Indian Journal of Traditional Knowledge
Vol 23(7), July 2024, pp 665-674
DOI: 10.56042/ijtk.v23i7.12422

Ethnomedicinal use of plant roots: A case study of the Juang tribe of eastern India

Amiya Kumar Sahoo[a], Hari Charan Behera[b,*] & Ajit Kumar Behura[a]

[a]Department of Humanities and Social Sciences, Indian Institute of Technology (Indian School of Mines), Dhanbad
[b]Sociological Research Unit, Indian Statistical Institute, Giridih, Jharkhand 815 301

[*]E-mail: hcbehera@gmail.com

Received 21 October 2021; revised 27 February 2023; accepted 28 June 2024

The Juang, a tribal community in Odisha indulges in traditional health care on the basis of locally available resources. This age-old practice of using plant extracts such as roots and leaves to treat various ailments and diseases is associated with the community culture and wisdom. The study examines the use of plant extracts, particularly roots by Juangs for treatment of various communicable and non-communicable diseases. The data were collected through questionnaire-based field survey, interviews, focus group discussion (FGD) and observation method. The information on medicinal plants including their local, scientific and family names, method of medicine preparation, life form, dosage, applications and effects was collected. The study includes roots of 16 plant species belonging to 13 families that are used for the medicinal purpose. We observed that roots from various wild plant species are used for treatment of various diseases and disorders such as jaundice, hypertension, rheumatism, asthma, infertility, nocturnal emission, venereal diseases, etc. Indigenous application of roots with specific dosages is based on cultural norms and value of the community. This knowledge is transferred from one generation to the other through oral tradition under prevailing health culture. The continuity of this practice with great acumen is determined by various factors such as socioeconomic status, education, occupation and ecological adaptation. The relevance of inherited indigenous healing culture needs to be investigated in this area for developing an alternative approach to community health services and public health policy.

Keywords: Health seeking behavior, Indigenous medicine practice, Medical pluralism, Socio-cultural life

IPC Code: Int Cl.[24]: A61K 36/00

People from different parts of the world (e.g. India, Africa, China, etc.) depend on their own indigenous medicine for the primary healthcare need[1,2]. According to the World Health Organization report, between 70% and 95% of people in developing countries depend on traditional medicine (predominantly medicinal plants and its extracts) for preventive and curative purpose[3]. A study found that Australian aboriginal inhabitants used traditionally around 39 plant species for the treatment of bacterial infection[4]. Medicinal plants become an integral part of cultural adaptation of African people, as a major proportion of these people use the herbal medicine to counter infectious diseases and about 90% of people in Ethiopia use herbal medicine for primary healthcare[5,6]. Over half of the population uses traditional and complementary medicine for wellbeing and disease preventions in developed countries and about 70% of people from Canada and Germany tried complementary and alternative medicine (CAM) at least for once[7,8].

The utilization of a wide variety of plant and animal species plays a significant role among the people living in remote areas. The tribal people use wild medicinal plants and their extracts in traditional health care practices to fulfil their health care need. The geography and climatic condition of India support the growth of over 45000 wild plant species, out of which 7500 plant species are used for preventive and curative purposes by rural people and various ethnic communities in traditional health care practices[9]. As per the census data of the Government of India, about 89.9% of the tribal population lives in remote areas of the forest and hilly regions[10], and 70% of Indian population rely on indigenous medicine[11] which is mostly (about 85%) derived from the plant extracts[12].

Several indigenous communities still depend exclusively on traditional health care practices. In the Andaman & Nicobar Islands the Nicobarese tribal community uses 39 medicinal plant species[13]. In the Western Himalaya, a semi-pastoral tribe the Gujjar use 83 plant species[14], and the Bhangalis tribe predominantly practices traditional medicine. The

*Corresponding author

Bhangalis folk tales described a person cannot die out of a disease in a locality if there wild medicinal plants such as *Vitex negundo* Linn., *Adhatoda vasica* (L.) Nees, *Acorus calamus* Linn., *Terminalia chebula* Retz., *Terminalia bellerica* (Gaertn.) Roxb., *Emblica officinalis* Gaertn. and *Tinospora cordifolia* (Thunb.) Miers ex Hook F. and Thoms.exist[15].

Forest dweller of Daitari range Hills of Odisha includes Munda, Majhi and Sabar communities, use 21 plant species[16] and in eastern India the Juang and Munda tribe use 215 plant species as medicine[17]. The Dongria Kondh tribe uses *Dioscorea* for both medicine and food[18]. The existing literature reveals that a substantial numbers of ethnomedicinal studies have been carried out in various regions of Odisha. However, fewer studies focus on the use of medicinal plants and their extracts in traditional health care practices by the ethnic communities of eastern India, which inhabits more than a hundred tribes and other ethnic communities.

The present case study was carried out to understand the socio-demographic features and treatment-seeking behaviour of traditional health healers and care seekers as well as to identify and classify roots of medicinal plant species and understand the application process of such roots in the curative and preventive mechanism for a wide range of diseases and ailments by the Juang community in eastern India. Our study thus adopts the ethnomedical approach as it seeks an "emic" perspective which is the study of insiders' view in the field of anthropological study.

There are sixty-two indigenous tribal communities including 13 particularly vulnerable tribal groups (PVTGs) living in Odisha. The Juang is one of the 13 PVTGs in Odisha which inhabits in Keonjhar district of the state. Ethnically, the Juangs belong to the Austroasiatic language family of Mundari group. They believe that they are originated from the *Juangpirh* at Gonasika Hill, at the foothill of Guptaganga which is also the origin of Baitarani River in Keonjhar. Now some of them are migrated into other parts of the state including Pallahara of Angul district, Kankadahada of Dhenkanal district, Harichandanpur of Keonjhar district, Ranpur of Nayagarh district, Nagada of Jajpur district in Odisha[19]. The Juangpirh is divided into four categories namely Jharkhand, Satakhand, Rebena and Kathua. Each *pirh* has a Sardar as its headman and a *pradhan* serving under him to handle judiciary functions. Socio-economically this tribe is one of the disadvantageous groups in the state.

Materials and Methods

Keonjhar district is situated between 21˚37' 44.1588" N and 85˚34' 54.0768" E at an elevation of 1200 m above the MSL in the Indian state of Odisha. It covers an area of 8240 sq. km. and the majority of the area is under lush green forest along with waterfalls, gorges, mountains, and valleys. About half of the geographical area was covered by forest, which included about 45% Reserve Forests. The forests belonged to northern tropical moist deciduous forest. The climate is pleasant throughout the year, which is however changing over the years. Agriculture in the district is mostly rain-fed and drought-prone. Paddy is the most popular staple crop grown widely in the district. The map of the study area is shown in (Fig. 1).

The ethnomedicinal surveys were carried out in three phases between March 2019 and February 2020. In the first phase, a pilot survey was conducted to establish rapport and identify the key resource persons who could facilitate us in translating local dialect and understand the usages of plant extracts as medicine. The main survey was carried out in the second phase for a period of three months with visits in three different seasons namely, summer, rainy and winter seasons to collect detailed information related to diseases and ethno-medicinal practices. In the third phase, a short field visit was carried out to cross-check the information gathered during the previous visits. Information about traditional healers as well as elderly men and women as practitioners was gathered through snowball sampling technique. Fourteen (twelve male and two female) key informants were interviewed after getting their verbal consent for data collection about the utilization of plant roots in the traditional health care system. Besides the use of questionnaire, interviews, observation and focus group discussions (FGD) were held with both the healers and treatment seekers separately to collect, cross verify and validate the gathered data. Information about the socioeconomic profile and plants including their local, scientific and family names, method of medicine preparation, life form, dosage, applications and effects were recorded during the field study. All the plant species were identified according to *The Flora of Orissa*[20]. The voucher specimens of the plants referred by the key resource

persons were collected and stored in the herbarium of the Council of Scientific and Industrial Research-Institute of Minerals & Materials Technology (CSIR-IMMT) Bhubaneswar, Odisha.

Results

Socio-demographic characteristics features

Our study included 297 persons which includes 150 males and 147 females (Table 1). The main occupation of the people was agriculture (85%), followed by causal labor (8.3%) and the rest included skilled labor, Govt. or semi govt. employee, self-employed (6.7%). Economy of the households is subsistence type as their average monthly expenditure was Rs. 2105/- (US $28.49) and saving was as meagre as Rs. 285/- (US $ 3.86) (Table 2). Fourteen traditional healers included 42.9% literates, 28.6% non-literates, 21.4% with the primary and 7.1% with the secondary level of education. The traditional healers' had an average monthly expenditure of Rs. 1736/- (US $23.49) and savings as low as of Rs. 622/- (US $ 8.42) (Table 3).

Level of education and perspectives of treatment received

About a half of the total Juang households preferred to use indigenous medicine such as plant extracts/herbs followed by access to public hospital/ PHC 45%, private doctor 3.3% and quack 1% (Fig. 2). The educational level of the head of

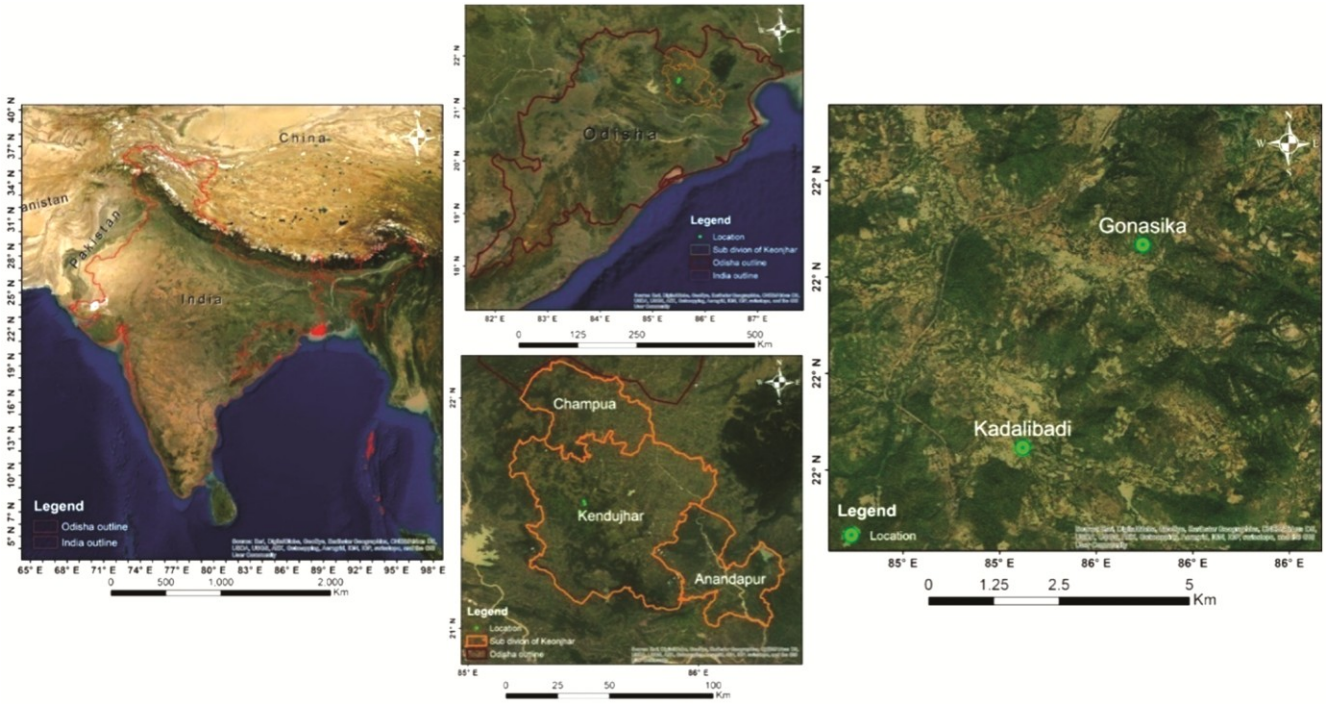

Fig. 1 — Map showing area under study

Table 1 — Population under study area

Statistics	Total Male	Total Female	Total Adult Male	Total Adult Female	Total Minor Male	Total Minor Female	Total population
Number of household	60	60	60	60	60	60	60
Mean	2.5	2.4	1.6	1.5	0.9	0.9	
Sum	150	147	96	91	54	58	297

Table 2 — Financial status and primary occupation of HoH

Statistics	Primary Occupation of HoH						Total	Total Monthly Expenditure in Rs.	Total Monthly Saving in Rs.
	Agriculture	Casual Labour	Skilled Labour	Govt./Semi Govt. employee	Self-employed	Others			
Number	51	5	1	1	1	1	60		
% of Total	85.0%	8.3%	1.7%	1.7%	1.7%	1.7%	100.0%		
Mean								2105	285

household (HoH) plays a significant role in treatment-seeking behavior. About 58.8% of literate, 53.8% of non-literate, and 46.2% people with primary education and 25% people with secondary education use indigenous medicine for the treatment of various diseases (Table 4).

Prevalence of indigenous medicine (e.g., root) and its' application

In traditional healthcare practices, the roots are obtained from various types of plants such as trees, shrubs and herbs. A major proportion of roots were extracted from herbs (38%) followed by trees (31%), small trees (6%) and shrubs (25%) respectively (Fig. 3). These roots belong to 16 medicinal plant species and 13 families. The diverse mode of preparation and application of the medicinal roots included paste, powder, crushed, concentrated liquor and juice (Fig. 4). The healers used these plant roots including single root for the treatment of a wide range of diseases and ailments (at least 18 types) varying from simply primary stage boil to highly complicated male and female disorders. They also treated jaundice, venereal disease, infertility, asthma and rheumatism (Fig. 5). The healers used pellets either by single or by a combination of different ingredients such as oil, milk, minerals and salt.

The roots of the medicinal plant species, their applications concerning specific diseases and mode of preparation and administration are presented in Table 5. This table illustrates the traditional healers'

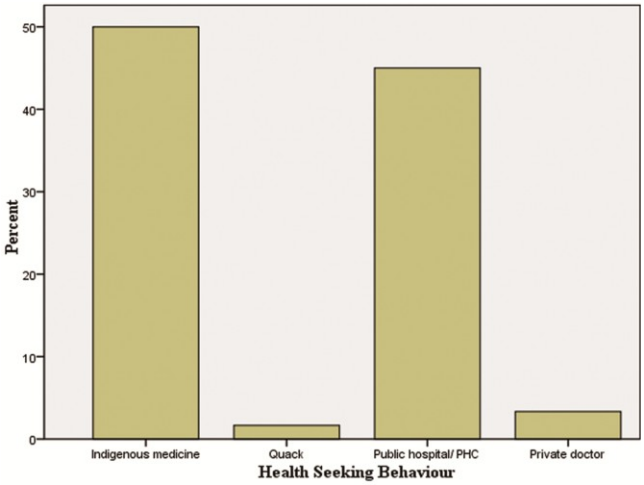

Fig. 2 — Treatment received from different healthcare practices

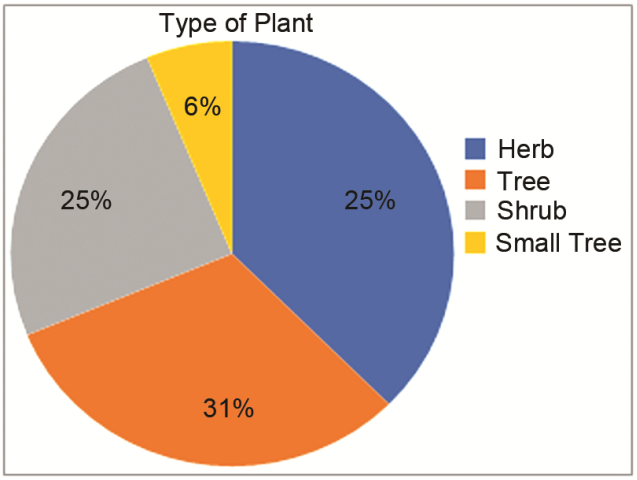

Fig. 3 — Type of plant species used to treat disease and ailments

Table 3 — Traditional healers' demography and socioeconomic profile

Traditional healers	Gender		Education				Total	Financial status	
	Male	Female	Illiterate	Literate	Primary	Secondary		Total Monthly Expenditure in Rs.	Total Monthly Saving in Rs.
Number	12	2	4	6	3	1	14		
% of Total	85.7%	14.3%	28.6%	42.9%	21.4%	7.1%	100.0%		
Mean								1736	622

Table 4 — Education level of HoH and treatment received

Education of HOH		Treatment Received				Total
		Indigenous Medicine	Quack	Public Hospital/PHC	Private Doctor	
Illiterate	Number	7	0	5	1	13
	%	53.8%	0.0%	38.5%	7.7%	100.0%
Literate	Number	10	0	6	1	17
	%	58.8%	0.0%	35.3%	5.9%	100.0%
Primary	Number	12	1	13	0	26
	%	46.2%	3.8%	50.0%	0.0%	100.0%
Secondary	Number	1	0	3	0	4
	%	25.0%	0.0%	75.0%	0.0%	100.0%
Total	Number	30	1	27	2	60
	%	50.0%	1.7%	45.0%	3.3%	100.0%

use of roots of different medicinal plant species. The paste prepared from the root of *A. aspera* Linn. is applied externally on the affected area to get relief from the primary stage boil. The patient suffered from dysentery chew the crushed rootstock of the plant species *A. calamus* Linn. About a half teaspoonful of the powder prepared from the rootstock of this plant species is prescribed to take in empty stomach once in the morning to increase appetite and twice daily to cure asthma. About 5 mg. doses of paste obtained from the root of *R. serpentine* (L.) Benth. Ex Kurz. is given to patient to take daily in empty stomach for a period of one week to reduce high blood pressure and about 10 mg. of root paste of this plant species is used orally for the treatment of snakebite. Whereas, 10 mg. oral application of paste prepared from the root bark with cold water helped to get relief from stomachache. Similarly, the root paste of *S. asper* Lour. is smoothly applied to the affected area for the treatment of dog bite. The powder prepared from the dried root of *S. zeylanica* Linn. is externally applied over the affected area to cure the chronic ulcers and

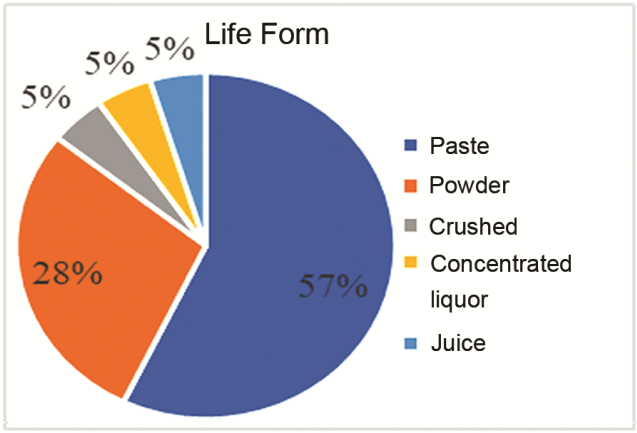

Fig. 4 — Method of and life form in medicine preparation and its application

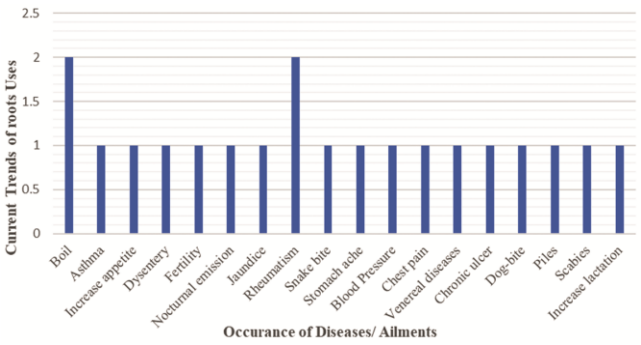

Fig. 5 — Number of roots used in indigenous medicine for the treatment of disease and ailments

the paste obtained from this root is taken orally once in a day for about one week for the treatment of venereal diseases and about 20 mL. of decoction prepared from this root is orally administered for a period of 15 days to cure rheumatism. In addition to this, about 5 mg. of the powder prepared from the root of *H. indicus* (L.) R. Br. ex Schult. is taken with lukewarm water thrice daily for a period of 21 days to cure rheumatism. Whereas, about 10 mg. of paste obtained from this root is taken with coconut water in empty stomach for seven days to treat jaundice. The paste obtained from the fresh root of *B. ceiba* L. is gently applied on the affected parts to get relief from the pain due to boils. But this paste along with jaggery is given to the women who suffer from issues of infertility to restore fertility and conceive a baby. Similarly, about 20 mL of juicy paste from tender tips of prop root of *F. benghalensis* L. is taken along with goat milk in empty stomach once daily for 21 days to stop nocturnal emission and restore vigour and strength in nerves. To produce and/or increase the breast milk of the lactating mother, about one tbs. of the powder prepared from the tuber of *P. tuberose* (Roxb. ex Willd.) DC. and anther of *M. paradisiacal* L. along with cow milk is given to the respective mother once a day for 15 days. The paste prepared from the root of *T. purpurea* (L.) Pers. is externally applied to get relief from the chest pain. About 3-4 tbs. of mixed juice prepared from the root of *C. pareira* (L.) var. hirsuta (Buch.-Ham. ex DC.), one onion (*A. cepa* L.) and stem bark of *S. nux-vomica* L. is taken twice daily after meal for three days to cure piles. For the treatment of scabies, the paste prepared from the root bark of *A. indica* A. Juss. along with *C. longa* Linn. is externally applied twice daily after cleaning up the wound with boiled neem water.

Discussion

The indigenous medicine is used for curative and preventive practices of various disease and bodily disorder such as communicable and non-communicable diseases, genetic disorders, maternal and child health etc. This practice is firmly accepted by the World Health Organization and the World Bank[21,22]. The Indian ancient medicinal systems such as Ayurveda, Sidha and Unani have a close resemblance with the ethnomedicine that is associated with the roots, barks, leaves, flowers, fruits and seeds of plant species for treatment of various diseases[23,24].

Our research shows that the root of *A. aspera* Linn. is used to cure primary stage tumour has also been

used in other parts of India also for treatment of various diseases and disorders like stomach ache, cholera, skin disease, rabies, rheumatism and infertility[25]. Similarly, the root of *A. calamus* Linn. which is used for the treatment of dysentery, asthma and to increase appetite by the Juang community is also found in practices of Ayurveda, Sidha, Unani, and Chinese medicine for the treatment of various diseases and ailments such as nervous disorders, loss of appetite, bronchitis, chest pain, colic, cramps, diarrhoea, indigestion, rheumatism, cough, fever, bronchitis, inflammation, depression, tumors, haemorrhoids, skin diseases, vascular disorders, epilepsy, mental illness, dysentery, fever, abdominal tumours, kidney and liver problems[26,27]. The Juang community which uses the roots of *B. ceiba* L. to restore the fertility of women and reduce the pain due to tumour is also used by the Garo and non-Garo

Table 5 — Roots of medicinal plants used for the treatment of various diseases in traditional health care practices.

Sl. No	Vernacular Name_Odia	Botanical Name, (Family)	Uses	Dosages and Applications
1	Apamaranga	*Achyranthes aspera* Linn. (Amaranthaceae)	Primary stage boil	Root paste is externally applied
2	Bacha	*Acorus calamus* Linn. (Acoraceae)	Asthma	About a half teaspoonful of the powder prepared from dried rootstocks is taken twice daily
			Appetite disorder	A half teaspoonful of rootstocks powder is taken in an empty stomach once in the morning
			Dysentery	Freshly crushed rootstocks are chewed
3	Simili	*Bombax ceiba* (L.) (Malvaceae)	Pain due to boils	Fresh roots are grinded with water and applied on the affected parts
			Infertility	Paste prepared from fresh root along with jaggery is taken by females
4	Bara	*Ficus benghalensis* (L.) (Moraceae)	Nocturnal emission and restores vigour and strength in nerves	About 20 mL. of juicy paste prepared from tender tips of prop root is taken in the empty stomach once daily for 21 days along with goat milk
5	Anantamula	*Hemidesmus indicus* (L.) R. Br. ex Schult. (Apocynaceae)	Jaundice	About 10 mg. of root paste is taken with coconut water in empty stomach for seven days
			Rheumatism	About 5 mg. of root powder is taken with lukewarm water thrice daily for a period of 21 days
6	Patalagaruda	*Rauvolfia serpentina* (L.) Benth. Ex Kurz (Apocynaceae)	Snakebite	About 10 mg. of root paste is taken orally
			Stomach ache	Bark obtained from the root is grinded and about 10 mg. of this paste is taken with cold water
			High blood pressure	About 5 mg. root paste is taken daily in empty stomach for a week
7	Banakultha	*Tephrosia purpurea* (L.) Pers. (Fabaceae)	Chest pain	Paste prepared from the root is externally applied.
8	Muturi	*Smilax zeylanica* Linn (Smilacaceae)	Rheumatism	About 20 mL of root decoction is taken for 15 days
			Venereal diseases	Paste prepared from the root is taken for a week
			Chronic ulcers	The dried root powder is applied externally.
9	Sahada	*Streblus asper* Lour. (Moraceae)	Dog-bite	Paste prepared from root paste is applied externally.
10	Kochila	*Strychnosnux-vomica* L. (Loganiaceae)	Piles	About 3-4 tbs. of juice prepared from the root of *Cissampelos pareira,* stem bark of *Strychnosnux-vomica*, and onion is taken twice daily after meal for 3 days.
11	Ooli/ Piaja	*Allium cepa* L. (Amaryllidaceae)		
12	Akalabindhi	*Cissampelos pareira* (L.) var. hirsuta (Buch.-Ham. ex DC.) (Menispermaceae)		
13	Nimba	*Azadirachta indica* A. Juss. (Meliaceae)	Scabies	Paste prepared from turmeric and rootbark of neem is applied externally twice daily after cleansing up the wounds with boiled neem water.
14	Haldi	*Curcuma longa* Linn. (Zingiberaceae)		
15	Bhuikakharu	*Pueraria tuberosa* (Roxb. ex Willd.) DC (Fabaceae)	Increasing lactation post-delivery	1 tbs. Powder prepared from dried tuber is mixed with dried anthers of *Musa paradisiaca* is taken once a day for 15 days to increase lactation post-delivery.
16	Kadali	*Musa paradisiacal* (L.) (Musaceae)		

traditional medicine men to increase sperm count of an adult male and to prevent the passing of semen through urine[28]. This plant species is also used for curing pimples, to make the skin soft and bright during the marriage and for food during summer seasons by the traditional healers and farmers of Panchmahal district, Gujarat in India[29]. *F. benghalensis* L. which is used by the Juang to prevent nocturnal emission, and to restore vigour and strength, is also used in other parts of south Asia for the treatment of cough, fever, headache, gastrointestinal disorders, respiratory and dermatological problems, and diabetes[30,31]. The root of *H. indicus* (L.) R. Br. ex Schult. is used for the treatment of jaundice and rheumatism by the Juang community. Other studies have noticed its application for snakebites, scorpion stings, rheumatism, diabetes, urinary diseases, menorrhagia, anorexia, abdominal colic and pain, dysentery, leprosy, inflammation, pyrosis, cancer, leukaemia, urinary tract and skin infections[32,33]. This plant species is also used as edible food stuff by tribes of Jharkhand[34]. The root of *R. serpentine* (L.) Benth. Ex Kurz. is used to cure snake bite, stomach ache and high blood pressure by the Juang tribe and this medicinal plant is used for the antidiarrheal activity, hypertension, insomnia, sedative, sexual aggression and vertigo[35-37]. Our findings that show the Juang community used *P. tuberose* (Roxb. ex Willd.) DC. and *M. paradisiacal* L. plant species to increase the lactation of a lactating mother have some similarity in its use by the Dongria Kondh community of Odisha. The Dongria Kondh uses *P. tuberose* (Roxb. ex Willd.) DC., *C. orchioides* Gaertn. and *B. ceiba* L. along with warm cow milk to increase breast milk of a nursing mother[38].

The traditional healers have to enter into the forest passing through narrow hill tracks and plains to collect roots of the medicinal plants and prepare medicines using different methods such as roasting, frying, and drying in the sunlight and boiling with water and crushing with specially designed tools[39] (Fig. 6). The traditional healers worship some plants before uprooting for their use to treat diseases like jaundice and nocturnal emission. The roots of these plants are collected only on specific days and events-Tuesday, Saturday and *Sankranti*. In addition to this, prohibition and food taboos are also noticed. The people without bath and a lady during her menstrual period are advised not to touch the medicine. The lactating mothers are not allowed to take cooked

Fig. 6 — Tools and methods of medicine preparation

pulses that include grass pea (*L. sativus* L.), black gram (*V. mungo* (L.) Hepper.) and green gram (*V. radiata* (L.) Wilczek) but they can consume horse gram (*M. uniflorum* (Lam.) Verdc.). Besides, they are also refrained from consuming a tuber known as taro (*C. esculenta* (L.) Schott). They are served boiled soaked rice and boiled brinjal with 2-3 cloves of garlic and a pinch of salt twice a day for up to one month starting from the day of delivery in order to maintain good health of the new-born baby as well as the mother. Taboos and restrictions are important cultural practice in ethnomedicine to become more effective and yield better results.

The developmental interventions through various central and state polices and flagship programs have changed socioeconomic status such as education, occupation and health status of tribal communities, which subsequently results in changes in the health culture of these communities[40]. The youths who migrate to cities in search of better livelihood get exposure to the modern world. Their return to villages brings in changes in the perception of health-seeking behaviour and increase adoption to modern biomedicine. A study shows that young people rely more on allopathic medicine, leading to the loss of the traditional knowledge system[41]. Some studies found that households with a higher educational level and socioeconomic status and urban inhabitants used modern medicine more than the households with lower educational level, socioeconomic status and habitation in a difficult geographical terrains[42]. However, a major proportion of the tribal people still adopt to the traditional healthcare practice. The Juang people are not opposed to the medical pluralism. They used both traditional as well as modern medicine for the treatment and prevention of various diseases and physical ailments. This shows that both ethnomedicine and biomedicine are socio-culturally reconciled.

Conclusion

Both results and discussion elicited that the traditional healthcare practice is associated with indigenous knowledge, belief, faith, and rationality of the community. The indigenous health care system is an alternative preventive health care system which has both scientific and cultural basis. The use of wide variety of roots in multiple forms for treatment of various diseases and bodily ailments reflects their rich traditional knowledge and scientific acumen. Both healers and community members better understand the local needs, norms and values and they practice taboos and prohibitions pertaining to health practices that fall in the ambit of local culture. Adoption to traditional health practice of the community is determined by various factors such as socioeconomic status, education, occupation, culture and environment. The use of roots in indigenous healthcare is not limited and confined to the Juang community alone as the similar practice is observed in other parts of India and world by several other indigenous communities. Although traditional medicine based on plant resources (roots, tubers, bark, stem, leaves, etc.) emerges as a research tool in the discovery of new drugs in contemporary biomedical practices yet the indigenous knowledge of health practices of the communities is not formally recognised. The communities are still lagging behind for their better access to public health care service.

Acknowledgements

The authors are thankful to all of the Indigenous healers and the Juang community who have participated and shared their wisdom throughout this study. The authors are also thankful to the editor and the anonymous reviewers for their insights in the paper.

Conflict of Interest

The authors have no conflicts of interest to declare.

Funding Information

This research received no specific grant from any funding agency, commercial entity or not-for-profit organization.

Prior Informed Consent

Both verbal and written consent were obtained from the knowledge holders.

Ethics Approval

Not applicable.

Author Contributions

AKS: Conceived there search design, collected and analysed the data, wrote the manuscript; HCB: Guided the research work, analysed the data and edited the manuscript; AKB: Gave the administrative support. All authors read and approved the manuscript.

References

1 Che C-T, George V, Ijinu T P, Pushpangadan P & Andrae-Marobela K, Traditional medicine, In *Pharmacognosy*, Simone Badal, Rupika Delgoda, Eds.; Elsevier: (2017) 15-30.

2 Alsanad S, Aboushanab T, Khalil M & Alkhamees O A, A Descriptive Review of the Prevalence and Usage of Traditional and Complementary Medicine among Saudi Diabetic Patients, *Scientifica* (*Cairo*), (2018). DOI: 10.1155/2018/6303190.

3 Robinson M M & Zhang X, Traditional medicines: global situation, issues and challenges, In *The world medicines situation*, (World Health Organization, Geneva), (2011) 1-14.

4 Palombo E A & Semple S J, Antibacterial activity of traditional Australian medicinal plants, *J Ethnopharmacol*, 77 (2-3) (2001) 151-157.

5 Ndhlala A R, Amoo S O, Ncube B, Moyo M, Nair J J, *et al*., Antibacterial, antifungal, and antiviral activities of African medicinal plants, In *Medicinal plant research in Africa*, Victor Kuete, Eds.; (Elsevier), (2013) 621-659.

6 Nafiu M O, Hamid A A, Muritala H F & Adeyemi S B, Preparation, standardization, and quality control of medicinal plants in Africa, In *Medicinal Spices and Vegetables from Africa*, Victor Kuete, Eds.; (Elsevier), (2017) 171-204.

7 Hawk C, Ndetan H & Evans Jr M W, Potential role of complementary and alternative health care providers in chronic disease prevention and health promotion: An analysis of National Health Interview Survey data, *Prev med*, 54 (1) (2012) 18-22.

8 Suroowan S & Mahomoodally F, Complementary and alternative medicine use among Mauritian women, *Complement Ther Clin Pract*, 19 (1) (2013) 36-43.

9 Rai R & Nath V, The role of ethnic and indigenous people of India and their culture in the conservation of biodiversity, Tropical Forest Research Institute, Jabalpur, 2003.

10 Government of India, Statistical Profile of Scheduled Tribes in India, 2013.

11 Datta T, Patra A K & Dastidar S G, Medicinal plants used by tribal population of Coochbehar district, West Bengal, India–an ethnobotanical survey, *Asian Pac J Trop Biomed*, 4 (2014) S478-S482.

12 Farnsworth N R, Screening plants for new medicines, In: *Biodiversity*, Wilson E O & Peter F M, Eds.; (National Academies Press (US), (1988) 83-97.

13 Sharma T V R S, Abirami K & Chander M P, Medicinal plants used by tribes of andaman and nicobar Islands: A conservation appraisal, *Indian J Plant Genet Resour*, 31 (2) (2018) 125-133.

14 Rana D, Bhatt A & Lal B, Ethnobotanical knowledge among the semi-pastoral Gujjar tribe in the high altitude (Adhwari's) of Churah subdivision, district Chamba, Western Himalaya, *J Ethnobiol and Ethnomed*, 15 (1) (2019) 10.

15 Uniyal S K, Singh K N, Jamwal P & Lal B, Traditional use of medicinal plants among the tribal communities of Chhota Bhangal, Western Himalaya, *J Ethnobiol Ethnomed*, 2 (1) (2006) 14.

16 Mohapatra S P, Prusty G B &Sahoo H P, Ethnomedicinal observations among forest dwellers of the Daitari Range of Hills of Orissa, India, *Ethnobotanical Leaflet*, 2008 (1) (2008) 147.

17 Mahapatra A K & Panda P K, Ethno-pharmacological knowledge of Juang and Munda tribes of eastern India, *Int J Sustain Dev World Ecol*, 9 (2) (2002) 151-158.

18 Parida S & Sarangi M, Medicinal uses of few edible tuber crops by "Dongria Kandha" tribes of Kandhamal district of Odisha, India, *Indian J Tradit Know*, 20 (1) (2021) 122-131.

19 Das P, The lost tribe of Odisha, *The Hindu*, Available online: https://www.thehindu.com/news/national/The-lost-tribe-of-Odisha/article14553424.ece. Published August 6, 2016. (Accessed on December 9, 2020).

20 Saxena H O & Brahmam M, *The Flora of Orissa*, Vol. 1-4, Bhubaneswar: RRL, 1994.

21 WHO, *Traditional Medicine*,Fact sheet No. 134 (2003) 2015.

22 World Bank, *Indigenous Knowledge: Local Pathways to Global Development*, 2004.

23 Gras A, Parada M, Garnatje T & Vallès J, Ethnobotany and plants used against cardiovascular diseases in the Iberian Peninsula and the Balearic Islands, In: *Herbal Medicine: Back to the Future, Vascular Health*, Ferid Murad, Atta-ur-Rahman, Ka Bian, Eds, 2 (2019) 1.

24 Gupta D, Mathur A, Patil G I, Tippanawar H K, Jain A, *et al*., Prevalence of musculoskeletal disorder and alternative medicine therapies among dentists of North India: A descriptive study, *Pharmacogn Res*, 7 (4) (2015) 350-354.

25 Vasudeva N & Sharma S K, Post-coital antifertility activity of Achyranthes aspera Linn. root, *J Ethnopharmacol*, 107 (2) (2006) 179-181.

26 Kami S S, Hameed I H & Hamza L F, *Acorus calamus*: Parts used, insecticidal, anti-fungal, antitumour and anti-inflammatory activity: A review, *Int J Pharm Qual Assur*, 8 (3) (2017) 153-157.

27 Rajput S B, Tonge M B & Karuppayil S M, An overview on traditional uses and pharmacological profile of *Acorus calamus* Linn. (Sweet flag) and other Acorus species, *Phytomed*, 21 (3) (2014) 268-276.

28 Rahmatullah M, Azam M N K, Rahman M M, Seraj S, Mahal M J, *et al*., A survey of medicinal plants used by Garo and non-Garo traditional medicinal practitioners in two villages of Tangail district, Bangladesh, *American-Eurasian J Sustain Agri*, 5 (2011) 350-357.

29 Depani P, Gadhvi K & Vyas S, Ethnobotanical potential and phytochemical screening of *Bombax ceiba* L., *European J Med Plant*, 29 (4) (2019) 1-8.

30 Joshi A R & Joshi K, Indigenous knowledge and uses of medicinal plants by local communities of the Kali Gandaki Watershed Area, Nepal, *J Ethnopharmacol*, 73 (1-2) (2000) 175-183.

31 Singh R K, Mehta S, Jaiswal D, Rai P K, & Watal G, Antidiabetic effect of *Ficus bengalensis* aerial roots in experimental animals, *J Ethnopharmacol*, 123 (1) (2009) 110-114.

32 Ferruzzi L, Turrini E, Burattini S, Falcieri E, Poli F, *et al*., *Hemidesmus indicus* induces apoptosis as well as differentiation in a human promyelocytic leukemic cell line, *J Ethnopharmacol*, 147 (1) (2013) 84-91.

33 Nandy S, Mukherjee A, Pandey D K, Ray P & Dey A, Indian Sarsaparilla (*Hemidesmus indicus*): Recent progress in research on ethnobotany, phytochemistry and pharmacology, *J Ethnopharmacol*, 254 (2020) 112609.

34 Kumar R & Saikia P, Wild edible plants of Jharkhand and their utilitarian perspectives, *Indian J Tradit Know*, 19 (2), (2020) 237-250.

35 Bunkar A R, Therapeutic uses of *Rauwolfia serpentina*, *Int J Adv Sci Res*, 2 (2017) 23-26.

36 Ezeigbo I I, Ezeja M I, Madubuike K G, Ifenkwe D C, Ukweni I A, *et al*., Antidiarrhoeal activity of leaf methanolic extract of *Rauwolfia serpentina*, *Asian Pac J Trop Biomed*, 2 (6) (2012) 430-432.

37 Soni R, Jaiswal S, Bara J K & Saksena P, The use of *Rauwolfia serpentina* in hypertensive patients, *IOSRJ Biotechnol Biochem*, 2 (2016) 28-32.

38 Mallik B K, Panda T & Padhy R N, Traditional herbal practices by the ethnic people of Kalahandi district of Odisha, India, *Asian Pac J Trop Biomed*, 2 (2) (2012) S988-S994.

39 Sahoo A K, Behera H C & Behura A K, Ethnomedicine and traditional health care system of a particular vulnerable tribal group in India: Application of plant extracts, *Res Square*, (2020). DOI: https://doi.org/10.21203/rs.3.rs-25202/v1

40 Banerji D, *Poverty, class, and health culture in India*, Vol 1, (New Delhi, India: Prachi Prakashan), 1982.

41 Kumar M, Rawat S, Nagar B, Kumar A, Pala N A, *et al*., Implementation of the use of ethnomedicinal plants for curing diseases in the Indian Himalayas and its role in sustainability of livelihoods and socioeconomic development, *Int J Environ Res Public Health*, 18 (4) (2021) 1509.

42 Singh M P, Saha K B, Chand S K & Savargaonkar D, Socioeconomic determinants of community knowledge and practice in relation to malaria in high-and low-transmission areas of central India, *J Biosoc Sci*, 52 (3) (2020) 317-329.