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Original Article

Ethnobotanicals used for the Treatment of Skin Diseases with Special Emphasis on Carbuncle Disease from Purulia District of West Bengal in India

Ghanashyam Mahato[1], Bangamoti Hansda[2], Nilanjana Banerjee[3,*]

ABSTRACT

Background: From time immemorial ethnic people of Purulia district of West Bengal are well acquainted with different plant resources for the treatment of various skin diseases including 'carbuncle' and others skin diseases. Carbuncle, caused by the methicillin resistant Staphylococcus aureus is of major concern in this part of India, mostly dominated by tribes like Majhi, Munda, Santal, Birhor, Ho and Rajwar etc. Hot climate, overcrowded households, improper sanitation, very poor economic background and frequent burn accidents are of major issues for spreading of these bacterial infections. **Objective:** Present authors are trying to summarize these ethno-medicinal knowledge of the local, conservative traditional healers by using structured questionnaires given to them and are trying to analyze these information from scientific perspective. **Materials and Methods:** Plant samples were collected from March 2014 to May 2016, mostly during their flowering stage and a total of 62 people, both male (84%) and female (16%) were interviewed. Informant consensus factor, fidelity level and use value were calculated. **Results:** Fifty-nine herbal plants belongs to 35 families were recorded for the cure of various skin diseases, among which 10 plants are used individually during medication whereas 9 polyherbal formulations were used in various combinations during treatment. Five species of the families Moraceae and Asteraceae was found to be the most common medicinal plants, among which 44.89% are herbaceous in habit. Leaves (55.55%) are the most common plant part for their use. **Conclusion:** Therefore, the present paper has been written to document this rapidly vanishing huge knowledge of folklore which should be digitally conserved for futuristic approach on medicinal plants in India.

Key words: Ethnobotany, Carbuncle, Purulia, Use value, Informant consensus factor, Fidelity level.

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INTRODUCTION

In ancient India plants were widely used for the treatment of skin disorders. In many countries till today, medicinal plants contribute significantly in the primary health care system of the rural population.[1-4] One of the most important skin ailments, mostly found in the tribal population of Purulia is **carbuncle** disease which is caused by the bacteria *Staphylococcus aureus*. However, the presence of carbuncle is actually the sign of active system to resist other skin infections.[5] The infection is contagious and may spread to other areas of the body. Each year, around 500,000 patients in hospitals of the United States are attacked by Staphylococcal infection, chiefly by *S. aureus*.[6] Since discovery *S. aureus* is experimentally resistant to a lot of antibiotics for example penicillin group (methicillin, oxacillin and cloxacillin),[7,8] amino glycosides, macrolides, tetracycline, chloramphenicol and lincosamides. Vancomycin-resistant *S. aureus* (VRSA) is a strain of *S. aureus* that usually resistant to the glycopeptides. The first case of vancomycin-intermediate *S. aureus* (VISA) was reported in Japan in 1996.[9]

Since last two decades development of drug resistance as well as the appearance of undesirable side effects of certain antibiotics lead us to search for new chemical structures having antimicrobial property from plant extracts.[10] Although the people of Purulia traditionally used various herbal plants for preparing drugs and medicines to treat carbuncle and some skin diseases no such detail documentation has been done earlier. Hence, the primary objective of the present study is to investigate the folkloric wisdom practiced by the aboriginals residing in the Purulia district, one of the poorest district in India, against skin diseases with special emphasis on carbuncle.

MATERIALS AND METHODS

Study area

The study area is located in the western most part of West Bengal, India (Figure 1). This area is situated between 22°6' to 23°5' N latitude and 85°7' to 86°6' E longitude and has an area of 6259 km^2. Purulia district covers subtropical ecology with deciduous forest mainly with luxurious population of Sal, Palash, Piyal, Mohul etc. having high diurnal temperature during summer (upto 52°C) and with average rainfall 1300 mm. It is situated under Chotonagpur plateau having undulated topography and lateritic soil.

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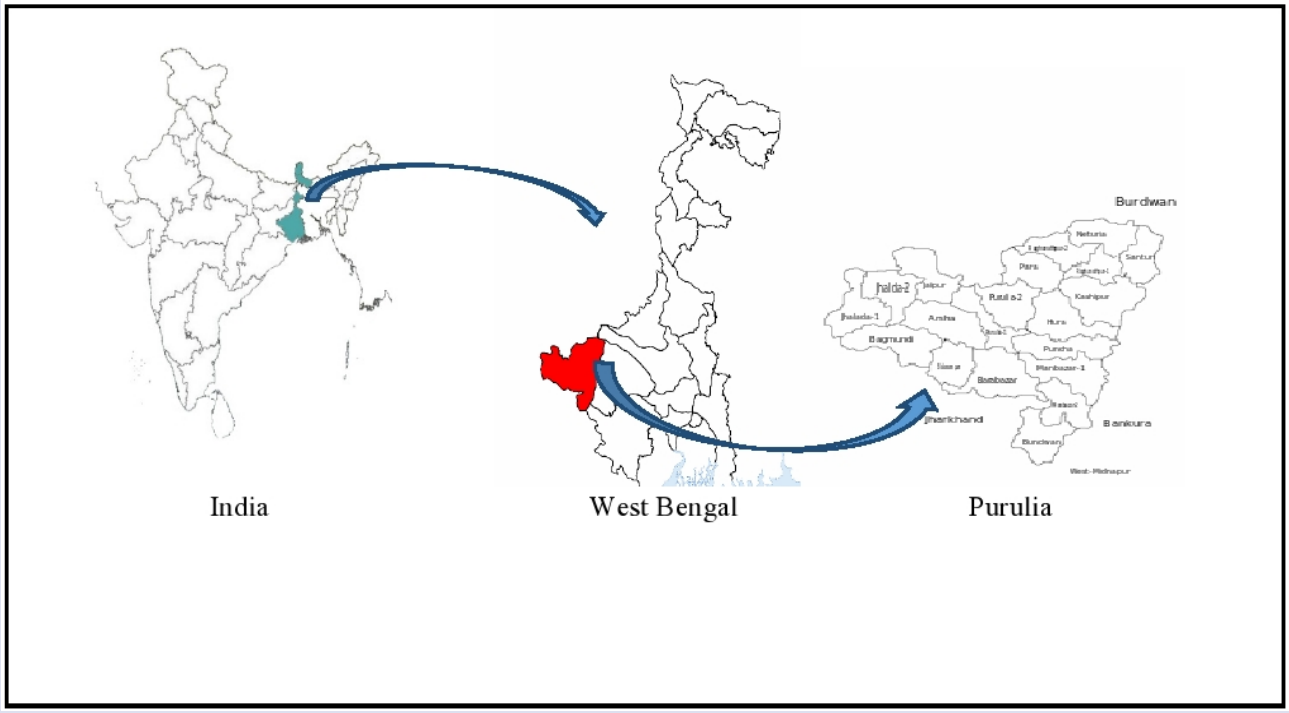

Figure 1: Map of study area. (not in scale).

Ethnobiological data collection and analyses

The survey was carried out from 20 field session based on ethno-biological explorations from 2014 to 2016. Main emphasis was given to the Maoist hot parts of the district. As GM, first author, knows some of the native languages of the tribes, semi structured questionnaire were placed to the informants following a standard ethno botanical method in local vernacular or in Bengali.[11,12] Herbarium specimens of these medicinal plants mostly in their flowering stage were collected for future references. The medicinal plant specimens were identified with the help of authentic herbarium specimens of Botanical survey of India, books, floras and revisions[13-16] and preserved, recorded and documented in the herbarium of Department of Botany, A. M. College, Jhalda.

Descriptive statistics was applied to compute the number and percentage of species, genera and families of ethnomedicinal plants, proportions of plant parts harvested, plant percentage from various sources, plant distribution among different families, life forms, nature of habitat and plant percentage in curing various ailments. Key informants are mostly more than fifty years old and are respectable person of that locality (Figure 3). The collected data was analyzed with three quantitative tools viz. the informant consensus factor (*F*ic), fidelity level (FL) and use value (UV). To test the level of homogeneity of information provided by different informants, Informants' Consensus Factor (F_{ic}) was calculated.[17] *F*ic =Nur-Nt/ (Nur-1) (where,Nur= number of use reports in each disease category; Nt=number of times species used). The value ranges from 0 to 1. High *F*ic value (close to1) means there exist well-defined selection for the species on account of a specific disease category whereas low *F*ic values (close to 0) indicates there is lack of consensus amongst the informants related to the medicinal uses of the species. Fidelity level (FL) index[18] was used to determine the relative healing potential of each reported medicinal plant used against various ailments. Fidelity level (FL%) = (Np /N x 100) (where Np = the number of informants who independently indicated the use of a species for treating a particular disease and N = total number of informants who reported the plant for any given disease). The use value (UV)[19] was also calculated using the formula: UV = (ΣU/n), where UV is the use value of species, 'U' is the total number of use reports per species and 'n' represents the total number of informants interviewed for a given plant. Values ranges from near1 to 0. High UV means there are many use reports for a specific plant and that plant is marked important for treatment.

RESULTS

Ethnomedicinal plant diversity and uses reported by the informants

Medicinal plants was enlisted with scientific name and author citation, followed by local name, family, habit, plant part (s) used and ailment (s) against each disease (Table 1). A total number of 10 monoherbal formulations (MF) were recorded which were used singly for medication during treatment and 9 polyherbal formulations (PF) were used in combination by different ethnic groups of this area (Table 2). The highest number of medicinal plants were recorded in four families viz. Moraceae (5 species), Asteraceae (5 species), Amaranthaceae (4 species), Euphorbiaceae (3 species), Fabaceae (3 species) and Malvaceae (3 species), followed by families Amaryllidaceae, Asclepiadaceae, Solanaceae and Myrtaceae. Each of these families comprises two species.

The distribution of plant habit types, plant part (s) used and method of preparations are illustrated in Figures 2-4 respectively. Out of 59 species 44.89% herbaceous plants are mostly used for medication followed by 36.73% trees, 14.28% shrubs and 2.04% climbers (Figure 2). Leaves (55.55%) were found to be the most favored plant parts followed by roots (11.11%), whole plant (5.55%) and barks (5.55%) (Figure 3). Quantitative ethno botanical analyses revealed high UV for *Curculigo orchioides* Gaertn. (0.81), *Hibiscus rosa-sinsnsis* L. (0.79), *Urginea indica* (Roxb). Kunth (0.77), *Glossocardia bidens* (Retz) Veldkamp (0.88), *Smilax zeylanica* L. (0.82), *Elephantopus scaber* L. (0.72) etc. Highest Fic value was represented by chicken pox (1), carbuncle (0.91) and ulcer (0.87) whereas lowest Fic value was exhibited mouth ulcer (0) and nail

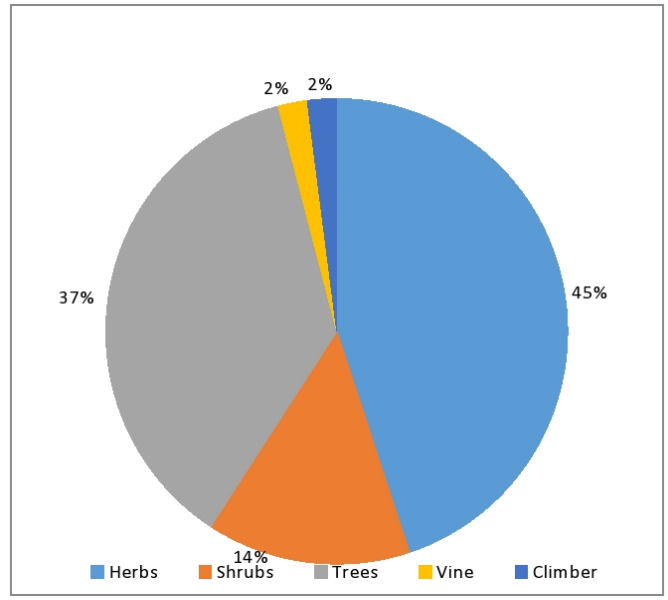

Figure 2: Percentage of habit types of the total studied plant specimens used for the treatment of carbuncle.

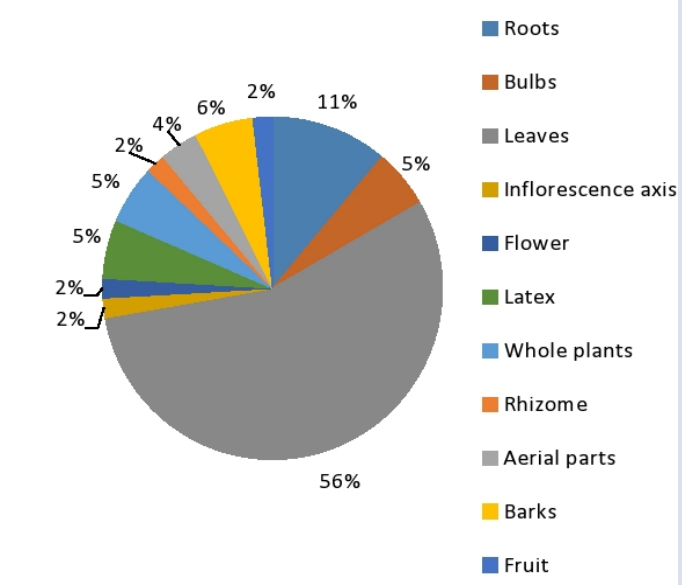

Figure 3: Percentage of plant parts used for medication.

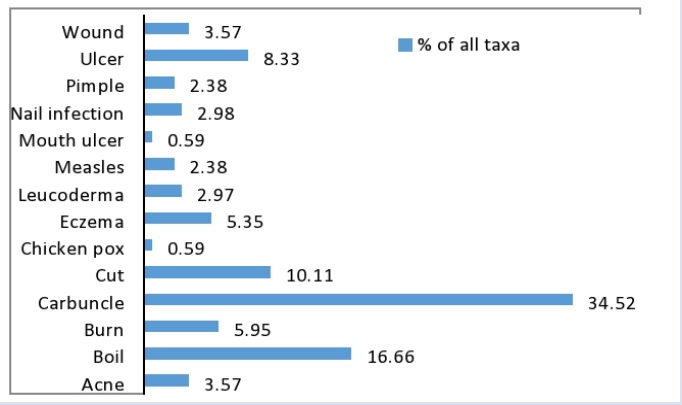

Figure 4: Percentage of species used for the treatment of a particular disease.

Table 1: Ethnobotanicals used for carbuncle and some other skin diseases treatment.

Sl. No.	Latin name	Local Name	Family	Plant parts used	Ailments other than Carbuncle	UV value	Habit
1	*Achyranthes aspera* L.	Chitchiti	Amaranthaceae	Roots	Boi and Ulc	0.4	Herb
2	*Achyranthes bidentata* Blume	Chitni	Amaranthaceae	Roots	Mea	0.24	Herb
3	*Aerva sanguinolenta*(L.) Blume	Chaldhuya	Amaranthaceae	Aerial parts	Mea and Cut	0.42	Herb
4	*Ageratum conyzoides L.*	Bhabri	Asteraceae	Leaves	Cut,Boi	0.24	Herb
5	*Allium sativum* L.	Piyaj	Amaryllidaceae	Bulbs	Boi and Ulc	0.33	Herb
6	*Aloe vera* L.	Ghritakumari	Xanthorrhoeaceae	Leaves	Ulc,Cut,Acne and nail infection	0.54	Herb
7	*Amaranthus spinosus* L.	kata nate	Amaranthaceae	Leaves	Boi,Acne	0.22	Herb
8	*Andrographis paniculta* (Burm.f.) Wal. ex. Nes.	Kalmegh	Acanthaceae	Leaves	Ulc	0.43	Herb
9	*Annona squamosa* L.	Atapata	Annonaceae	Leaves	Boi and Pim	0.29	Tree
10	*Argemone mexicana* Linn	Siyalkata	Papaveraceae	Roots	Cut	0.21	Herb
11	*Artocarpus heterophyllus* Lam.	Kathal	Moraceae	Inflorescence axis(IA)	Boi and Leo	0.39	Tree
12	*Averrhoa carambola* L.	Kamranga	Oxalidaceae	Roots	Ulc	0.19	Tree
13	*Azadirachta indica* A. Juss.	Nim	Meliaceae	Leaves	Mea, Chick pox, Ulc and Boi	0.75	Tree
14	*Barleria lupulina*Lindl.	Bialyakaran	Acanthaceae	Leaves	Bur	0.26	Shrub
15	*Bauhinia purpurea* L.	kanchan	Leguminosae	Leaves	Boi and Bur	0.22	Shrub
16	*Boerhavia diffusa* L.	Kathasak	Nyctaginaceae	Leaves	Cut	0.39	Herb
17	*Bombax ceiba* L.	Bakul	Bombacaceae	Leaves	Mouulc	0.21	Tree
18	*Bryophyllum pinnatum* (Lam)Oken	Patharkuchi	Crassulaceae	Leaves	Boi	0.26	Herb
19	*Calotropis gigantea* (Linn.) R. Br.ex.Ait.	Akuni	Asclepidaceae	Leaves and Latex	Bur	0.37	Shrub
20	*Calotropis Procera* (Aiton) R. Br.	Akanda	Asclepidaceae	Leaves	Bur	0.26	Shrub
21	*Cannabis sativa* L.	Ganja	Cannabaceae	Leaves	Cut	0.12	Shrub
22	*Cotula anthemoides* L.	Tar dingla	Asteraceae	Whole plant	Ulc,Boi,Acne,Leo and Pim	0.88	Herb
23	*Crinum asiaticum* Linn.	Baniyaj	Amaryllidaceae	Bulbs	Boi	0.48	Herb
24	*Curculigo orchioides* Gaertn.	Talmuli	Hypoxidaceae	Roots	Boi,Bur,Leo and cut	0.81	Herb
25	*Curcuma longa* L.	Halud	Zingiberaceae	Rhizomes	Ulc ,Cut and Acne	0.52	Herb
26	*Cuscuta reflexa* Roxb.	Sarnalata	Convolvulaceae	Whole plant	Boi	0.47	Climber
27	*Cyperus rotundus* L.	Mutha	Cyperaceae	Whole plant	Ulc	0.47	Herb
28	*Datura metel* L.	Dhutra	Solanaceae	Leaves	Nail inf	0.15	Shrub
29	*Datura stramonium* L.,	Dhutrajhuri	Solanaceae	Leaves	Nail inf	0.09	Shrub
30	*Elephantopus scaber* L.	Mayurjhuti	Asteraceae	Roots	Boi,Bur and Ulc	0.42	Herb
31	*Euphorbia hirta* L.,	Lalpata	Euphorbiaceae	Aerial parts	Mea and Cut	0.42	Herb
32	*Euphorbia milii var. longifolia* D. Moul.	Latjhakha	Euphorbiaceae	Leaves	Bur	0.16	Herb
33	*Ficus benghalensis* L.	Asasta	Moraceae	Leaves and Bark	Pim	0.1	Tree
34	*Ficus hispida* L. f.	Dumur	Moraceae	Leaves and Latex	Boi and Bur	0.27	Tree
35	*Ficus racemosa* L.	Pagadumur	Moraceae	Leaves and Latex	Boi and Bur	0.39	Tree
36	*Ficus religiosa* L.	Jar	Moraceae	Leaves	Nail inf	0.03	Tree
37	*Gloriosa superba* Linn.	Barphuli	Colchicaceae	Leaves	Leo	0.22	Herb
38	*Glossocardia bidens* (Retz) Veldkamp	Pisainandi	Asteraceae	Whole plant	Ulc,Boi,Acne,Leo and Pim	0.88	Herb
39	*Gmelina arborea* Roxb. ex Sm.	Gamer	Lamiaceae	Barks	Wou and cut	0.24	Tree
40	*Hemidesmus indicus* (L.) R.Br.	Anantamuli	Apocynaceae	Aerial parts	Ecz and Ulc	0.47	Herb
41	*Hibiscus rosa-sinensis* L.	Jaba	Malvaceae	Leaves	Boi and Acne	0.79	Shrub
42	*Lawsonia inermis* L.	Natur	Lythraceae	Leaves	Cut	0.21	Shrub
43	*Lippia alba* (Mill.)N.E.Br.ex Britton and P.Wilson	laltia	Verbenaceae	Aerial parts	Ecz	0.47	Herb
44	*Madhuca longifolia* (Konig) J.F.Macbr.	Mahua	Sapotaceae	Flower	Boi, Ulc and Bur	0.58	Tree
45	*Magnifera indica* L.	Aam	Anacardiaceae	Leaves	Ecz and wou	0.4	Tree
46	*Piper betle* L.	Pan	Piperaceae	Leaves	Boi	0.5	Vine
47	*Polygala crotalarioides* Buch.-Ham. ex Dc.	Nilkantha	Polygalaceae	Root	Boi	0.45	Herb
48	*Psidium guajava* L.	Peyara	Myrtaceae	Leaves	Ecz and Nail inf	0.19	Tree
49	*Pterocarpus santalinus* L.f.	Set chandan	Fabaceae	Barks	Boi,Ecz and Wou	0.64	Tree
50	*Ricinus communis* L.	Jara	Euphorbiaceae	Leaves	Boi and cut	0.4	Tree
51	*Shorea robusta* Gaertn.	Sal	Dipterocarpaceae	Leaves	Boi,Ecz and Wou	0.42	Tree

Sl. No.	Latin name	Local Name	Family	Plant parts used	Ailments other than Carbuncle	UV value	Habit
52	*Sidacordata* (Burm. f.) Borss. Waalk.	Laltoa	Malvaceae	Leaves	Ecz	0.32	Herb
53	*Sida cordifolia* L.	Chalpata	Malvaceae	Leaves	Boi and cut	0.48	Herb
54	*Smilax zeylanica* L.	Ramdatun	Smilacaceae	Roots	Boi,Ecz and Wou	0.42	Shrub
55	*Syzygium cumini* (L) Skeels	Jam	Myrtaceae	Leaves	Wou and cut	0.63	Tree
56	*Tagetes patula* L.	Gandha	Asteraceae	Leaves	Cut and Ecz	0.6	Herb
57	*Tamarindus indica* L.	Tetul	Leguminosae	Leaves and Fruits	Boi and Ulc	0.73	Tree
58	*Urginea indica* (Roxb.)Kunth	Banpiyaj	Liliaceae	Bulbs	Boi,Leo, Cut and Ulc	0.77	Herb
59	*Vitex negundo* L.	Buyan	Verbenaceae	Leaves	Cut and Boi	0.61	Shrub

Wou = wound; Boi = Boil; Cut = Cut; Ulc = Ulcer; Leo = Leukoderma; Ecz = Eczema; Nail inf = Nail infection; Pim = Pimple; Mea = measles; Moulc = Mouth ulcer; Chick pox = Chicken pox; Bur = Burn; Acn = Acne;Car = Carbuncle.

Table 2: Details of formulations for medication.

Formulations	Plant species used singly / combinations	Parts used	Additives	Method of preparation	Mode of administration
MF1	*A vera*	L	Water	Paste	Apply on Carbuncle
MF2	*A indica*	L	Water	Form small pea sized pills	Once a day before breakfast
MF3	*C gigantea*	L + LA	NR	Burn to form ash	Apply on mouth of Carbuncle
MF4	*D metel*	L	NR	Burn to form ash	Apply on mouth of Carbuncle
MF5	*D stramonium*	L	Milk; Rhizome of kanchahalud/turmaric	Paste	Apply on Carbuncle
MF6	*V negundo*	L	Jira/Cumin seeds	Paste	Apply at starting time
MF7	*C anthemoides*	WH	Honey	Form small sized pills	Three times in a day before meal
MF8	*C viviparum*	BU	Milk from sheep	paste	Apply on mouth for seven days
MF9	*C orchioides*	RH	Water	Form small pea sized pills	Two times before to take meal
MF 10	*G bidens*	WH	Water	Paste	Applied on the affected parts twice a day for five days
PF1	*A aspera* + *A sativum* + *A paniculta*+ *A squamosa*+ *A heterophyllus* + *A indica*+ *C viviparum*+*G bidens*+ *A sanguinolenta*	R+BU+L+L+IA +L+BU+A+A	Talmichri made from palm tree; Honey	Grinding all the items, small pea-sized pills are made from a paste	Once in a day for five days
PF2	*A carambola*+ *C Procera*+ *C longa* + *E scaber* + *R communis* + *A vera* + *C anthemoides*+ *A indica*+*L alba*	R+L+Rh +R +L +L+WH+L+L	Kalajira; Mirchi	After grinding all the ingredients pills are prepared from a paste	Thrice a day
PF3	*F recemosa*+ *H rosa-sinsnsis* +*P guajava* +*S cordata* +*S cumini* + *C anthemoides*+*S zeylanica*+*A conyzoides*	L+L+L+L +L +WH+RT+L	Clarified butter(Ghee) of Cow milk;honey	Alltheingredientsaregrindedtoforma paste whichismixed well with Ghee.	One teaspoonful of mixture is taken before breakfast for 4 to 5 days.

Formulations	Plant species used singly / combinations	Parts used	Additives	Method of preparation	Mode of administration
PF4	*A bidentata* + *A Mexicana* + *B diffusa* + *B ceiba* + *B pinnatum*+ *C viviparum*+ *C orchioides*+*B lupulina*	R+R+L +L+L+BU+RH+L	Kalojira(Seeds of*Nigellasativa*L.; Ranunculaceae); Rabing(Fruitsof*Piper nigrum*L.; Piperaceae); Michri(Sugar candy)	Paste	Apply on the affected part
PF5	*C anthemoides* + *C reflexa* + *E scaber* + *F hispida*+ *G arborea*+*A spinosus*	WH+ WH+R+L+B+A	Blackpepper/Rabing(Fruitsof*Piper nigrum*L.; Piperaceae); Cummin/ Jira(Seeds of *Cuminumcyminum*L.; Apiaceae); Milk	A decoction is prepared in boiled water	Consumed with ginger.
PF6	*M longifolia* + *P santalinus*+ *S cordifolia* + *U indica*+ *C anthemoides*+ *A indica* + *C orchioides*+*G bidens*+*B purpurea*	FR+B+L+BU +WH+L+Rh+ WH+L	Rice washed water	All the materials are mixed together to make a dough. Cakes/ pies are prepared from the dough	Cakes/pies are consumed in hot or warm condition
PF7	*C viviparum* + *C orchioides*+ *C rotundus*+ *E hirta* + *A paniculata*+*S zeylanica*+*P crotalaroides*	BU +R+ WH+A +L+RT+RT	Ada/Ginger (Rhizomeof*Zingiberofficinale*Roscoe; Zingiberaceae): adequate amount; Honey, equalto the amountofGinger;Ricewashedwater	All ingredients are grinded to a paste with the help of a mortar and pestle. Peas-like pills are made from this paste	Two pills are taken each day in empty stomach for 21 days
PF8	*H indicus* + *C viviparum*+ *F bengaalensis* +*G superba* +*L inermis* + *C orchioides*	A+BU+L+L+L+RH	Bark ofmango/Aamtree (*Mangiferaindica*L.; Anacardiaceae); Chun	Paste	Apply on Carbuncle for 7 days
PF9	*M indica* +*P betle* +*S robusta* +*T patula* +*T indica*+ *C anthemoides*	L+L+L+L+FR+ RH	Cow urine	Mixed all to form paste	Apply on the affected part

L = Leaves; BU = Bulb; FR = Flower; RH = Rhizome; A = Aerial part; WH = Whole plant; B = Bark; R = Root; IA = Inflorescence axis; LA = Latex; NR = Not required.

infection (0.6) (Table 3). High FL designates a plant's ethno-medicinal usage agreed upon by a number of informants.

FL of the plants

Plants were classified according to specific disease concern and FL value.

Boil÷

Achyranthes aspera L. (24%), *Allium sativum* L. (28.57%), *Annona squamosa* L. (33.33%), *Artocarpus heterophyllus* Lam. (25%), *Azadirachta indica* A. Juss. (34.04%), *Bryophyllum pinnatum* (18.75%), *Cotula anthemoides* L. (27.77%), *Crinum latifolium* Linn. (46.66%), *Curculigo orchioides* Gaertn. (12%), *Cuscuta reflexa* Roxb. (48.27%), *Elephantopus scaber* L. (23.07%), *Ficus hispida* L.f. (23.52%), *Ficus racemosa* L. (16.66%), *Hibiscus rosa-sinsnsis* L. (28.57%), *Madhuca longifolia* (Konig) J.F.Macbr. (16.66%), *Piper betle* L. (51.61%), *Pterocarpus santalinus* L.f. (15%), *Ricinus communis* L., (24%), *Shorea robusta* Gaertn., (23.07%), *Sida cordifolia* L. (33.33%), *Tamarindus indica* L., (40%), *Urginea indica* (Roxb.) Kunth (29.16%), *Vitex negundo* L. (36.84%).

Ulcer÷

Achyranthes aspera L. (28%), *Allium sativum* L. (14.28%), *Andrographis paniculta* (Burm.f.) Wal.ex. Nes. (59.25%), *Averrhoa carambola* L. (33.33%), *Azadirachta indica* A. Juss. (19.14%), *Cotula anthemoides* L. (25.92%), *Curcuma longa* L. (18.75%), *Cyperus rotundus* L. (55.17%), *Elephantopus scaber* L. (15.38), *Hemidesmus indicus* (L.) R.Br. (20.68%), *Madhuca longifolia* (Konig) J.F.Macbr. (13.88%), *Urginea indica* (Roxb.) Kunth (18.75%), *Aloe vera* L. (17.64).

Measles÷

Achyranthes bidentata Blume (26.66%), *Azadirachta indica* A. Juss. (6.38%), *Euphorbia hirta* L. (23.07%).

Cut

*Aloe vera*L. (8.8%), *Argemone mexicana* Linn (38.46%), *Boerhavia diffusa* L. (45.83%), *Curculigo orchioides* Gaertn. (18%), *Curcuma longa* L. (15.62%), *Euphorbia hirta* L. (19.23%), *Hemidesmus indicus* (L.) R.Br. (6.66%), *Lawsonia inermis* L. (15.38%), *Ricinus communis* L. (28%), *Sida cordifolia* L. (20%), *Syzygium cumini* (L) Skeels (33.33), *Tagetes patula* L.

Table 3: Data analyses for Informants' consensus factor for specific disease category.

Category of ailments	Number of taxa	% of all taxa	Number of use reports	% all use reports	Informants' consensus factor (Fic)
Acne	6	3.57	32	2.56	0.84
Boil	28	16.66	214	17.12	0.87
Burn	10	5.95	53	4.24	0.83
Carbuncle	58	34.52	597	47.76	0.91
Cut	17	10.11	113	9.04	0.86
Chicken pox	1	0.59	5	0.4	1
Eczema	9	5.35	44	3.52	0.81
Leukoderma	5	2.97	19	1.52	0.77
Measles	4	2.38	13	1.04	0.75
Mouth ulcer	1	0.59	1	0.08	0
Nail infection	5	2.98	11	0.88	0.6
Pimple	4	2.38	12	0.96	0.73
Ulcer	14	8.33	104	8.32	0.87
Wound	6	3.57	32	2.56	0.84

(45.94%), *Tamarindus indica* L. (28.88%), *Urginea indica* (Roxb.) Kunth (12.5%), *Vitex negundo* L. (26.31%).

Acne÷

Aloe vera L. (11.76%), *Cotula anthemoides* L. (11.11%), *Curcuma longa* L. (21.87%), *Hibiscus rosa-sinsnsis* L. (30.61%).

Nail infection÷

Aloe vera L. (5.8%), *Datura metel* L. (23.33), *Datura stramonium* L. (66.66%), *Ficus religiosa* L. (50%), *Psidium guajava* L. (8.33%).

Pimple÷

Annona squamosa L. (16.66%), *Cotula anthemoides* L. (9.2%), *Ficus benghalensis* L. (66.66).

Chicken pox÷

Azadirachta indica A. Juss. (10.63%)

Mouth ulcer÷

Bombax ceiba L. (7.6%)

Burn÷

Calotropis gigantea (Linn.) R. Br.ex. Ait. (47.82%), *Calotropis procera* (Aiton) R. Br. (25%), *Curculigoorchioides* Gaertn. (16%), *Elephantopus scaber* L. (19.23%), *Euphorbia milii var. longifolia* D. Moul. (40%), *Ficushispida* L.f. (11.76%), *Ficus racemosa* L. (37.5%), *Madhucalongifolia* (Konig) J.F.Macbr. (27.77).

Leukoderma

Artocarpus heterophyllus Lam. (25%), *Curculigo orchioides* Gaertn. (14%), *Gloriosa superba* Linn. (7.1%), *Urginea indica* (Roxb.) Kunth (10.41%).

Wound÷

Gmelina arborea Roxb. Ex Sm. (13.33%), *Mangifera indica* L. (20%), *Pterocarpus santalinus* L.f. (15%), *Shorearobusta* Gaertn. (19.23%), *Syzygium cumini* (L) Skeels (35.89%).

Eczema÷

Hemidesmus indicus (L.) R.Br. (37.93%), *Mangifera indica* L. (24%), *Pterocarpus santalinus* L.f. (15%), *Shorea robusta* Gaertn. (19.23%), *Syzygium cumini* (L) Skeels (35.89%), *Tagetes patula* L. (16.21%), *Sida cordata* (Burm. f.) Borss. Waalk. (30%).

Carbancle÷

Achyranthes aspera L. (48%), *Achyranthes bidentata* Blume (73.33%), *Allium sativum* L. (66.66%), *Aloe vera* L. (55.88%), *Andrographis paniculta* (Burm.f.) Wal.ex.Nes. (40.74%), *Annona squamosa* L. (50%), *Argemone mexicana* Linn (61.53%), *Artocarpus heterophyllus* Lam. (50%), *Averrhoa carambola* L. (66.66%), *Azadirachta indica* A. Juss. (29.78%), *Boerhavia diffusa* L. (54.16%), *Bombax ceiba* L. (92.30%), *Bryophyllum pinnatum* (Lam) Oken (81.25%), *Calotropis gigantea* (Linn.) R.Br.ex.Ait. (52.17%), *Calotropis procera* (Aiton) R. Br. (75%), *Cotula anthemoides* L. (25.92%), *Crinum viviparum (Lam) R. Ansari & V.J. Nair*, *Curculigo orchioides* Gaertn. (40%), *Curcuma longa* L. (43.75%), *Cuscuta reflexa* Roxb. (51.72%), *Cyperus rotundus* L. (44.82%), *Datura metel* L. (66.66%), *Datura stramonium* L. (33.33), *Elephantopus scaber* L. (42.30), *Euphorbia hirta* L. (61.53%), *Euphorbia milii var. longifolia* D. Moul. (60%), *Ficus benghalensis* L. (33.33%), *Ficus hispida* L.f. (64.70%), *Ficus racemose* L. (45.83%), *Ficus religiosa* L. (50%), *Gloriosa superba* Linn. (92.85%), *Gmelina arborea* Roxb. ex Sm. (80%), *Hemidesmus indicus* (L.) R.Br. (41.37%), *Hibiscusrosa-sinsnsis* L. (40.81%), *Lawsoniai nermis* L. (84.61%), *Madhucalongifolia* (Konig) J.F.Macbr. (41.66%), *Mangifera indica* L. (56%), *Piper betle* L. (48.38%), *Psidium guajava* L. (58.33%), *Pterocarpus santalinus* L.f. (52.5%), *Ricinus communis* L. (48%), *Shorea robusta* Gaertn. (42.30%), *Sida cordata* (Burm. f.) Borss. Waalk. (70%), *Sida cordifolia* L. (46.66%), *Syzygium cumini* (L)Skeels (30.76%), *Tagetes patula* L. (37.83%), *Tamarindus indica* L. (31.11%), *Urginea indica* (Roxb.) Kunth (29.16%), *Vitex negundo* L. (36.84%).

DISCUSSION AND CONCLUSION

We report a total of 59 plant species belonging to 35 different families which are used directly or with some additives (Table 2) for the treatment of carbuncle. Herbal formulations are usually made with dry dehydrated form rather than fresh form of plant parts. Dried plant parts are stored at homes throughout the year so that these can be used for treatment during off-season, especially in winter when leafy species become scarce. Usually, healers follow their own traditional knowledge for drug formulation and do not want to disclose it to the patients. In most of the cases they prefer leafy parts of different herbs. UV represents the relative importance of plants in that locality for drug formulation (Table 1). High Fic designates the use of a particular species reported by a large fraction of the interviewed informants for a particular disease and low Fic denotes the disparity amongst the informants in using a specific species against a specific disease. In many cases, medication was preferred in a composite mixtures from different plants/plant parts with the understanding that synergistic effect of phytochemicals of

different plants species may improve the rate of healing.[20] This classical knowledge, inherited by these local tribal healers from their ancestors is rapidly vanishing due to degradation of forest covers, uprooting of tribal population due to fast urbanization and industrialization and above all indifferent attitude of younger generation, although still maintaining the skeletal structure of primary healthcare system of Purulia district. Therefore, the present documentation is a preliminary attempt to pave the path for developing digitized database in future. A proper planning and management is the need of the age for their sustainable exploitation and conservation.

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CONFLICTS OF INTEREST

None.

ABBREVIATIONS

FL: Fidelity Level; *Fic*: Informants' Consensus Factor; UV: Use Value; MF: Monoherbal Formulation; PF: Polyherbal Formulation.

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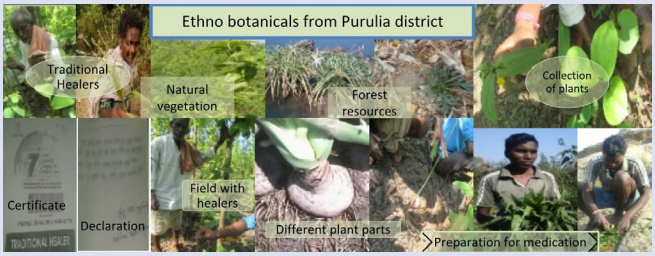
GRAPHICAL ABSTRACT



SUMMARY

Fifty-nine herbal plants belongs to 35 families were used in various combinations during treatment. Most of the species belongs to Moraceae and Asteraceae families in comparison to other families. Herbaceous plants are most commonly used and leaves are the most common part for preparing formulations.

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