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Ethnomedicinal Knowledge of Plants Among *Paudi Bhuyan* Tribal Population of Angul District In Northern Odisha, India.

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ABSTRACT

Indigenous (tribals/ *adivasis*/ ethnic) communities are custodians of traditional knowledge. These communities live in different geographical locations and face a range of socio-ecological conditions which contribute to variations in their Traditional Ethnoecological Knowledge (TEK). Both planned and forced migrations contribute to gains and losses in their knowledge pool. The current study presents information on plants of medicinal importance harnessed by *Paudi Bhuyan*, a particularly vulnerable tribal group inhabiting 11 villages in district Angul of Odisha. A total number of 50 plant species belonging to 32 families were recorded to be used in treatment of various ailments. Within a radius of 270 square kilometres of our study area, we observed considerable variation in knowledge of medicinal plants in the 11 villages. Village composition, altitude, and distance from urban centres are some of the key reasons behind observed variations.

There is a strong relevance of this study, since *Paudi Bhuyan* tribe is greatly influenced by rapid urbanization. Traditionally *Guniyas* (medicine men) were present in all *Paudi Bhuyan* villages who could cure all ailments with the help of plants known for their healing properties. From our study on *Paudi Bhuyan* tribal community, we conclude that knowledge about plant species used for medicinal value still persists. This is an important finding since there is a greater need for conservation and utilization of biological resources. These repositories need to be further validated with pharmacological findings.

KEY WORDS: Indigenous, Fluxes, Migration, Custodians, Ethno-medical, TEK

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1. INTRODUCTION

Plants play an important role in our lives. Apart from meeting our direct requirements like supply of oxygen, food, fibre and shelter, they are also linked with several secondary uses. Global estimates predict that about 50,000 of known 4,22,000 seed plants have medicinal properties¹. India is one of the twelve mega diverse regions of the globe, and 43% of its flora is reported to have medicinal value². Primary healthcare is highly dependent on plant based treatments because 85% of traditional medicines globally are derived from plants³. Dependence on plants with known medicinal value has led to their overexploitation. This has also resulted in rapid decline of lesser known plants of medicinal value⁴.

8.6 % of overall population of India is constituted by tribals (also known as *adivasis or* indigenous people). Article 342 of Indian constitution has notified 500 tribes in India. Indian state of Odisha has presence of 62 tribes. Out of these 62, there are 13 specified as Particularly Vulnerable Tribal Groups (PVTGs) which are in the most primitive stage of development. Paudi Bhuyan is one of these PVTG. Information and census details of five primitive tribes are extremely limited. These tribes are *Dongria Khond, Chuktia Bhunjia, Kutia Khond, Lanja Saura and Paudi Bhuyan*⁵. Odisha is blessed with a strong presence of tribal communities. These communities in staying in and near the forested areas have a rich knowledge of the natural history and uses of indigenous plants and their medicinal values. This is an inherited knowledge protected over several generations. These tribals are also bequeathed with the knowledge about maintaining the plant wealth around them and their sustainable use due to non-accessibility to modern health care.

The current study was done to captures fast eroding knowledge about plants with medicinal value being used by Paudi Bhuyans (PB). Paudi Bhuyan is an important particularly vulnerable tribal groups (PVTG) found in Odisha⁶. PVTGs are a group of tribes placed in the lowest level of development based on their primitive agriculture technology, declining population, low literacy rates and subsistence economy⁷.

11 villages are included in this study, and are mentioned in the study area. These villages have presence of PB tribe along with members of *Munda, Kolha, Gandia and Ho* tribes. Presence of this type of mixed population have led to culture assimilations leading to losses and gains in knowledge of various ethno ecological practices, including knowledge of medicinal plants. We observed that this knowledge is mostly confined with traditional healers called as ‘*Guniyas*’ in our study area.

2. EXPERIMENTAL SECTION

2.1 Study Area

Villages included in the study are located in Pallahara division of district Angul in Odisha. This district is spread over an area of 6375 sq. km and records an elevation between 76 m. to 1186 m. It is located between 20° 31' & 21° 40' N Latitude and 84° 15' E & 85° 23' E Longitude.

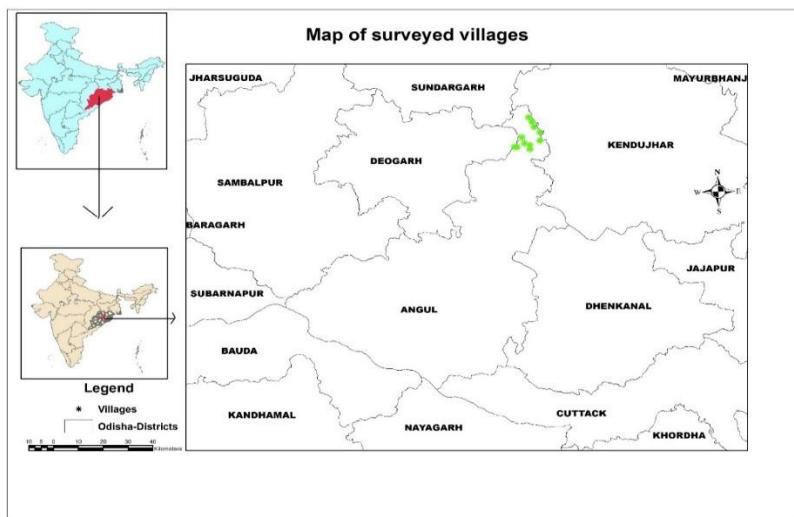


Fig. 1- Map of Study area

For convenience of analysis, we have clubbed these villages into two categories- higher altitude (more than 1000 feet) and lower altitude (less than 1000 feet). Villages falling under higher altitude category are Balibahal (2010 ft), Sibida (1986 ft), Namagaon (1913 ft), and Nagira (1778 ft). Villages under lower altitude category are Bandabhuyan (917 ft), Rugudhi (834 ft), Bhimkhand (783 ft), Dudipani (738 ft), Jamardihi (692 ft), Itee (650 ft), Siaria (592 ft). Siaria, has a 100% Paudi Bhuyan population and all other villages have a mixed population of *Paudi Bhuyan* along with *Munda, Gandia, and Ho* tribes.

2.2 Methodology

Rapid appraisals followed by intensive surveys were carried out in the time period 2014 to 2018. Communication channel with local inhabitants was facilitated after discussions with PBDA (Paudi Bhuyan Development Agency, Pallahara). Participatory rural appraisals (PRAs), interviews, implementation of semi- structured and open ended questionnaire were done. Focus group discussions (FGDs) were also conducted at village level for collation of information. Around 20 participants were involved in each FGD. They belonged to different age groups and had a representation of both men and women. Selection of informants was done keeping in mind their presence in the village for a longer period of time, and adequate knowledge of plants.

Information about plants with medicinal value was collated at two levels. A list of species was first compiled after discussions with village members included in FGD. This was followed up by a more intensive discussion with *Guniya* (traditional healer) to finalise the list of plants still being used by the inhabitants of these villages. It is very difficult to strike a rapport with *Guniyas* since they are secretive about this knowledge. However our relationship with the villagers helped us in this knowledge sharing.

Information about local names of plants, parts used and types of ailments addressed was recorded. Our questionnaire was open ended that allowed descriptive responses on the plants' medicinal uses. Herbarium specimens and photographs of plant species recorded during the study were deposited in Indraprastha University Herbarium (IPUH), USEM, GGSIPU, Dwarka, New Delhi. All specimens were given Voucher numbers (indicated in Table1). Photographs of plants used for medico purposes were labelled and numbered as per the list in table 1. These photographs were compiled into a folder and copied on compact disc (CD). This CD was named '*Kahlon & Singh, 2014-2018 (2)*' and deposited in IPUH, USEM, GGSIPU, Dwarka, New Delhi, India.

Since we conducted surveys spread over the period of 2014- 2018, we were also able to record the household pattern existing in the villages. This helped us in calculating a change percentage of the number of households in the 11 villages. This has been presented in Fig. 2, along with the number of plants known for their medicinal properties. Information about various ailments that are treated with plant extracts in the villages was recorded and presented in Table 1.

3. RESULTS AND DISCUSSION

Separate discussions with different age and gender groups revealed that overall several changes have taken place over the last decade. Village elders of Balibahal informed us that their forefathers used several plants for medicinal purposes, but this practice has steadily declined. Younger generation prefers modern medicine considerably. A similar observation was recorded from Dudipani. However faith in traditional healer still persists, and if someone is sick for longer duration, a visit to *Guniya* (traditional practitioner) is a must. In Bandabhuyan and Balibahal, traditional treatment of ailments like stomach pain, dysentery, fever, body pain, and cold were done with help of plants. But here too, faith of younger generation on traditional healing practices is less as compared with elderly. Similar observations were made from all other villages.

Since we were aware of the changes in the village constitution regarding presence of tribes and years of settlement, we analysed this against the variation in knowledge level. This is represented in Fig. 2.

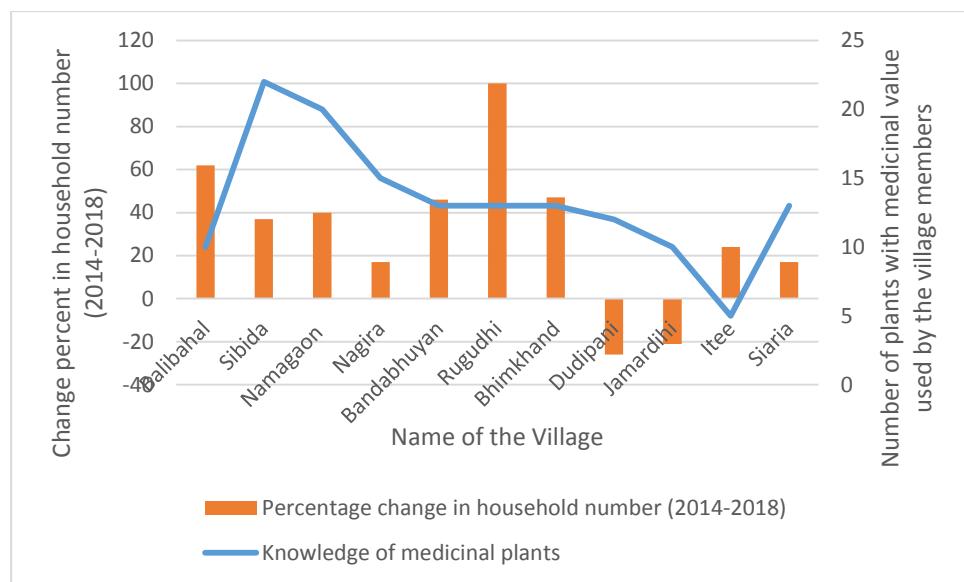


Fig. 2- Knowledge about medicinal plants in relation with changes in villages regarding number of households.

Villages Dudipani and Sibda show a decline in number of households. Knowledge about medicinal plants in these villages is restricted to 10-12 species. Highest level of knowledge is in villages Sibda and Namagaon (20-22 species). Constitution of these two villages is relatively stable in comparison with other villages (Rugudhi has recorded a 100% change). Village Itee has lowest level of usage of medicinal plants. Another factor that plays an important role is the elevation level of these villages. Balibahal, Namagaon, Sibda and Nagira are all located at higher altitudes as compared to the remaining 7 villages. Another factor that we considered for tabulation and analysis of our findings was presence and domination of *Paudi Bhuyan* (PB) tribe in the villages. Village Sibda has complete domination by PB population. Namagaon has a mixed population of PB and Munda tribes. All remaining villages have higher intermixing with other tribal populations and members of general caste. Hence we speculate that higher practice of traditional medicine in Namagaon and Sibda is due to 3 factors- majority of Paudi Bhuyan tribe members (Sibda), intermixing between PB and Munda (Namagaon), and elevation (both Namagaon and Sibda are located at higher altitudes).

In another related study usage of plants for edible purpose was ascertained. It was found that village knowledge about edible plants is highest in Namagaon (1913 ft) and Nagira (1778 ft). These villages -Namagaon and Nagira are showing abundance of both edible plant species and knowledge of medicinal plants. Namagaon has presence of Paudi Bhuyan and Munda tribe, and Nagira has both Paudi Bhuyan and Kolha tribe. Hence we speculate that intermixing of tribes have influenced and increased knowledge about plant species amongst the village population. Correlating both these studies we speculate that villages located in higher altitudes are having higher level of traditional knowledge which is proxied as knowledge about medicinal plants in the current study.

Villagers use various plant parts such as bark, root, leaf, seed, flower, fruit or entire plant for medicinal purpose to cure different ailments. Some ailments commonly cured by use of medicinal plants are respiratory problems, digestive issues, and skin ailments.

We listed 50 plant species with medicinal value from the study area. These belonged to 32 families (Fig. 3). Species with maximum usage were *Nyctanthes arbortristis* (Gutakhadika), *Andrographis paniculata*, *Terminalia chebula* (Harida), *Terminalia bellerica* (Bahada), and *Rauvolfia serpentine* (Patalgaruda).

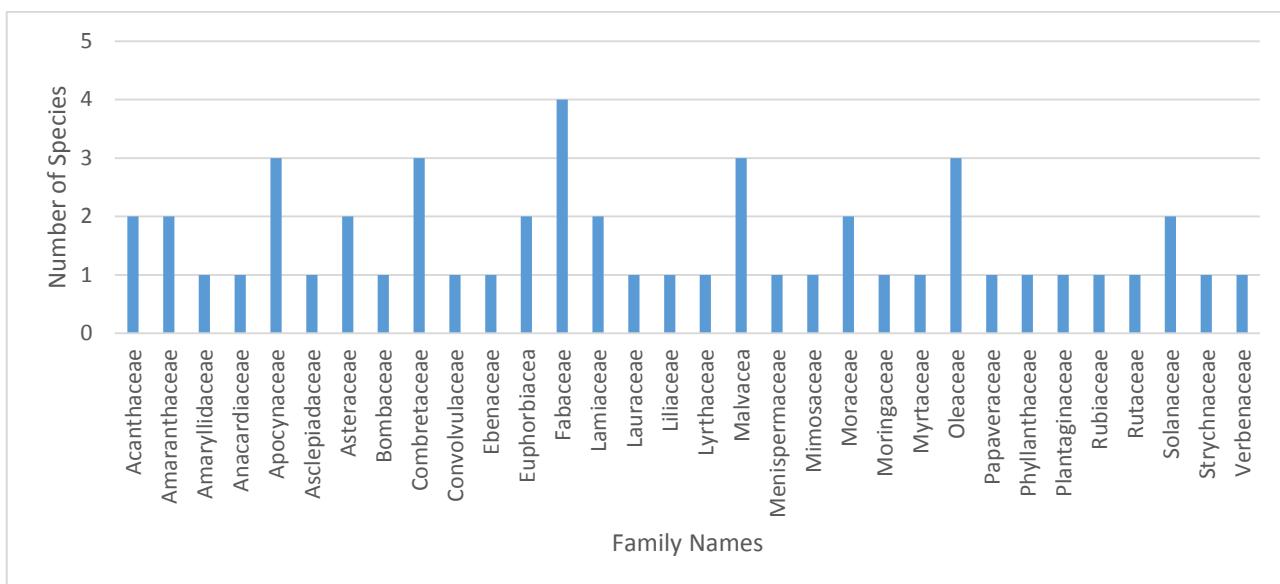


Fig. 3- Plant families recorded for medicinal uses

Five plant families with highest number of plant species of medicinal value are Fabaceae (highest record), followed by Apocynaceae, Combretaceae, Malvaceae, and Oleaceae (Fig.3).

Table 1- Plants documented for medicinal properties in study area

S.No	Scientific Name	Family	Common name (Odia)	Habit	Medicinal use	Specimen voucher number/photograph
1.	<i>Abelmoschus esculentus</i> (L.) Moench	Malvaceae	<i>Bhendi</i>	Herb	Leaf latex is used to cure ulcers in children's moth.	2287
2.	<i>Achyranthes aspera</i> L.	Amaranthaceae	<i>Chirchiri</i>	Herb	Leaf is used as cure for scorpion sting. Other uses include cure for head ache and small pox.	2284
3.	<i>Andrographis paniculata</i> (Burm.f.) Nees	Acanthaceae	<i>Bhuin limb</i>	Shrub	Plant filtrate water is used in treatment of scabies, and other skin ailments. Leaf and root is consumed in abdominal pain. Leaf decoction is given in malaria, diarrhoea, and dysentery.	Photograph
4.	<i>Argemone mexicana</i> L.	Papaveraceae	<i>Kanta kusum</i>	Herb	Sap of young leaves applied on eyelids during eye infections. Stem latex is used to heal wounds.	2289
5.	<i>Asparagus racemosus</i> Willd.	Liliaceae	<i>Satvari</i>	climber	Checks spread of small pox. Root extract used in diarrhoea, and stomach ailments. Root paste is applied on wounds for quick healing.	Photograph
6.	<i>Bacopa monnieri</i> (L.) Wettst.	Plantaginaceae	<i>Brahmi</i>	Herb	Plant is consumed as brain tonic and to sharpen memory.	2280
7.	<i>Bauhinia racemosa</i> Lam.	Leguminosae	<i>Kanchan</i>	tree	Stem bark extract is taken to cure diarrhoea.	2286
8.	<i>Bombax ceiba</i> L.	Bombaceae	<i>Simli</i>	tree	Gum is used to treat diarrhoea. Root extract is used as reproductive stimulant in men.	Photograph
9.	<i>Calotropis gigantea</i> R. Br	Asclepiadaceae	<i>Arakha</i>	herb	Leaf is chewed to cure asthma, and treat pain in ear. Root extract is consumed to cure cholera and stomach disorder.	2274
10.	<i>Celosia cristata</i> f. <i>argentea</i> .	Amaranthaceae	<i>Murgchodai</i>	shrub	Leaf juice is used to cure diarrhoea.	2279
11.	<i>Cascabela thevetia</i> (L.) Lippold.	Apocynaceae	<i>Konioro</i>	Tree	Fruit is used as fish poison. Plant juice is applied locally as cure for rheumatism.	2288
12.	<i>Cissampelos pareira</i> L.	Menispermacea e	<i>Akanabindhi</i>	shrub	Root paste is used to cure diarrhoea and stomach complaints. Leaf paste is applied on boils to relieve pain and help in early healing.	Photograph
13.	<i>Clausena excavata</i> Burm.f	Rutaceae	<i>Agnijal</i>	herb	Leaf is consumed to cure indigestion. Root is chewed and eaten to cure painful urination	Photograph
14.	<i>Crinum asiaticum</i> L.	Amaryllidaceae	<i>Hatikanda</i>	herb	Leaf extract is consumed to cure ear ache.	Photograph

15	<i>Datura metel</i> L.	Solanaceae	<i>Dudhra</i>	Shrub	Seed paste is used to cure breathing problems, diarrhoea and dysentery. Application of leaf juice reverses hair fall. Latex is applied to cure skin treatment.	Photograph
16	<i>Diospyros melanoxylon</i> L.	Ebenaceae	<i>Kendu</i>	Tree	Pieces of stem when tied to waist reduce backache. Root paste applied to counter harm from scorpion bite.	2262
17	<i>Ficus benghalensis</i> L.	Moraceae	<i>Banyan</i>	Tree	Latex from tree cures lesions and abscess in urinary parts.	Photograph
18	<i>Ficus religiosa</i> L.	Moraceae	<i>Pipalo</i>	Tree	Stem bark juice is used to treat burns and wound.	2282
19	<i>Gmelina arborea</i> Roxb.	Verbenaceae	<i>Gambhari</i>	Tree	Stem bark decoction used to cure fever and body ache. Fruit extract cures dysentery.	Photograph
20	<i>Gossypium arboreum</i> L.	Malvaceae	<i>Kopa</i>	Shrub	Tender leaf extract is consumed to cure urinary infection.	2273
21	<i>Hibiscus rosa-sinensis</i> L.	Malvaceae	<i>Hibiscus</i>	Shrub	Leaf extract is used to treat hair fall.	2272
22	<i>Ipomoea sepia</i> Koenig ex Roxb.	Convolvulaceae	<i>Mushakani</i>	Root	Plant paste is given to children to cure boils.	Photograph
23	<i>Jasminum sambac</i> L.	Oleaceae	<i>Bela</i>	Climber vine	Leaf is used to cure eye problems like redness, and itching.	Photograph
24	<i>Justicia adhatoda</i> L.	Acanthaceae	<i>Basanga</i>	Shrub	Leaf juice and flower extract cures breathing disorders. Root powder expedites delivery. Plant used to cure snake bite.	photograph
25	<i>Lablab purpureus</i> (L.) Sweet	Leguminosae	<i>Malal</i>	climber	Seeds are eaten to cure respiratory issues, digestive and general exhaustion problems.	2291
26	<i>Lawsonia inermis</i> L.	Lyrthaceae	<i>Benjati</i>	Shrub	Leaf paste is applied on feet to prevent measles. Consumption of root extract cures constipation.	Photograph
27	<i>Litsea glutinosa</i> (lour.) Robinson	Lauraceae	<i>Jai sana (or Jaisandha)</i>	Tree	Leaf powder is consumed to cure cough and cold. Bark paste is eaten to counter diarrhoea and dysentery.	Photograph
28	<i>Mallotus philipensis</i> (Lam.) Mull. Arg.	Euphorbiaceae	<i>Sinduri</i>	Tree	Seed paste applied on wounds, leaf paste used in small pox, and root extract is taken in dysentery.	2283
29	<i>Mangifera indica</i> L.	Anacardiaceae	<i>Ambo</i>	Tree	Leaf extract is taken to cure dysentery. Bark is also consumed to cure abdominal pain.	Photograph
30	<i>Mitragyna parvifolia</i> (Roxb.) Korth	Rubiaceae	<i>Karam</i>	Tree	Bark juice consumed as cure for stomach pain. Root paste applied for muscle pains.	2297
31	<i>Moringa oleifera</i> Lam.	Moringaceae	<i>Drumstick</i>	Tree	Stem bark paste is applied on body to cure skin ailments.	2263
32		Oleaceae		Shrub	Leaf juice is consumed to treat malaria.	Photograph

	<i>Nyctanthes arbor-tristis L.</i>		<i>Gutakhadika</i>			
33	<i>Ocimum sanctum L.</i>	Lamiaceae	<i>Tulsi</i>	Herb	Leaf juice taken as a preventive measure to protect from malaria. Leaf extract is put in nose during nasal bleeding.	Photograph
34	<i>Phyllanthus emblica L.</i>	Phyllanthaceae	<i>Aonla</i>	Tree	Root chewed to check bleeding in gums, tooth ache. Leaf juice given in diarrhoea and gastric pain. Dried fruit eaten to cure stomach ache.	photograph
35	<i>Psidium guajava L.</i>	Myrtaceae	<i>Guava</i>	Shrub	Young leaf is used in treating dysentery, cure bleeding piles.	photograph
36	<i>Rauvolfia serpentina L.</i>	Apocynaceae	<i>Patalgaruda</i>	Shrub	Root extract cures snake bite. Also useful in stomach ache and counterskin irritations.	photograph
37	<i>Ricinus communis L.</i>	Euphorbiacea	<i>Ram Jada</i>	Shrub	Root bark decoction is used to wash eyes during redness.	2277
38	<i>Schleichera oleosa (Lour.) Oken</i>	Oleaceae	<i>Raj Kusum</i>	Tree	Seed paste applied on wounds and cuts. Also cures white patches on skin.	2258
39	<i>Senna obtusifolia (L.) H.S.Irwin & Barneby</i>	Fabaceae	<i>Badachakunda</i>		Seed paste is applied on body itches.	2293
40	<i>Solanum xanthocarpum Schrad.& H. Wendl.</i>	Solanaceae	<i>Rangaini</i>	Herb	Dry seed is smoked to relieve tooth pain. Leaf is used to cure cough and breathing ailments.	2278
41	<i>Strychnos nuxvomica L.</i>	Strychnaceae	<i>Kuchla</i>	climber	Bark used in stomach pain, and diarrhoea.	photograph
42	<i>Tabernaemontana divaricata (L.) R.Br. ex Roem.&Schult.</i>	Apocynaceae	<i>Tagar</i>	shrub	Root, leaf and flowers used in treatment of scorpion and snake bites	2276
43	<i>Tagetus erecta L.</i>	Asteraceae	<i>Geda</i>	Herb	Leaf paste consumed to cure stomach ache.	photograph
44	<i>Tephrosia villosa (L.)Pers.</i>	Fabaceae	<i>Bano- kolathia</i>	herb	root paste given with warm water to cure scrotum pain	photograph
45	<i>Terminalia bellirica (Gaertn.) Roxb.</i>	Combretaceae	<i>Bahada</i>	Tree	Fruit powder cures diarrhoea, stomach pain,	Photograph
46	<i>Terminalia chebula Retz.</i>	Combretaceae	<i>Harida</i>	Tree	Fruit paste taken in cough and cold. Bark past is applied on wounds.	Photograph
47	<i>Terminalia elliptica Willd.</i>	Combretaceae	<i>Asan</i>	Tree	Bark is used in treatment of diarrhoea. Bark juice also applied to heal cuts and wounds.	2294
48	<i>Tridax procumbens L.</i>	Asteraceae	<i>Ghambra</i>		Leaf juice is used to heal wounds. Also to cure skin itches and blisters.	2275
49	<i>Vachellia nilotica (L.) P.J.H. Hurter &Mabb</i>	Mimosaceae	<i>Babul</i>	Tree	leaf extract used as disinfectant for wounds.	2252
50	<i>Vitex negundoL.</i>	Lamiaceae	<i>Sinduri</i>	Shrub	Leaf paste used to clean teeth, leaf decoction taken in fever.	2295

4. CONCLUSION

System of using plant based extracts in treating various diseases was an integral part of the tribal culture till recent years. Each tribe has its own set of traditional knowledge which they have inherited through generations. They collect different parts of medicinal plants and herbs from the forest. However changing lifestyle coupled with migrations and related urbanisation stresses is reducing this age old practice of use of plant based medicines. Proximity to towns and urban centres have brought the tribal people closer to western medicine.

Tribal communities are living in adverse conditions and have minimal access to modern health facilities. Younger generation has a lack of interest in the merits of the ancestral wisdom. Hence this precious resource is fast depleting. It is necessary to collect and document such precious knowledge from the tribal areas. Evaluation for medico uses of plant resource needs to be prioritised⁸.

Paudi Bhuyan is a PVTG residing in parts of Odisha about which much information is not available. There is a strong relevance of this study, since this tribe is being greatly influenced by rapid urbanization. Traditionally *Guniyas* (medicine men) were present in all Paudi Bhuyan villages who could cure all ailments with the help of plants known for their healing properties.

Traditional medicine based on floral diversity provides health services to the marginalised sections of the society across the globe. Establishment of a separate ministry in India on various aspects related to alternative medicine, AYUSH(Ministry of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy, Govt. of India), speaks at length of the growing relevance and efficacy of the traditional medicines. It is hence important to identify and record medicinal utility of less known plants available in remote areas of country⁹.

From our study on *PaudiBhuyan* tribal community, we conclude that knowledge about plant species used for medicinal value still persists. This is an important finding since there is a greater need for conservation and utilization of biological resources. These repositories need to be further validated with pharmacological findings

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