

PLANT RESOURCES USED FOR TOOTH BRUSHING AND DENTAL CARE BY THE PARAJA AND THE GADABA TRIBES OF KORAPUT DISTRICT, ODISHA, INDIA

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Traditional dental health practices which generally called alternative / complementary or unconventional health practices were practiced as early as 7000 BCE in the Indian subcontinent. Ethnomedicine become the vital source of medicine in the Koraput district of Odisha. Tribal communities like the Paraja and the Gadaba are advanced in such practice in the Koraput District. Total 40 plant species from 24 families were used by them for the purpose of brushing teeth and dental care. This information was collected from 37 Paraja and Gadaba tribal dominated villages of 25 Gram Panchayats belonging to 5 development blocks of Koraput district, Odisha. Out of 40 plant species, 13 have been described in the Ancient Ayurvedic Literatures. With the influence of globalization, area many of such unconventional health practices are now first disappearing in peril condition as they are considered as outdated, even in the remote pockets. Thus, it is high time to explore, identify, document, digitalise and disseminate this traditional knowledge.

Introduction

Teeth are very hard and sensitive organs which are rooted in the jaw bones. Teeth help in the biting and grinding of food and also help in speech making. Any fault of the teeth or a disease of the gums affects perturbs the process of digestion. Due to paucity of accurate information it is difficult to tell about when, where and how people use to learn to clean their teeth. It was commonly narrated that during ancient civilizations, to clean teeth, people rubbed their teeth with rough cloth or salt or charcoal, etc¹. Excavations at different sites suggest that medical interventions such as dentistry and trepanation were practiced as early as 7000 BCE in the Indian subcontinent². Using plant resources as tooth brushing stick (*datun*) is also known as chewing stick. The importance of dental health and oral hygiene has been

identified through centuries³⁻⁵. Ayurveda, the system of Indic traditional medicine, is having a rich knowledge on plant, whereas the list of chewing sticks is very limited so less⁶⁻¹² (Table-1).

Table 1 Number of herbal chewing sticks mentioned in the Ancient Ayurvedic Literatures

Sr. No.	Source	Number of herbal chewing sticks mentioned
1	Charaka Samhita (800BC)	6
2	Sushruta Samhita (700BC)	5
3	Asthanga Hridaya (500BC)	5
4	Asthanga Sangraha (500BC)	10
5	Koorma Purana (9th C)	7
6	Ananda Kanda (13th C)	33
7	Brahma Vaivarta Purana (15th C)	17
8	Bhava Prakasha (16th C)	23

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Table 2 Plant resources used as tooth brushing and dental care by the studied communities have description in the Ancient Ayurvedic Literatures

Sr. No.	Scientific name	Also described in the Ancient Ayurvedic Literatures
1	<i>Acacia nilotica</i> (L.) Wild	-
2	<i>Acacia polyacantha</i> Wild.	-
3	<i>Acacia sinuta</i> (Lour.) Merr.	-
4	<i>Achyranthes aspera</i> L.	Asthanga Sangraha, Ananda Kanda, Bhava Prakasha, Brahma Vaivarta Purana, Koorma Purana
5	<i>Aegle marmelos</i> L.	Bhava Prakasha, Koorma Purana
6	<i>Alangium salvifolium</i> (l.f.) Wang	Ananda Kanda
7	<i>Asparagus racemosus</i> Wild.	-
8	<i>Azadirachta indica</i> A.Juss.	Sushruta Samhita, Ananda Kanda, Bhava Prakasha
9	<i>Bambusa bambos</i> (L.) Voss	-
10	<i>Bombax ceiba</i> L.	-
11	<i>Breynia retusa</i> (Dennst.) Alston	-
12	<i>Cipadessa bacifera</i> (Roxb.) Miq.	-
13	<i>Erythrina indica</i> Lam.	Bhava Prakasha
14	<i>Eucalyptos citriodora</i> Hook	-
15	<i>Ficus benghalensis</i> L.	Asthanga Hridaya, Asthanga Sangraha, Ananda Kanda, Bhava Prakasha, Brahma Vaivarta Purana, Koorma Purana
16	<i>Hygrophila auriculata</i> (Schum.) Heine	-
17	<i>Jatropha curcas</i> L.	-
18	<i>Lantana camara</i> L. / <i>Var aculeate</i> (L.) Mold.	-
19	<i>Mangifera indica</i> L.	Ananda Kanda, Bhava Prakasha, Brahma Vaivarta Purana
20	<i>Mimusops elengi</i> L.	-
21	<i>Murraya paniculata</i> (L.) Jack	-
22	<i>Nyctanthes arbor-tristis</i> L.	-
23	<i>Phoenix acaulis</i> Buch.-Ham ex Roxb.	-
24	<i>Phoenix sylvestris</i> (L.) Roxb.	-
25	<i>Phyllanthus embelica</i>	Brahma Vaivarta Purana, Koorma Purana
26	<i>Pongamia pinnata</i> (L.) Pierre / <i>Derris indica</i>	Charaka Samhita, Sushruta Samhita, Asthanga Hridaya, Asthanga Sangraha, Ananda Kanda, Bhava Prakasha
27	<i>Psidium guajava</i> L.	-
28	<i>Shorea robusta</i> Gaertn. F.	Asthanga Sangraha, Ananda Kanda, Brahma Vaivarta Purana
29	<i>Smilx perfoliata</i> Lour.	-
30	<i>Streblus asper</i> Lour.	-
31	<i>Strychnos nux-vomica</i> L.	-
32	<i>Syzygium cumini</i> (L.) Skeels	Ananda Kanda
33	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	-
34	<i>Terminalia chebula</i> Retz.	-
35	<i>Terminalia tomentosa</i> (DC.) W. & A.	-
36	<i>Urena lobata</i> L.	-
37	<i>Vitex negundo</i> L.	Brahma Vaivarta Purana
38	<i>Zanthoxylum armatum</i> DC.	-
39	<i>Ziziphus rugosa</i> Lam.	-
40	<i>Zyzyphus mauritiana</i> Lam.	Ananda Kanda



Fig. 1 Photos of plant resources used as tooth brushing and dental care by the studied communities. Sr. No. wise the name of the plant is mentioned in the Table-2

The use of *Salvadora persica* twigs as tooth brush was reported to practice by Babylonians in almost 7000 years ago¹³. In India, documentation of traditional knowledge on dental health and hygiene are insufficient except a few random works¹⁴⁻²⁰. It was reported that Neem (*Azadirachta indica*) twigs were used in the ancient Indian civilizations for brushing teeth using the edge of the twig chewed for soften to form bristles to brush to clean teeth²¹. The traditional use of the plant twigs as toothbrush is still found to practice in many counties including India²²⁻²⁵.

Materials and Methods:

In the state Odisha, there are 30 districts and all total 62 Scheduled Tribes inhabit. Koraput district of Odisha lies between 18° 14' to 19° 14' N latitude and 82° 5' to 83° 25' E longitude, which is consecrated with rich and diverse cultural heritage of tribal people who are possessing rich knowledge regarding plants and animals including their usage for treating common ailments²⁶. Koraput district is a tribal dominated district having 8 major tribal groups such as Gadaba, Omanatya, Paroja, Saura / soura / Sabara / Savar / Sora / Saora / Sahara, Bhumia, Bhattada, Durua, Kondh etc. Population wise Paroja and Gadaba are highest in number and they have a sound knowledge on ethnomedicines which they ascribed through successive generations since time immemorial²⁷.

The Paraja are also found in Andhra Pradesh, Assam, Chhattisgarh, Madhya Pradesh, Maharashtra and West Bengal. The original Paraja language is *Parji* which belongs to Dravidian family of languages, however most of them who are staying in Koraput are speaking local *Desia* language or Odia language. The Gadabas are Proto-Australoid origin and their original language is *Gutob* which is a Mundari language belonging to Austri-Asiatic language family. Both communities are interdependent among themselves for many purposes and medicinal interdependency is one of them. Ethnomedicinal knowledge is a complicated knowledge system embedded within the traditional ethnographical properties²⁶. As the major population concentration of the Paraja and Gadaba of Odisha are in Koraput district in general and in the studied five blocks (Semiliguda, Pottangi, Nandpur, Lamtaput and Baipariguda), data collection was made on the basis of snowball technique. The study on Plant resources used as tooth brushing and dental care was conducted in 37 villages and collected information from two tribal communities, i.e. the Paraja and the Gadaba. The information regarding 40 plant species used for tooth brushing and dental care were collected from 2019 to 2021.

Results and Discussion

The study identified 40 plant species belonging to 24 angiosperm families for brushing teeth to maintain oral health, hygiene, and cultural practice by these communities. The plant families, e.g., Combretaceae, Euphorbiaceae, Mimosaceae, Myrtaceae, and Rutaceae have three plant species each which twig are used as chewing stick. Two plant species each from plant families like Arecaceae, Fabaceae, Meliaceae, Moraceae, Rhamnaceae, and Verbenaceae are used as chewing stick. One plant species each from plant families like Acanthaceae, Alangiaceae, Amaranthaceae, Anacardiaceae, Bombacaceae, Dipterocarpaceae, Liliaceae, Longaniaceae, Malvaceae, Oleaceae, Poaceae, Sapotaceae, and Smilacaceae are used as chewing stick. Out of 40 plant species, 13 are also described in the ancient ayurvedic literatures (Table-2). The photo of these plant species are depicted in the Figure-1, and the number mentioned in this photo is belongs to that plant as per the Sr. No. mentioned in the Table-2. The plant species *Pongamia pinnata* (L.) Pierre / *Derris indica* which is used by the studied communities has description in all most all ancient Ayurvedic literatures. The criteria they used to choose a plant species for the purpose of tooth brushing and dental care are that the plant should be either *kashaya* (astringent), *katu* (pungent) or *tikta* (bitter) in taste. Ayurveda recommends chewing sticks in the morning as well as after every meal to prevent diseases. Ayurveda insists on the use of herbal brushes, approximately 9 inches long and the thickness of one's little finger²⁸. From ancient time to present 21st century, across the world and cultures, tooth brush has been a basic part of a daily routine. The indispensable function of the tooth brush which was to mechanically cleanse the mouth has remained the same over the ages^{29,30}. The studied communities basically used chewing sticks for three purpose (Table-3) such as medicinal purpose for dental and gum problem (20 species), regular use for dental/oral care and mechanically cleansing the mouth (7 species),

Table 3 Purpose of using chewing stick by the studied communities

Use of chewing stick	Total Number of Plant Species used
Medicinal purpose for Dental and Gum problem	20
Regular use for dental/oral care	7
Cultural practices	13
Total	40

Table 4 Detail list of plant resources with their local name, family and parts used as tooth brushing and dental care by the studied communities:

Sr. No.	Scientific name	Local name (l); Odia name (o)	Family	Parts used	Purpose of use
1	<i>Acacia nilotica</i> (L.) Wild	Babula (o)	Mimosaceae	Fresh stem twigs	Used for brushing teeth as a part of learning process of a trainee of Black magic.
2	<i>Acacia polyacantha</i> Wild.	Sami (l); Sami(o)	Mimosaceae	Fresh stem twigs	Used for brushing teeth as a part of learning process of a trainee of Black magic.
3	<i>Acacia sinuta</i> (L.) Merr.	Silli / Chillli (l); Sikaya (o)	Mimosaceae	Raw stem twigs	Regular use
4	<i>Achyranthes aspera</i> L.	Kukurdatki (l); Apamaranga (o)	Amaranthaceae	Stem twig	Regular use
5	<i>Aegle marmelos</i> L.	Gadia / Bel (l); Bela (o)	Rutaceae	Fresh stem twigs	Used for brushing teeth as a part of learning process of a trainee of Black magic.
6	<i>Alangium salvifolium</i> (l.f.) Wang	Pani bareng / Erru wadang / Udika Maran (l); Ankula(o)	Alangiaceae	Fresh stem twigs	Regular use of this herbal twigs are believed to cause infertility.
7	<i>Asparagus racemosus</i> Wild.	Deobadni / DuliKurkuti (l); Satabari (o)	Liliaceae	Fresh stem twigs	Used for brushing teeth as a part of learning process of a trainee of Black magic.
8	<i>Azadirachta indica</i> A.Juss.	Limba / Wepa (l); Neem (o)	Meliaceae	Raw stem twigs	It is prohibited to be used on the weekly days of Tuesday, Thursday, and Saturday.
9	<i>Bambusa bambos</i> (L.) Voss	Bamso (l); Baunsha (o)	Poaceae	Raw stem twigs	Regular use
10	<i>Bombax ceiba</i> L.	Simli / Le-eka (l); Simili (o)	Bombacaceae	Fresh stem twigs	Used for brushing teeth as a part of learning process of a trainee of Black magic.
11	<i>Breynia retusa</i> (Dennst.) Alston	Hati Girli / Goli kuti / Peng (l); Rakta trichuli (o)	Euphorbiaceae	Fresh stem twigs	Frequently, i.e. every bi-weekly.
12	<i>Cipadessa bacifera</i> (Roxb.) Miq.	Pitimari (l); Pitamari (o)	Meliaceae	stem twigs	Dental and Gum problems
13	<i>Erythrina indica</i> Lam.	Palda (l); Paladhua (o)	Fabaceae	Fresh stem twigs	Used for brushing teeth as a part of learning process of a trainee of Black magic.
14	<i>Eucalyptos citriodora</i> Hook	Nilgiri (l); Neelagiri (o)	Myrtaceae	Fresh twigs	Odontalgia
15	<i>Ficus benghalensis</i> L.	Bor gocha / Bod maranu (l); Bara gachha (o)	Moraceae	Arial, tender branches	Looseness of the teeth
16	<i>Hygrophila auriculata</i> (Schum.) Heine	Kikrikata (l); Koilekha / Koilikhia (o)	Acanthaceae	Fresh stem twigs	Used for brushing teeth as a part of learning process of a trainee of Black magic.
17	<i>Jatropha curcas</i> L.	Dumajada (l); Ramjada (o)	Euphorbiaceae	Fleshy Stems	Sensitive teeth, looseness of teeth
18	<i>Lantana camara</i> L. / <i>Var aculeate</i> (L.) Mold.	Sembarani / Puruda (l); Naga airi (o)	Verbenaceae	Twig, Fruits	Twig is used as a tooth brush to check dental carries
19	<i>Mangifera indica</i> L. Amba (o)	Ambo / Mask (l);	Anacrdiaceae	Fresh stem twigs	Regular use
20	<i>Mimusops elengi</i> L.	Baula (l); Baula (o)	Sapotaceae	Stem twigs	Looseness of teeth
21	<i>Murraya paniculata</i> (L.) Jack	Pongal goch / Indramoris / Miram maran (l); Hadakinkali (o)	Rutaceae	Twig as tooth brush	Swelling, Loose teeth. Brushing with the twig of the plant strengthens the loose teeth.

Sr. No.	Scientific name	Local name (l); Odia name (o)	Family	Parts used	Purpose of use
22	<i>Nyctanthes arbor-tristis</i> L.	Gangachiudi (l); Gangasiuli (o)	Oleaceae	Twig as tooth brush	Dental carries
23	<i>Phoenix acaulis</i> Buch.-Ham ex Roxb.	Sindi / Sindhi (l); Bana Khajuri (o)	Arecaceae	Fresh stem twigs	Used for brushing teeth as a part of learning process of a trainee of Black magic.
24	<i>Phoenix sylvestris</i> (L.) Roxb.	Khajuri (o)	Arecaceae	Fresh stem twigs	Used for brushing teeth as a part of learning process of a trainee of Black magic.
25	<i>Phyllanthus embelica</i>	Amla (l); Amla (o)	Euphorbiaceae	Fresh stem twigs	Prevents and treats spongy and bleeding gums (Scurvy).
26	<i>Pongamia pinnata</i> (L.) Pierre / <i>Derris indica</i>	Karanch / Kadang (l); Karanja (o)	Fabaceae	Fresh stem twigs	Regular use
27	<i>Psidium guajava</i> L.	Jam (l); Pijuli (o)	Myrtaceae	Fresh stem twigs	Looseness of teeth
28	<i>Shorea robusta</i> Gaertn. F.	Sal (l); Sal (o)	Dipterocarpaceae	Fresh stem twigs	Looseness of teeth
29	<i>Smilx perfoliata</i> Lour.	Mutri mal / Pandri peden (l); Muturi (o)	Smilacaceae	Strm twigs	Prevents as well as cures dental caries.
30	<i>Streblus asper</i> Lour.	Adjodi / Karai (l); Sahada (o)	Moraceae	Fresh stem twigs	Raw twigs are used as herbal tooth brush to make the teeth stronger.
31	<i>Strychnos nux-vomica</i> L.	Kachela (l); Kochila (o)	Longaniaceae	Fresh stem twigs	During pain in abdomen it is advised to brush teeth be tender twigs of the plant.
32	<i>Syzygium cumini</i> (L.) Skeels	Noondri / Jamkoli (l); Jamakoli (o)	Myrtaceae	Fresh stem twigs	Looseness of teeth
33	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Bahada (o)	Combretaceae	Fresh stem twigs	Looseness of teeth
34	<i>Terminalia chebula</i> Retz.	Harida (o)	Combretaceae	Fresh stem twigs	Looseness of teeth
35	<i>Terminalia tomentosa</i> (DC.) W. & A.	Saaj (l); Sahaja (o)	Combretaceae	Stem twig	Looseness of teeth
36	<i>Urena lobata</i> L.	Sikajad / Baramukhi / Brhmajati (l); Raktapheni (o)	Malvaceae	Stem twig, Whole plant	Used for brushing teeth as a part of learning process of a trainee of Black magic.
37	<i>Vitex negundo</i> L.	Nilgundi /Du-ubaroda (l); Begunia / Nirgundi (o)	Verbenaceae	Twigs, Leaves, Roots	Odontalgia with dental carries, Sensitive teeth
38	<i>Zanthoxylum armatum</i> DC.	Ranbeli (l); Ranibeli (o)	Rutaceae	Raw stem twigs	Odontalgia with dental carries, Sensitive teeth
39	<i>Ziziphus rugosa</i> Lam. TinKoli(o)	Kantakoli (l);	Rhamnaceae	Fresh stem twigs	Used for brushing teeth as a part of learning process of a trainee of Black magic.
40	<i>Zyzyphus mauritiana</i> Lam.	Barkoli (l); Barakoli(o)	Rhamnaceae	Fresh stem twigs	Used for brushing teeth as a part of learning process of a trainee of Black magic.

and for cultural practice to get black magic and ethnomedicinal practice training (13 species). Detail list of plant resources with their local name, family, and parts used as tooth brushing and dental care by the studied communities are mentioned in the Table-4. The purpose of use of each plant chewing stick as also mentioned in this table-4.

Conclusion

Brushing teeth with natural toothbrush as it has more advantages when compared with conventional toothbrushes⁴. When compared to modern toothbrushes, chewing sticks have quite a lot of advantages like dental protection, ecologically protected, cost efficient and become self reliant; however, too much scrubbing could injure the gums. Though it was documented that the studied

communities used 40 plant species as chewing stick, but due to embodiment of new advanced methods and also penetration of globalisation in to the remote part, many of the traditional practices are not remain as a part of daily life even are fast declining. With fast change of the societies, it is high time to document, digitalize, and disseminate the traditional indigenous knowledge; and in this line this study is an initiative. The present study will serve as baseline information for future research on phytochemical analysis and can open path for development of new drugs in the line of dental health.

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