



An Ethnobotanical Study on Native Plants of Bargarh District of Western Odisha, India in Relieving Urogenital Ailments

Alok Ranjan Sahu, Maninee Sahu, and Ain Raal

Databases and Inventories

Abstract

Background: This study focused on the ethnobotanical study on native plants of Bargarh district of western Odisha, India in relieving urogenital ailments.

Methods: The study area was visited regularly and close interaction were made with the senior tribal people involved with herbal medicines. During field work, interviews were conducted with local educated villagers, the herbal healer, old woman and medicinal plant vendors. A total of 42 healers from Binjhal tribes (Dravidian ethnic group) were interviewed from the 10 selected blocks.

Results: A total of 28 species belong to 27 genera and 17 families were focused to have ethnobotanical significance towards urogenital ailments. Among the 28 plants species, 12 (43%) trees species, eight (29%) shrubs, six (21%) herbs species and two (7) climber species were recorded. Various parts of these species were used by the natives, of these roots of highest number of species (8) were used, followed by leaves (7), barks (4), seeds and fruits of three species each; flowers, gums, corollas, and whole plants of one species each.

Conclusions: The present study showing that there was an abundance of huge knowledge within the different ethnic communities that were not explored yet. Due to lack of communication and systematic transmission among the young generation the ethnobotanical knowledge may be declined. Hence it is urgent to document the ethnobotanical knowledge of old age people. Several species such as *Achyranthes aspera* var. *indica*, *Bauhinia*

racemosa, *Cassia auriculata*, *Celosia argentea*, *Gloriosa superba*, *Terminalia bellirica*, etc. can be further studied for their pharmacological activity and active compounds.

Keywords: ethnobotanicy, urogenital ailments, ethnic communities, Bargarh district.

Correspondence

Alok Ranjan Sahu^{1,*}, Maninee Sahu², and Ain Raal^{3,*}

¹Department of Botany, Vikash Degree College, Vikash Knowledge Hub, Barahaguda Canal Chowk, Bargarh, Odisha, India, e-mail: alok.btgene@gmail.com

²Department of Physics, Ghess College, Ghess, Odisha, India

³Institute of Pharmacy, Faculty of Medicine, University of Tartu, Tartu, Estonia

*Corresponding Author: (A.Raal): ain.raal@ut.ee, (A.R.Sahu): alok.btgene@gmail.com

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Background

Since from ancient time, traditional systems of medicine have been used to treat various ailments in countries like China, Japan and India (Gilani & Rahman 2005, Mukherjee & Wahile 2006). Ayurveda is known as the mother of all therapies, and also known as Traditional Indian Medicine and the oldest healthcare system on earth. Ethnomedicine has

evolved since the ancient time. Ethnobotanical information arises from complex interface among human beings and their adjacent environment that depends on a variety of factors such as local categorization system (Ellen 2009), communication through local language (Maffi 2005), human awareness and their cultural history (Leonti & Casu 2013), faith and religion (Pieroni & Quave 2005), use of social networks and information (Bandiera & Rasul 2006). Ethnomedicinal research is the study of sole information concerning plant wealth and look for new resources for the preparation of herbal medicines, utilization of edible plants and plant parts, and other aspects of plants (Chandra *et al.* 2013, Kumar *et al.* 2021). Still traditional medicine is the main source for treating health related problems around the globe (Tefera & Kim 2019). In spite of globalization and modernization, in developing countries nearly about 60- 85 % of the global population depends on traditional medicine for their health care purposes (Bhattacharyya *et al.* 2020). In the last few decades there was an increase on demand of herbal medicine globally. The previous reports were affirmed that out of 2,50,000 flowering plants in the world, only > 10% have been screened so far for their therapeutic influence, and still more than 90% remains unexplored (Rai *et al.* 2000, Ojha *et al.* 2020). Tribal groups store huge information on traditional herbal remedies and this require to be properly documented (Karunamoorthi & Tsehaye 2012). Ethnobotanical studies are the major sources for discovery of novel drugs from the plant species (Balunas & Kinghorn 2005). India is considered as the primary manufacturer of medicinal plants and represents one of the best reservoirs of ethnobotanical assets (Maikhuri & Gangwar 1993, Prakash *et al.* 2008). About 65% of the Indian population depends on traditional therapies (Timmermans 2003). The knowledge on conservation of medicinal plants and its use has made an interlinked between promoting the environmental conservation and native information (Cameron 2008). In order to fulfill the demand of rising population, in recent few years there is an increased interest on the use of medicinal plants to expand novel drugs and medicines (Gazzaneo *et al.* 2005, Ojha *et al.* 2020). So, the information on plants of their ethnomedicinal uses holds greater potential.

This communication projects the medicinal plants currently used by the native of Bargarh district, especially for urogenital complaints. The urogenital complaints may be hereditary or acquired. They may be in the nature of genetic disorders, drug-abuse, malnutrition, and even prevalent in particular environments and communities. Earlier researchers focused on flora and vegetation study of this area. Concerning useful plants, the classical approach for this area has been study of economic plants that

could be grown in these areas for landscape protection and mostly agricultural and livestock raising activities. Our basis of specific questions to each local practitioner are that what are the plants they used to cure for urogenital ailments, what are the common names of those plants they were used, which part parts they used for urogenital ailments, and what were the doses were asked and recorded to generate tables. In Odisha, there was very little publication related to use of medicinal plants for urogenital complaints (Panda & Mishra 2011, Mahalik *et al.* 2015). In this manuscript we had pertinently tapped the information from the rural peoples of the study area. These, in turn, will prompt phytochemists and pharmacologists for evaluating them as source modern medicine.

Study Area

Bargarh district is one of the ten districts of Western Odisha, eastern India (Figure 1). It lies between 20° 43' to 20° 41' North latitude and 82° 39' to 83° 58' East latitude. It is surrounded on the north by the state of Chhatisgarh and on the east by the district of Nawapara. The major rivers in the Bargarh district are tributaries of Mahanadi River, Ong (Ang), Jira and Jhaun rivers. There are natural springs at Nrushinghanath at the foot of Gandhamardhan hills of Padampur subdivision forming streams flowing in cascades down the steep hill side. The total geographical area of Bargarh district is 5837 km², out of which 269.329 km² of the area is covered by forest. Although agriculture is the main occupation of the tribal people, they are mostly dependent on forest and forest-based resources for supplementing their livelihood and health care. The physiography of the district gives a perfect platform for the tribal in sustaining their ethno cultural identity. Furthermore, the forests are dry deciduous and moist type. The population of the district is 14,81,255 (census 2011). The district is inhabitant by tribes like *Sahara, Binjhal, Kondh, Gond, Munda, Kuli, Oran, Kisan, Mirdha, Kharia* and *Parja*. Out of these, *Sahara, Binjhal, Kondh* and *Gond* are the predominant tribes. The Binjhal (also known as Binjhwar) is a Dravidian ethnic group found mainly in five districts of Odisha i.e. Bargarh, Bolangir, Sonepur, Nuapada and Sambalpur. The Binjhal tribe is the second largest tribe belonging to Scheduled Tribe. As per the 2011 census report the total population of Binjhal tribe in Odisha is around 137040 including 68810 men and 68230 women. In Bargarh district, still agriculture is considered as the primary occupation of Binjhal tribe, many of them work as laborers in agricultural fields. As per the community people said that Binjhal is a combination of two words i.e. Bin and Jhal. 'Bin' in the local terms means 'without' and 'Jhal' means 'sweat'. Hence Binjhal are those who can 'work for long hours without sweating'. Thus the Binjhal of the

Bargarh district are regarded as hard-workers and good agricultural laborers. In general, people having good strength and stamina, who can work in the field

for long period of times without sweating (Sahu *et al.* 2010).

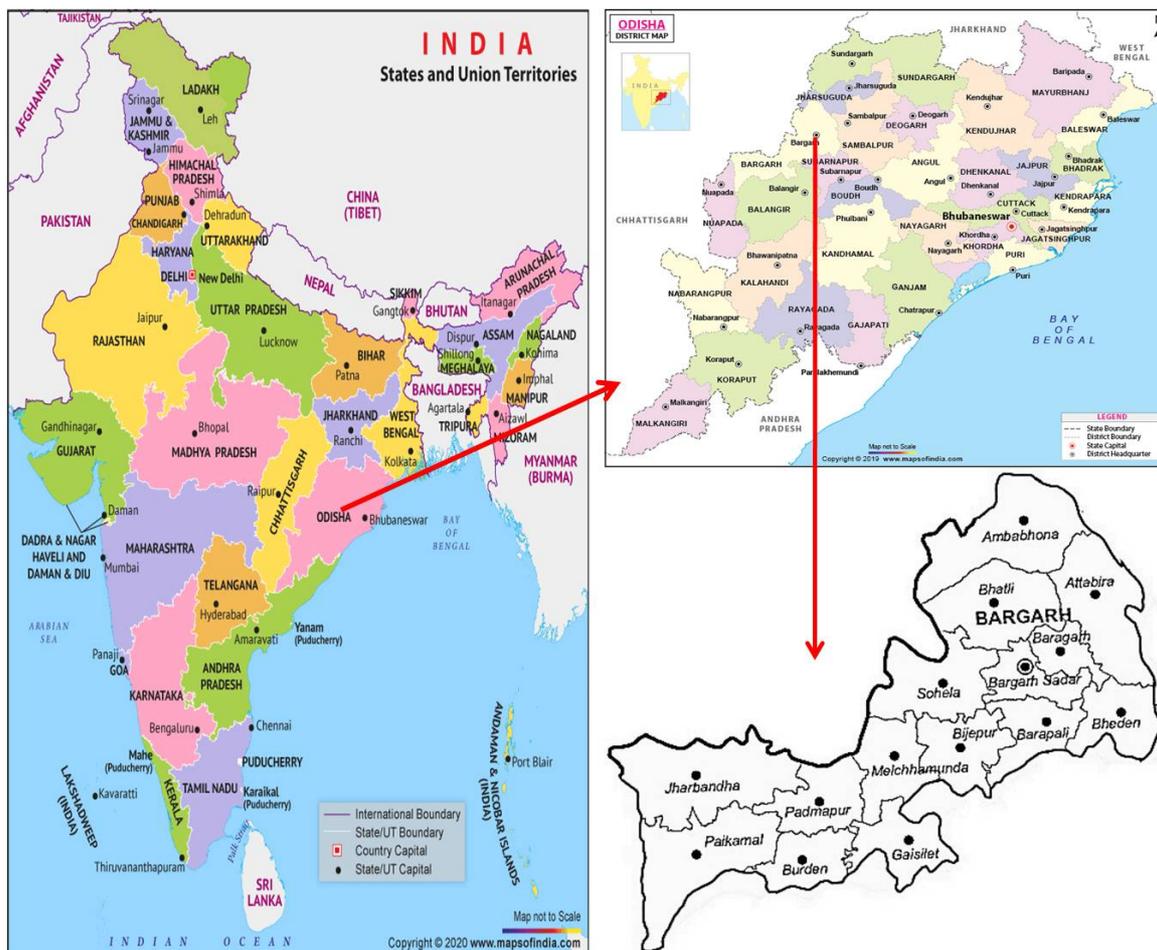


Figure 1. Map of India and Bargarh district.

Materials and Methods

Before the field work started, in order to know the geographical location, demographic details, local name of plants, a literature survey was carried out in the study area (Sahu *et al.* 2010, Sahu *et al.* 2013, Sahu *et al.* 2016, Sen & Behera 2003, Sen & Behera 2008). The study area was visited in an interval of two months from 2010 to 2020 and close interactions were made with the senior tribal people involved with herbal medicines.

A total of 90 healers were interviewed and among them 42 well known healers from were selected for this study. These 42 healers form Binjhal tribes (Dravidian ethnic group) of different gender, educational qualification and years of experience were interviewed of 10 selected blocks of Bargarh district, western Odisha, India during January 2010 (Table 1). During field work, interviews were conducted with local educated villagers, the herbal healer called 'Kabiraj' or 'Vaidyas' (local physicians

in Indian System of Medicine), old woman and medicinal plant vendors.

Small rewards were given to participants. Moreover, 120 common tribal people were also interviewed. Each use report was verified more than 10 times in 10-15 localities. For the ethnobotanical survey we used (Jain 1991, Pullaiah *et al.* 2017, Thakur *et al.* 2020). The local names of plants and doses of administration were documented in field. Further the local names were cross checked by using available previous report of Bargarh district (Sahu *et al.* 2010, Sahu *et al.* 2013, Sahu *et al.* 2016, Sen & Behera 2003, Sen & Behera 2008). The plant specimens were collected and identified using (Jain 1991, Saxena & Brahmam 1994-1996). The plants were enumerated alphabetically with botanical name, family, voucher number, mode of uses and compiled in a tabular form. To collect the voucher specimen we followed the protocol as described by Mohanty (2018). The voucher specimens (No 003-210) were deposited at the Department of Botany, Vikash Degree College, Bargarh, India.

Table 1. Demographic characteristics of the healer of Bargarh district, western Odisha, India.

Locality (Blocks)	Gender		Educational Qualification			Age (Years)			Years of experience as healer (Years)					
	Female	Male	Primary	Secon-dary	Extra teaching quali-fication	21-40	41-60	61-80	≤10	11 to 20	21 to 30	31 to 40	41 to 50	>5
Bheden	2	3	5	0	0	2	2	1	0	0	2	1	2	0
Bijepur	1	2	3	1	0	0	2	1	0	1	1	1	0	0
Sohela	2	3	5	2	1	1	2	2	1	2	1	0	0	1
Jharbandha	3	2	5	0	0	2	2	1	1	0	1	2	1	0
Paikamal	2	4	6	0	0	3	2	1	1	2	0	1	2	0
Bhatli	1	2	3	1	0	2	1	0	0	0	1	1	1	0
Padmapur	1	3	4	2	1	1	2	1	0	1	1	2	0	0
Gaisilet	0	2	2	1	0	1	1	0	0	0	0	1	1	0
Melchha-munda	2	2	4	1	1	2	1	1	0	0	2	1	1	0
Ambabhona	2	3	5	0	0	2	1	2	1	1	2	0	0	1
Totals	16	26	42	8	3	16	16	10	4	7	10	13	6	2

Results and Discussion

In this manuscript we reported a total of 28 species of medicinal plants belong to 27 genera and 17 families (Table 2, Figure 2). The highest numbers of plant species were contributed from Fabaceae (*Abrus precatorius* L., *Bauhinia racemosa* Lam, *Butea monosperma* (Lam.) Taub, *Cassia auriculata* (L.) Roxb., *Tamarindus indica* L.), Malvaceae (*Bombax ceiba* L., *Gossypium herbaceum* L., *Hibiscus rosa-sinensis* L., *Sida acuta* Burm. f.) and Lamiaceae (*Gmelina arborea* Roxb., *Tectona grandis* L. f., *Vitex nergundo* L.); two species each from two families, Amaranthaceae (*Achyranthes aspera* var. *indica* L., *Celosia argentea* L.), and Moraceae (*Ficus hispida* L. f., *Ficus religiosa* L.). The remaining ten families contributed one each (Figure 3). For categorization of plants the APG-IV system of plant classification was used (Mohanty 2018). Among the 28 plants species, 12 (43%) trees species, eight (29%) shrubs, six (21%) herbs species and two (07%) climber species were recorded (Figure 4). Various parts of these species were used by the local practitioners of Binjhal tribe (Dravidian ethnic group), mostly roots number (8 species) were used, followed by leaves (7), barks (4), seeds and fruits of three species each; flowers, gums, corollas, and whole plant of one species each (Figure 5).

Achyranthes aspera var. *indica* was used to cure arthritis, asthma, dandruff, fistula, hepatitis, insect bite, leprosy, piles, snake bite, wound (Dey 2011). The bark of *Bombax ceiba* was used to cure joint break (Kumar et al. 2021). Seeds and flowers of *Butea monosperma* were used in the treatment of

dysentery and ring worm (Kumar et al. 2021). Several species as listed in Table 2, such as *Aloe vera*, *Azadirachta indica*, *Ricinus communis*, *Withania somnifera*, *Phyllanthus emblica*, and *Lawsonia inermis* have a long tradition of use in folk medicine, their composition and effects have been fairly well studied and they are recognized in various countries as medicinal plants (Table 2). Previous experience in studying the biological activity of Estonian and Vietnamese medicinal plants shows that the experience of folk medicine is often confirmed by research of their biological activity (Raal et al. 2015, Nguyen et al. 2018, Tran et al. 2019). Therefore, it is important to pay attention to those plants that have so far been little scientifically studied; there are no studies about biological activity and clinical trials of *Bauhinia racemosa*, and *Madhuca longifolia* var. *latifolia*. The species such as *Bauhinia racemosa*, *Cassia auriculata*, *Celosia argentea*, *Gloriosa superba*, *Terminalia bellirica*, etc. have been very little studied in terms of chemical composition and biological activity.

There were no earlier report available regarding the traditional uses of medicinal plants to cure urogenital complaints in the Binjhal tribes (Dravidian ethnic group) in this study sites. Panda and Mishra (2011) reported the uses of *Coix aquatica* Roxb. to cure painful urination and menstrual complaints, and *Limnophili arugosa* (Roth) Merr. to cure urinary burning by the local healer of South Odisha. Mahalik et al. (2015) reported about the use of 26 plant species in the treatment of urinary disorders in Dhenkanal district of Odisha.

Table 2. Medicinal plants and their traditional uses for the treatment of urogenital complaints by the natives of Bargarh District, Western Odisha.

Botanical Name	Local Name as per the Dravidian ethnic group (Binjhal tribe)	Family	Voucher number	Plants parts with ethnomedicinal uses for urogenital complaints	No. of papers indexed by Web of Science*: total/chemical composition/biological activity/clinical trial
<i>Abrus precatorius</i> L.	Gunj	Fabaceae	ARS/BGH-03	White seeds kept in unboiled cow milk for the period of overnight and the seed is given to woman in the morning at the end of menstruation cycle for preventing conception.	376/4/7/1
<i>Achyranthes aspera</i> var. <i>indica</i> L.	Latkana	Amaranthaceae	ARS/BGH-09	Root paste is applied externally on abdomen for quick delivery.	18/1/0/0
<i>Aloe vera</i> Mill.	Gheekuanri	Liliaceae	ARS/BGH-20	About 5 gm of leaf juice along with turmeric and black salt is taken twice daily in empty stomach to cure irregular periods.	3111/45/24/114
<i>Azadirachta indica</i> A. Juss.	Lim	Meliaceae	ARS/BGH-32	About 20 gm each stem bark of <i>Azadirachta indica</i> A. Juss. and <i>Acacia nelotica</i> is boiled in three glasses of water and filtered. The filtrate (one glass) is taken in the morning in empty stomach for one week to cure white discharge	3913/70/75/10
<i>Bauhinia racemosa</i> Lam.	Kuler	Fabaceae	ARS/BGH-37	Leaf extract mixed with sugar and milk is given four times a day for normal urination.	46/1/0/0
<i>Boerhavia diffusa</i> L.	Gadhapurni	Nyctaginaceae	ARS/BGH-38	About 15ml of whole plant decoction is given once a day in the early morning for fifteen days for the treatment of Leucorrhoea	107/3/1/0
<i>Bombax ceiba</i> L.	Semel	Malvaceae	ARS/BGH-39	About 1gm of pasty mass of fleshy roots of young plant mixed with 2ml of unboiled cow milk is taken once a day in the early morning for a week by women to regulate irregular menstruation.	155/3/0/0
<i>Butea monosperma</i> (Lam.)Taub.	Palsa	Fabaceae	ARS/BGH-44	A cup of flowers decoction is drunk in the morning for seven days to regulate menstrual cycle.	234/3/0/0

<i>Cassia auriculata</i> (L.) Roxb.	Radhachura	Fabaceae	ARS/BGH-53	Gum of the plant is mixed in latex of <i>Ficus benghalensis</i> and about 20 ml of this mixture is given four times a day for about a fortnight to expel urinary stone.	145/1/1/0
<i>Celosia argentea</i> L.	Sirel	Amaranthaceae	ARS/BGH-59	Root paste of the plant is applied locally on stomach for urinary stone for a month. Leaf extract of the plant is consumed for 15 consecutive days to expel stone from kidneys.	212/1/3/0
<i>Ficus racemosa</i> L.	Dumer	Moraceae	ARS/BGH-104	Boiled green fruits given to mother as a galactagogue for better milk.	169/3/1/1
<i>Ficus religiosa</i> L.	Pipal	Moraceae	ARS/BGH-105	About 10 gm of bark is taken with one glass of water twice daily for one month to cure white discharge.	260/1/1/0
<i>Gloriosa superba</i> L.	Puraful	Colchicaceae	ARS/BGH-107	Paste of roots and tubers prepared in water is applied on hand palms and soles of feet of women to help expel the delayed placenta after delivery.	181/1/4/0
<i>Gmelina arborea</i> Roxb.	Gambher	Lamiaceae	ARS/BGH-109	Fruit powder is homogenized with milk and cow ghee. About 25ml of it is taken orally per day during the 5 th month of pregnancy for better settlement of foetus.	469/12/1/0
<i>Gossypium herbaceum</i> L.	Kapa	Malvaceae	ARS/BGH-110	Rice grains are dipped in water for overnight. Root powder of this plant is mixed in this water. Two spoonfuls of this is given daily in the morning to the patients suffering from leucorrhoea.	112/1/1/0
<i>Hibiscus rosa-sinensis</i> L.	Mandar	Malvaceae	ARS/BGH-115	5-6 young leaves extract was taken orally daily for 20-30 days to cures leucorrhoea.	490/7/3/1
<i>Ipomoea aquatica</i> Forssk.	Kalam Sag	Convolvulaceae	ARS/BGH-118	About 20-25ml of leaf extract was taken orally for 7 days regularly before the probable date of delivery to accelerate easy delivery.	396/0/2/0
<i>Lawsonia inermis</i> L.	Benjati	Lythraceae	ARS/BGH-123	About 100ml of leaf juice is taken orally as contraceptive. It is effective in preventing conception as long as the woman consumes it.	427/10/5/6

<i>Madhuca longifolia</i> var. <i>latifolia</i> (Roxb.) A. Chev	Mahul	Sapotaceae	ARS/BGH-126	A glass of decoction of corollas is taken orally to treat dysuria till cure.	235/10/0/0
<i>Phyllanthus emblica</i> L.	Anla	Phyllanthaceae	ARS/BGH-95	Fruit powder and sugar mixed properly mixed in ghee and honey are consumed by men as an aphrodisiac.	816/12/6/12
<i>Ricinus communis</i> L.	Jada	Euphorbiaceae	ARS/BGH-143	Leaf smeared with groundnut oil is warmed and ties on abdomen to relieve menstrual pains.	4164/75/51/4
<i>Sida acuta</i> Burm. f.	Bajarmuli	Malvaceae	ARS/BGH-179	About 10gm of root powder mixed in milk or honey and taken orally to cures bleeding leucorrhoea.	98/0/1/0
<i>Tamarindus indica</i> L.	Tentel	Fabaceae	ARS/BGH-190	The seeds are soaked overnight, then the paste of those soaked seed (two spoons) along with one glass of milk is taken twice daily to cure white discharge.	754/21/6/2
<i>Tectona grandis</i> L. f.	Sagun	Lamiaceae	ARS/BGH-191	Seed powder is soaked in cold water. About half galas of it taken orally to cures strangury caused during sunny days.	1195/23/3/0
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Behera	Combretaceae	ARS/BGH-194	About 2gm of stem bark paste is prescribed to women with hot water twice a day after food continuously 10 days as a cure for leucoderma.	113/2/1/0
<i>Vitex negundo</i> L.	Nirgundi	Lamiaceae	ARS/BGH-203	Root paste is applied on abdomen for easy delivery.	467/10/4/1
<i>Withania somnifera</i> (L.) <i>Dunal</i>	Aswagandha	Solanaceae	ARS/BGH-204	About 20 ml of root extract of this plant was taken orally once a day for a period of two weeks, that helps to arouse sexual desire in both women and men.	1800/11/24/15
<i>Ziziphus mauritiana</i> Lam.	Buro	Rhamnaceae	ARS/BGH-210	Stem bark paste is taken twice a day after food as a cure for abdominal pain during pregnancy.	330/6/4/0



Figure 2. Photograph of *Abrus precatorius* L. seeds (a), *Achyranthes aspera* var. *indica* L. roots (b), *Aloe vera* Mill. (c), *Azadirachta indica* A. Juss. Bark (d), *Bauhinia racemosa* Lam. leaves (e), *Boerhavia diffusa* L. (f), *Phyllanthus emblica* L. Fruits (g), *Ficus racemosa* L. Young fruits (h), *Ficus religiosa* L. bark (i), *Gossypium herbaceum* L. root (j), *Lawsonia inermis* L. leaves (k), *Sida acuta* Burm. f. roots (l), *Tamarindus indica* L. Seeds (m), *Tectona grandis* L. f. seeds (n), *Terminalia bellirica* (Gaertn.) Roxb. Bark (o), *Withania somnifera* (L.) Dunal roots(p).

Conclusion

This study provides evidence that the tribal people of Bargarh district were sacred with the huge knowledge of ethnobotanical uses of plants of their surroundings.

The present study exposed that there was an abundance of huge knowledge within the different ethnic communities that were not explored yet and which need more special attention in next studies. Majority of the people of the study area depend on

plant-based medicine for their common health problems such as common colds, dysentery, toothache, scorpion and insect bites, skin diseases, etc. Young generation people hesitated to pursue such kind of traditional practices. Due to lack of communication and systematic transmission among the young generation the ethnobotanical knowledge may be declined. Several species can be further studied for their pharmacological activity and active compounds.

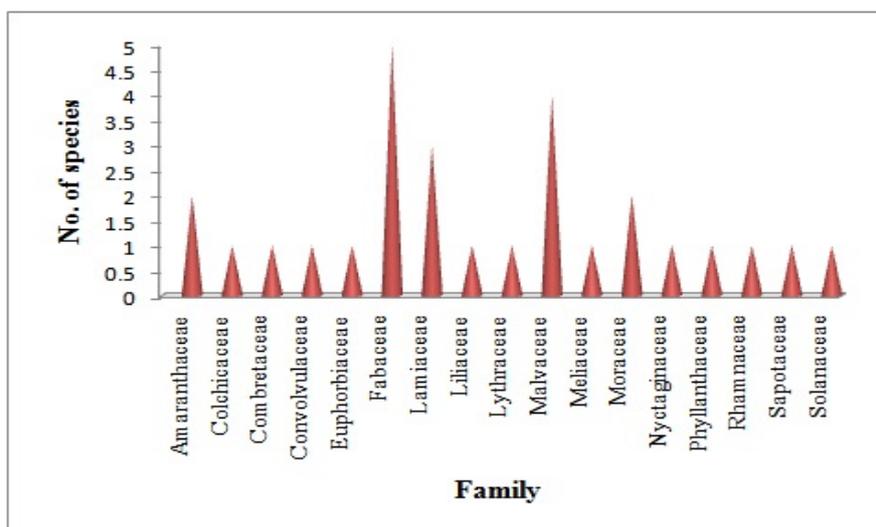


Figure 3. Family-wise distribution of medicinal plant species.

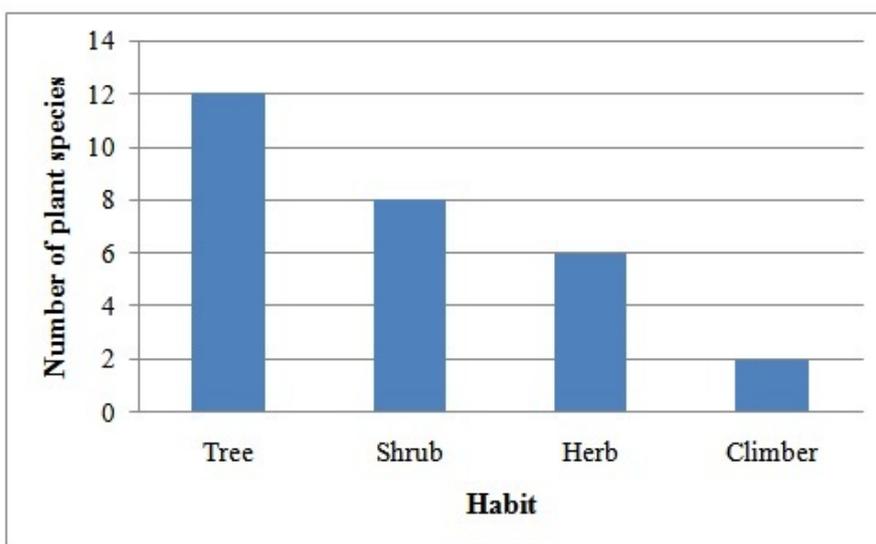


Figure 4. Diversity of plant species by habit.

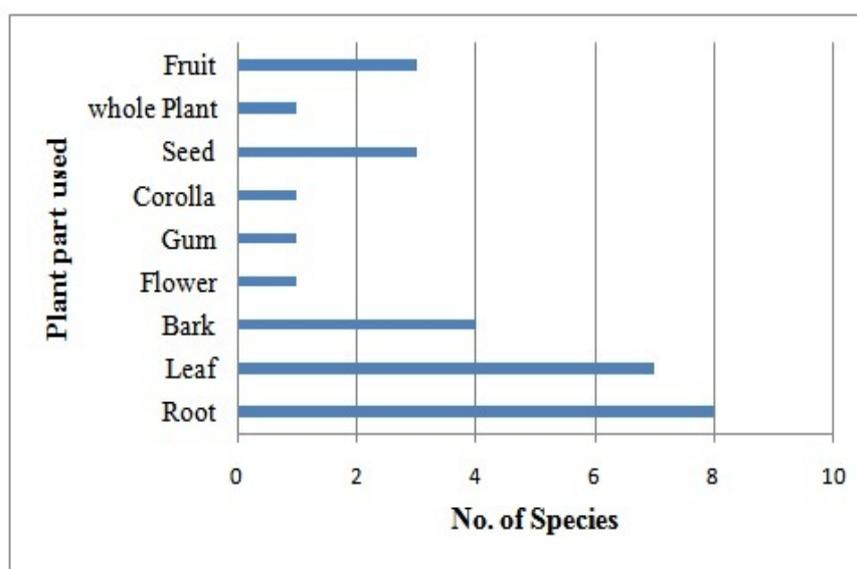


Figure 5. Statistical representation of used parts for relieving Urogenital ailments of the study sites.

The local population of Bargarh district used modern medicines for the cure of ailments other than urogenital complaints. But for urogenital complaints, they were generally hesitating to go use allopathic or medicaments from hospitals. Though the World Health Organization encourages the use of traditional herbal medicines, which have been proven to be safe and effective for healthcare needs (Anonymous 1993), it appears essential to assess the medicinal effectiveness of such plants. Such attempts will help integrate the folk medicines with the modern system of medicine. There are many sexual hazards in tribal population, such as age at menarche and menopause, adolescent sterility, family structure, varying and changing socio-economic conditions. Awareness programs are necessity in the study area.

Declarations

List of abbreviations: The article does not contain abbreviations.

Ethics approval and consent to participate: The study does not include ethical conflict. No animal experiments were used. This article is not in conflict with the Nagoya Protocol on Access and Benefit Sharing. All participants provided oral prior consent before the interviews.

Consent for publication: Not applicable.

Availability of data and materials: Not applicable.

Competing interests: Not applicable.

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Authors' contributions: Dr. Alok Ranjan Sahu conceived the project, designed the experiment, conducted the field survey interpreted the results, and contributed to the writing of the manuscript. Mrs. Maninee Sahu helped the first author during field survey, analyzed the data and contributed to the writing of the manuscript. Prof. Ain Raal helped two other authors to analyse the results of the study, he contributed to the writing and correcting and submission of the manuscript.

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