

RPL is the ratio between numbers of ailments treated by a particular plant species and the total number of informants for any disease. The relative popularity level (RPL) assumes a value 0 and 1.0, with `1' being complete popularity of a plant for major ailments and `0' no ailments treated by a plant species (13).

Rank order priority (ROP)

ROP is a correction factor, used for appropriate ranking of the plant species with different FL and RPL values. The ROP is derived by multiplying RPL and FL values as explained earlier (14).

$$ROP = FL\ RPL$$

Observation & Results

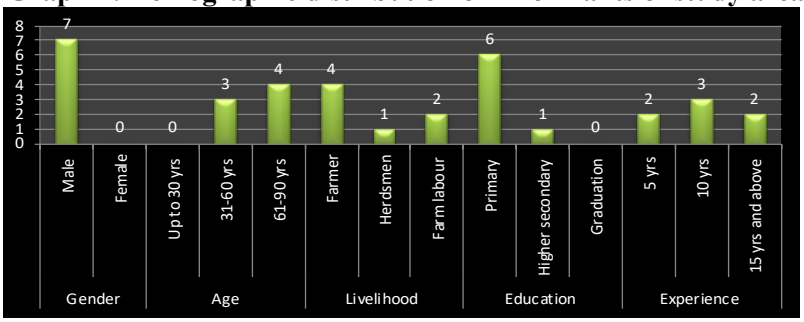
Table 1: List of Ethno-botanical plant species of the study area with RFC and UV value:

S.N.	Botanical name	Family	Local Name	Sanskrit name	Habit	Part Used	Disease Treated	Preparation	Administration Route	RFC*	UV**
1	*Acacia arabica* (Lam.)Willd.	Mimosoideae	*Babhul*	*Babbul*	Tree	Bark, Gum	Pyorrhea, General debility	Decoction, Powder	Oral, Gargle	0.14	0.28
2	*Achyranthes aspera* Linn.	Amaranthaceae	*Aghada*	*Apamarga*	Herb	Root	Dogbite, Snake bite, Scorpion bite,	Decoction, Paste	Topical	0.28	0.57
3	*Adhatoda vasica* Nees	Acanthaceae	*Adusa*	*Vasa*	Shrub	Leaves	Asthama, Phelgm	Juice with honey	Oral	0.57	0.85
4	*Aegel marmelos* Linn.	Rutaceae	*Bel*	*Bilwa*	Tree	Fruit	Diarrhoea, amaebiaasis	Powder	Oral	0.14	0.28
5	*Ailanthus excelsa* Roxb	Simaroubaceae	*Maharukh*	*Aralu*	Tree	Bark, Leaves	Asthama, Cr.Fever, Tonic	Powder	Oral	0.28	0.85
6	*Aloe vera* (L.) Burn.F.	Asphodelaceae	*Karan kuwari*	*Kumari*	Herb	Leaves	Wound , burns, amenorrhoea	Paste	Oral, Topical	0.14	0.42
7	*Allium ursenum* L.	Amaryllidaceae	*Jangali Lashun*	*Wild Lashun*	Herb	Tuber	Galectogauge	Decoction	Oral	0.14	0.14
8	Anogeissus *latifolia*(DC)Wall	Combretaceae	*Dhavada*	*Dhav*	Tree	Bark	Intestinal ulcer	Decoction	Oral	0.14	0.14
9	*Andrographis paniculata* (Burm.F.)Nees	Acanthaceae	*Bhuineem*	*Kalmegh, Chiraita*	Herb	Whole plant	Fever, Acidity	Decoction	Oral	0.14	0.28
10	*Argemone mexicana* Linn	Papaveraceae	*Pivala dhotra*	*Swarna kshiri*	Shrub	Root, Leaves	Skin diseases	Ash	Topical	0.14	0.14
11	Argyreia speciosa Linn F.	Convolvulaceae	*Vidhara*	*Samudr shosha*	Climber	Seeds	Aphrodisiac, Joint pain	Powder	Oral	0.14	0.28
12	*Arundo donax*(L)	Gramineae	*Palicha kanda , San*	*Ranboru*	Herb	Tuber	Piles, Eczema	Paste	Topical	0.28	0.42
13	*Asparagus recemosus* (willd)	Asparagaceae	*Sansan*	*Shatavari*	Climber	Root	Antacid, Lactation, Tonic	Powder	Oral	0.14	0.42

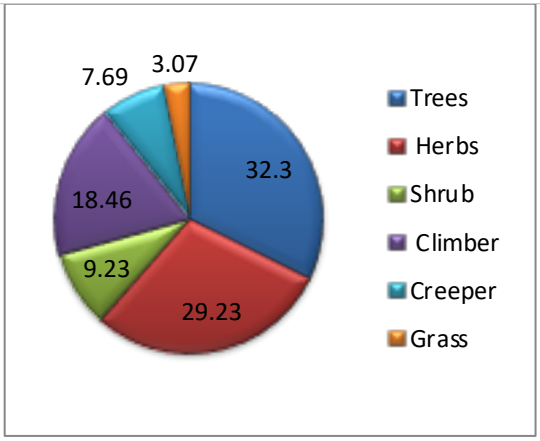
14	*Astercantha longifolia* (L.) Ness	Acanthaceae	*Kolistha*	*Talim khana Kokil-aksha*	Herb	Seeds	Aphrodisiac, Tonic	Powder	Oral	0.14	0.28
15	*Azadirachta indica* A.Juss	Maliaceae	*Neem*	*Nimb*	Tree	Bark	Fever	Decoction	Oral	0.14	0.14
16	*Bacopa monnieri* H.B.K.	Plantaginaceae	*Dimakh-dari*	*Bramhi*	Herb	Plant	Memory enhancer, Nervous disorder	Paste	Topical	0.28	0.71
17	*Balanitis aegyptica*(L.) Delil	Zygophyllaceae	*Hinganbet*	*Ingudi*	Tree	Fruit	Worms	Decoction	Oral	0.14	0.14
18	*Bauhinia recemosa* Lam.	Leguminoceae	*Bhos*	*Ashma-ntak*	Tree	Leaves	Burning micturation, Renal calculi	Juice	Oral	0.14	0.28
19	*Brassica juncea* (L.) Czern	Cruciferae	*Aasuri*	*Rajika*	Herb	Flower	Asthama, Phelgm	Ash with honey	Oral	0.14	0.28
20	*Butea monosperma* Lam.	Papilionaceae	*Palasful*	*Palash*	Tree	Flower	Diabetes	Decoction	Oral	0.14	0.14
21	Cassia angustifolia Vahl	Leguminoceae	*Sonaa-mukhi*	*Marka-ndika*	Climber	Leaves	Constipation	Powder	Oral	0.14	0.14
22	*Cassia tora* L.	Leguminoceae	*Tarota, Takla*	*Chakra marda*	Herb	Seeds	Abdominal pain, Itching	Decoction	Oral, Tropical	0.14	0.28
23	*Calotropis gigantea* (L.)	Asclepideaceae	*Rui*	*Arka*	Shrub	Flowers	Asthama, Pheglm	Powder	Oral	0.14	0.28
24	*Capparis zeylanica*(L.)	Capparaceae	*Vaghanti*	*Vyaghra nakhi*	Herb	Root	Dog bite	Paste	Topical	0.14	0.14
25	*Celastrus paniculatus* (Willd.)	Celastraceae	*Fofus vel*	*Jyotish-mati*	Climber	Seeds , Tuber	Aphrodisiac Tonic	Powder	Oral	0.14	0.28
26	*Citrulus colocynthis* (L.) Schrad	Cucurbitaceae	*Jangali sherni, safed indryan*	*Indra-waruni*	Creeper	Seeds, Root	Worms , Dismehhoragia Snake bite	Powder	Oral	0.28	0.71
27	*Cletoria ternaeta* (L.)	Fabaceae	*Safed Bhopari*	*Aparajita*	Climber	Whole plant	Azoospermia	Powder	Oral	0.14	0.14
28	*Cochlospermum religiosum* (L.) Alston	Bixaceae	*Gongal*	*Giri-salmalika Ganeri*	Tree	Gum	Cough , Diarrhoea, Dysentry	Powder	Oral	0.14	0.42
29	*Crateava nurvala Buch.* Hum	Capparidaceae	*Varna varni*	*Vayvarna*	Tree	Bark, Leaves	Internal abscess	Decoction, Paste	Oral, external	0.14	0.14
30	*Curcuma amada* Roxb	Zingiberaceae	*Ambehalad*	*Amra-haridra*	Herb	Tuber	Diseases of nervous system, Itching	Paste	Tropical	0.14	0.28
31	*Cuscuta reflexa* (Roxb)	Convolvulaceae	*Adharvel*	*Aakashvel*	Climber	Whole plant	Skin diseases	Ash	Topical	0.14	0.14
32	*Cymbopogon martini* Roxb	Gramineae	*Tikhadazara*	*Tikhadi*	Grass	Leaves	Fever	Decoction	Oral	0.14	0.14
33	*Cynodon dactylon* (L). Pers	Poaceae	*Doob*	*Durva*	Grass	Leaves	Epistaxis , Fever	Juice	Nasal drop, oral	0.14	0.28
34	*Dioscorea bulbifera*(L.)	Discoreaceae	*Dukkarkanda*	*Warahi*	Creeper	Tuber	All skin diseases	Paste	Topical	0.14	0.14
35	*Diplocyclos palmatus* L.	Cucurbitaceae	*Shivlingi*	*Shivlingi*	Climber	Seeds	Female infertility	Powder	Oral	0.14	0.14
36	*Dregea volubilis* (L.f)	Asclepiadaceae	*Hiranvel*	*Haran-dodi*	Creeper	Root	Lactation, aphrodisiac	Powder	Oral	0.14	0.28
37	*Ehretia Laevis* Roxb.)	Boraginaceae	*Khanduchakka*	*Khandu-chakka*	Tree	Leaves	Wound	Powder	Topical	0.14	0.14
38	*Euforbia nerifolia* (L.)	Euphorbiceae	*Nagphani*	*Snuhi*	Shrub	Leaves	Itching, Eczema	Ash with coconut oil	Tropical	0.28	0.42
39	*Eugenia jambolana* Lam.	Myrtaceae	*Jambhul*	*Jamuna*	Tree	Seeds, Leaves	Diabetis , Diarrhoea	Powder Juice	Oral	0.14	0.28
40	*Gmelina arborea* Roxb	Laminaceae	*Shivan*	*Gambhari*	Tree	Leaves	Meningitis, Cr. rhinitis, Epilepsy	Paste, Juice	Topical, Nasal drop	0.14	0.42
41	*Helicteres isora* (L.)	Malvaceae	*Muradphalli*	*Murad-sheng*	Herb	Fruit	Diarrhoea, Dysentry,	Paste	Oral	0.14	0.28
42	*Ixora arborea* (Roxb.)	Rubiaceae	*Lokhandi pala*	*Kota-gandhal*	Tree	Leaves	Diseases of nervous system , weakness	Decoction	Oral	0.28	0.42
43	*Kalanchoe pinnata* (Lam.) Pers	Crassulaceae	*Panphuti*	*Parna-phuti*	Herb	Leaves	Diabetis	Juice	Oral	0.28	0.28

44	*Jasminum grandiflorum* L.	Oleaceae	*Jai*	*Jati*	Climber	Leaves	Mouth ulcer, pyorrhoea	Decoction	Gargle	0.14	0.28
45	*Lannea coromandelica* (Houtt) Merr	Anacardiceae	*Moi*	*Jhingini*	Tree	Bark	Wound healing	Decoction	Topical	0.14	0.14
46	*Litsea glutinosa* (Lour.)CB Robins	Lauraceae	*Maidalakdi Lenja*	*Medasak*	Tree	Bark, Leaves	Urinary diseases, tonic	Decoction, Powder	Oral	0.28	0.71
47	*Melia azedarach* (L.)	Meliaceae	*Bakan*	*Mahanimba*	Tree	Bark	Skin diseases, Fever	Decoction	Oral	0.14	0.28
48	*Mimosa pudica*(L.)	Leguminoceae	*Lajvanti*	*Lajjalu*	Creeper	Root	Snake bite Blood purifier	Paste	Topical	0.14	0.28
49	*Mucuna pruriens*(L.) DC.	Leguminoceae	*Khajkuhili*	*Kapi-kachhu*	Climber	Seeds	Scorpion bite, Azzospermia	Powder	Tropical, oral	0.14	0.28
50	*Ocimum sanctum* (L.)	Labiateae	*Tulas*	*Tulsi*	Herb	Leaves	Asthama, Phelgm	Decoction	Oral	0.14	0.28
51	*Randia dumentorum* (Retz) Lam.	Rubiaceae	*Fetal*	*Madan-phala*	Tree	Root	Scorpion bite	Paste	Topical	0.14	0.14
52	*Ricinus communis* (L.)	Euphorbiaceae	*Erandi*	*Erand*	shrub	Leaves	Jaundice	Juice	Oral	0.14	0.14
53	*Plumbago zeylanica* (L.)	Plunbaginaceae	*Chitraka*	*Chitraka*	Herb	Root	Chronic skin diseases, Vitiligo	Paste	Topical	0.14	0.28
54	*Pongamia glabra* (L.)	Leguminoceae	*Karanji*	*Karanj*	Tree	Leaves	Diseases of nervous system	Decoction	Oral	0.14	0.14
55	Solanum indicum (Linn.)	Solanaceae	*Bhui dorli*	*Brihati*	Herb	Root	Dog bite	Paste	Topical	0.14	0.14
56	*Scilla indica* (Roxb)	Liliaceae	*Rankanda*	*Van-palandu*	Herb	Tuber	Cough, Sotha,	Paste	Topical	0.14	0.28
57	*Sterculia urens* (Roxb)	Malvaceae	*Karucha*	*Karu*	Tree	Gum	Bone fracture	Powder	Oral	0.14	0.14
58	*Tephrosea purpura* (L.)Pres	Fabaceae	*Unhali*	*Shar-punkha*	Herb	Root , Seed	Snake bite, colic Spleenomegalae	Powder	Oral, Topical	0.14	0.42
59	*Tinospora cordifolia* (Willd.)	Menisperm-aceae	*Gulvel*	*Guduchi*	Climber	Stem	Arthritis, gout	Decoction	Oral	0.42	0.71
60	*Tribulus terristris* (L.)	Zygophyllaceae	*Sarata*	*Gokshur*	Creeper	Fruit	Urinary diseases, burning micturation	Decoction, powder	Oral	0.14	0.28
61	*Terminalia arjuna* Wight & Arn	Combretaceae	*Aajan saal*	*Arjuna*	Tree	Bark	Heart diseases , Diabetis Otalgia	Decoction, Leaves juice	Oral, eardrop	0.14	0.42
62	*Tridex procumbens* (L.)	Asteraceae	*Ekdandi , Ghavpala, dagdi pala*	*Kamber-modi*	Herb	Leaves	Cuts, wounds	Juice	Topical	0.28	0.85
63	*Ventilago denticulata* (Willd.)	Rhamnaceae	*Raktapitti*	*Raktavalli*	Climber	Root	Menorrhagia	Decoction	Oral	0.14	0.14
64	*Vitex negundo* (L.)	Laminaceae	*Nirgudi*	*Nirgundi*	Shrub	Leaves	Vataroga, Shotha	Decoction	Oral	0.28	0.28
65	*Cardiospermum helicacabum* (L.)	Sapindaceae	*Kapal-phodi*	*Indravalli*	Climber	Leaves	Rhumatism , arthritis	Poultice	Topical	0.14	0.28

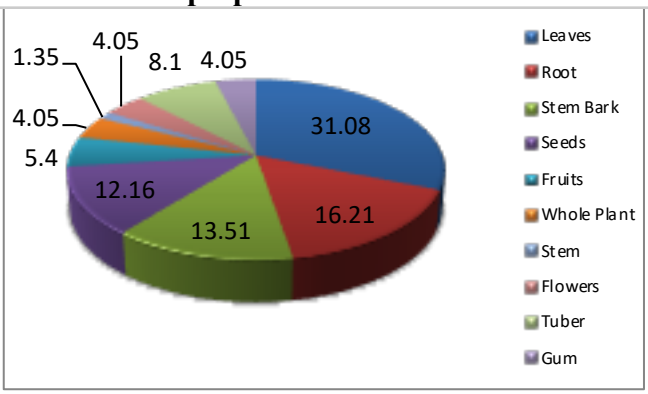
Graph 1: Demographic distribution of Informants of study area



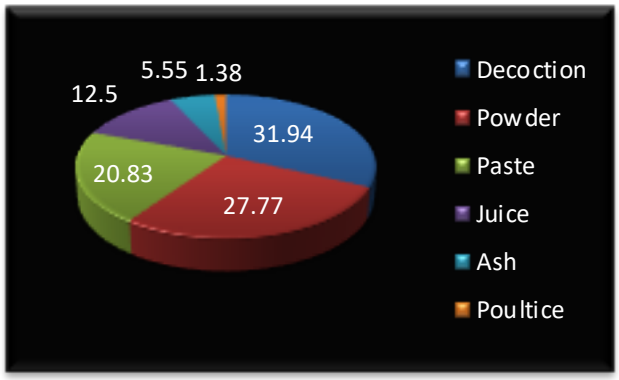
Graph 2 : Habitat of the study area



Graph 3 : Percentage of Plants parts used for the preparation of medicine



Graph 4 : Proportional contribution of herbal preparations in the treatment



Graph 5 : Routes of administration of prepared medicine in the study area

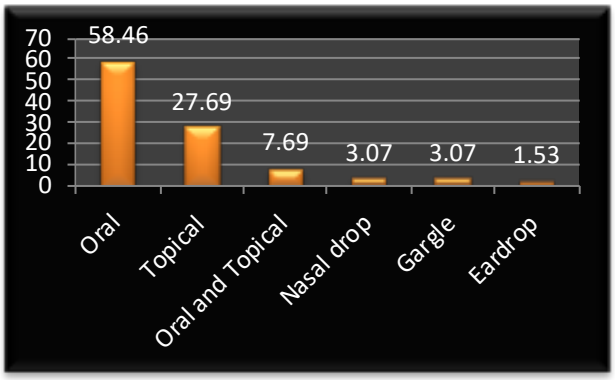


Table 2: Commonly used herbal drugs of the study area along with FL, RPL and ROP value

S.N.	Name of drug	N	ND	Disease treated	Np	RPL*	FL**	ROP***
1	*Adhatoda vasica* Nees	4	4	Cough & Bronchitis	4	0.28	100	28
2	*Tinospora cordifolia* Willd.	3	4	Arthritis	3	0.42	100	42
3	*Achyranthes aspera* Linn.	2	3	Scorpion bite	2	0.42	100	42
4	*Ailanthus excels* Roxb.	2	3	Tonic	2	0.42	100	42
5	*Arundo donax* Linn.	2	2	Himorrhoides	2	0.28	100	28
6	*Bacopa monnieri* Linn.	2	5	Nervous disorder	1	0.71	50	35
7	*Butea monosperma Lam.*	2	2	Diabetes	1	0.28	50	14
8	*Euforbia nerifolia* Linn.	2	2	Eczema	2	0.14	100	14
9	*Citrullus colocynthis*(L.) Schrad	2	3	Worm infestation	2	0.42	100	42
10	*Kalonchoe pinnata* (Lam.) Pers	2	2	Renal calculi	1	0.28	50	14
11	*Ixora arborea* Roxb.	2	2	Arthritis	2	0.14	100	14
12	*Litsea glutinosa* (Lour.)CB Robins	2	3	Urinary disease	2	0.28	100	28
13	*Vitex negundo* Linn.	2	2	Diseases of nervous system	2	0.28	100	28
14	*Tridex procumbens* Linn.	2	3	Cuts & wounds	2	0.28	100	28

N - Number of total informants citing the species for any given disease ND - Number of diseases treated
Np - No. of informants who asserted a use of certain herb for a specific ailment
FL - Fidelity level, RPL- Relative popularity level, ROP- Rank order priority

Table 3: Showing the ICF value of used herbal plants against various disease categories

No.	Disease categories	Number of use reports	No. of plants used	ICF* Value
1	Gastro-Intestinal diseases	17	15	0.12
2	Dermatological Diseases	22	18	0.19
3	Respiratory Diseases	15	10	0.35
4	Genito-Urinary Diseases	22	19	0.14
5	Skeleto-Muscular Disorders	17	13	0.18
6	Poisonous Bites	15	13	0.14
7	Cardio-vascular diseases	1	1	0.00

8	Endocrinal Disorders	4	4	0.00
9	Ear, Nose, Throat (ENT) & mouth related problems	5	5	0.00
10	Reticulo endothelial system	2	2	0.00
11	Nervous disorders	6	4	0.40
12	General Health	9	9	0.00

Discussion

Demographic/Personal Information on Respondents:

Total 7 tribal traditional healers commonly known as *Vaidu* were interviewed during the survey period. All were men ranges in the age of 48 to 82 years having the practicing experience of 5 to 25 years. All these tribes speak Marathi language for communication, belonged to farmer, herdsmen and farming labor category and hardly have had primary education. All were primarily depending on an agricultural and forest resource for their survival(Gragh1).

Diversity of Medicinal plant

Present investigation revealed information on 69 plant species but after cross checking in follow up visits 65 plant species related to 46 families were verified, authenticated and then documented (Table 1) as being used to various ailments. The most representative family was Leguminoceae with 6 species, Acanthaceae 3 species, Asclepiadaceous, Cucurbitaceae, Convovulaceae, Combritaceae, Euphorbiceae, Gramineae, Fabaceae, Laminaceae, Maliaceae, Malvaceae, Rubiaceae and Zygophyllaceae with two species each and the remaining families were represented by one species each associated with the treatment of the reports. Informants generally share the name of plants in local language used in the treatment of various diseases. This was inconsonance with Singh (2008) who reported that plants are generally known by their colloquial names throughout the world (15). The colloquial names help in understanding the ethno botanical study of a particular tribe or region. Due to the lack of uniformity and consistency local names are not recommended directly for scientific accounts, yet they may certainly play a vital role in search of new useful plants or new indications of known plants (16).

Habitat

The habitat of the documented plant species in the study area is mentioned in graph 2. Total 6 types of habitat were identified out of the 65 plant species discussed/reported. They were trees (20 species), herbs (19 species), Shrubs (07 species), climbers (12 species), creepers (05 species) and grass (02 species). This classification revealed that trees (32.30%) and herbs (29.23%) were the routinely used plant habits by the traditional healers for treating the various disease conditions in the study area. This could be associated to the high availability throughout the year and usefulness of trees and herbs in the study area, making them available to the users easily (17).

Plant parts used

Though all plant parts are important as a medicine, however it is observed (graph 3) that traditional healers utilized leaves as the most common plant part with 31.08 % applications in medicinal preparations, followed by roots (16.21%), stem bark (13.51%) Seeds (12.16%), fruits (5.40%) tuber (8.10%), flowers, whole plant, Gum and resin (each 4.05% respectively) and stem (1.35 %). These findings are congruent with the study conducted by Shosan L. *et al* (18), Senthilkumar K *et al* (19) and Chandrakumar Patale *et al* (20). It is obvious that the use of leaves is beneficial for the survival of medicinal plants as compared to the collection of stem, root and whole plant which may cause severe menace to local flora and fauna.

Traditional healers of the study area have had the sound knowledge with respect to medicinal preparations for the treatments of various ailments. Most of the preparations used were in the form of decoction, juice, powder, paste, ash and poultice. Decoction was the choice of preparation (23 applications), followed by powder, paste and juice (20, 15 and 09 applications respectively) whereas ash (black burned powder) and poultice were used in 04 and 01 applications respectively (Graph 4). It aids the traditional healers to utilize the herbal drugs in various forms and techniques to treat the diseases and to compete with easy dispensing and palatability (21). Findings of broad range of medicine preparation methods have also been reported in previous studies (22-23).The broad use of decoction and powder found in the survey is congruent with the ethnomedicinal survey conducted in various tribes of India and other countries (24-26). Internal uses of medicines (58.46%) were predominant over external or topical uses (27.69%), both oral and topical (7.69 %), nasal drop and gargle (3.07% each) and only 1.53% administered as eardrop (Graph 5).

Informant Consensus factor

Informant Consensus factor was calculated by classifying the reported diseases into 12 types of disease categories based on their use reports (Table 3). It is observed that dermatological and genitourinary diseases were dominated with each 22 use reports followed by gastrointestinal diseases and skeleto muscular disorders (17 use reports each respectively) and respiratory diseases and poisonous bites (15 use reports each respectively).Thus findings from the study revealed that dermatological diseases and genitourinary disorders are common in the study area. Personal unhygienic conditions prevalent in the study area may be reason to develop these conditions. Similar findings are congruent with the study conducted by *Muhammad Umair et al* Punjab Pakistan (27). The ICF values of different diseases categories were ranged from ‘0’(cardiovascular diseases, endocrinal diseases, ENT disorders, Reticulo endothelial system & general health) to 0.35 for respiratory disorders. Thus for all disease categories the

average ICF value was 0.12. Higher ICF value (0.35) calculated for respiratory disorders which indicate that genuine species of herbs are utilized by tribal healers because of their authenticity with respect to disease curing capacity. It also tests the consistency of informant's knowledge regarding plants species for treating a particular illness category. However low ICF indicates that informants have no resemblance in using the herbal drugs while treating the diseases.

Relative frequency of citation (RFC)

RFC signifies the local importance of each species in study area. RFC of reported species ranged in between 0.14 To 0.57. The higher RFC was observed for *Adhatoda vasica* (0.57) followed by *Tinospora cordifolia* (0.42) and *Achyranthus aspera*, *Ailanthus excelsa, Arundo donax, Bacopa monnieri, Citrulus colosynthis, Euphorbia nerifolia, Ixora arborea, Kalanchoe pinnata, Litsea glutinosa, Tridax procumbens and Vitex nigund*o (0.28) respectively. It means that these species were well known to the informants of the study area. (Table 1) Those medicinal plant species having high RFC must be further assessed for phytochemical analysis and pharmaceutical analysis to identify their active constituents.

Use value (UV)

Data collected from the present study it is observed that UV ranges from 0.14 to 0.85. The highest UV calculated for *Adhatoda vasica, Tridex procumbens , Ailanthus excelsa* (UV = 0.85 each) followed by and *Tinosphora cardifolia, Bacopa monnieri, Citrulus colocynthis* & *Litsea glutinosa* (UV= 0.71 each). This indicated the sound knowledge of informants regarding various plant species in treating the various ailments. Recent advance researches on few herbal drugs like *Azadirachta indica*, *Tinospora cordifolia, Bacopa monnieri*, *Ocimum sanctum* have revealed the significant immune boosting and antiviral activity also (28-29).

Lowest UV of *Balanites aegyptica*, *Kalanchoe pinnata*, *Solanum indicum* & *Ventilago denticulate* (UV = 0.14 each) may be due to the low accessibility of these species in the study area. Plant species with high UV should be further studied for ethno-pharmacological screening to find out the active compounds.

Related popularity level (RPL)

The highest RPL value calculated for *Bacopa monnieri* (0.71) followed by *Tinospora cordifolia, Achyranthes aspera, Citrulus colocynthis* (0.42). It means not a single drug have achieved complete popularity level. May be due to each drug is considered as best in specific condition.

Fidelity level (FL)

The fidelity level (FL) of the 14 most important plant species ranged from 50 to 100%. The high FL indicates the frequency and maximum use of the plant species for treating a particular ailment by the informants. *Adhatoda vasica, Tinospora cordifolia, Achyranthes aspera, Ailanthus excelsa, Arundo donax, Euphorbia nerifolia, Citrulus colocynthis, Ixora arborea, Litsea glutinosa, Vitex negundo, Tridax procumbens* showed 100% FL against the diseases shown in table 2.

Study conducted by Srithi K *et al* (2009) and Bibi T *et al* (2014), *Vitex negundo* and Ixora arborea depicted 100% FL against diseases of nervous system respectively (30-31). In another study, *Ranunculus sceleratus, Moringa oleifera, Tribulus terrestris* were claimed as having antiurolithiatic property to treat urinary disorder (32-33).

Rank order priority (ROP)

ROP is a correction factor, used for appropriate ranking of the plant species with different FL and RPL values. Out of the highly ranked 14 species, only four species attained ROP near 50. Based on ROP value *Achyranthus aspera, Ailanthus excelsa*, *Citrulus colocynthis* and *Tinospora cordifolia* were widely utilized species with ROP = 42. The other plant species with significant ROP was *Bacopa monnieri* (ROP=35)

From the above findings it is recommended that the plant species used by the traditional healers in specific disease condition and species with high RPL value could be studied further to screen bioactive compounds and their pharmacological activities to introduce novel drugs.

Conclusion

Present study concluded that the knowledge and applications of traditional herbal medicine for the treatment of various diseases prevalent among the tribes located in Karanja Ghadge Tahsil of Wardha district is still a major part of their life and culture. Tribal communities have a strong belief in the efficacy and success of these species grow around them and the results of the study provided evidences that the plant species continued to play vital role in the healthcare system of this community. Lacking the interest among the younger generations of tribal people in traditional medicine is a matter of concern. The present work would be useful in identification of newer species and their therapeutic applications. Ethno-botanical data of plant species may be helpful to policy makers which are under threat due to over exploitation. Traditional medicinal preparations may pave a way to develop advance and modified drug dosage forms so that can be administered by different routes over traditional routes effectively.

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