



## Traditional phytotherapy for dental and oral care in Odisha, India

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### Abstract

The present study deals with less known uses of 54 plant species in the treatment of various dental and oral diseases like dental caries, gingivitis and pyorrhea. It is primarily based on field surveys carried out in villages, where dwellers provided information on plant species used as medicine, parts used to prepare the remedies, and the illnesses to which the remedies were prescribed. The relevance of this phytotherapy has also been presented with reference to the socioeconomic milieu of the rural people of Odisha. Maximum number of species are reported from family Fabaceae (5) and Mimosaceae (5) followed by members of Euphorbiaceae (4), Moraceae (3), and Sapotaceae (3). Besides, bark, leaf and rhizome as such or being processed are used as tooth powder. In few cases the latex, juice or oil extracted from seeds are either directly applied on the effected tooth and gums or gurgled for relief. Moreover, out of 54 plant species, 28 are exclusively used for tooth stick, 12 for toothache due to caries, 09 for gum diseases and 24 species for pyorrhea. This research will hopefully help in monitoring and management of ethnomedicinal plants and highlights their importance. It could be a valuable tool for better understanding the long-term effects of traditional knowledge available in different districts of Odisha, India.

**Keywords:** Dental caries, ethnobotany, phytotherapy, periodontal diseases

### 1. Introduction

The oral cavity is the principal pathway through which the body is exposed to external environment and considered to be the gateway of infection. The teeth, the gums supporting the teeth and other oral tissues are subject to certain diseases. A high proportion of the people all over the world suffer from a variety of oral diseases affecting teeth, gum, mucosa and tongue. The

two prevalent oral health problems in India and Asia pacific region are dental caries and periodontal (gum) disease which are usually followed by malocclusion and oral cancer [1]. Dental caries is caused by acids produced as a result of fermentation of carbohydrates in the food by the bacteria present in the dental plaques [2] and is prevalent in almost every

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decalcification of the tooth structure. The decalcification process starts in the pits and fissures on the tooth surface and other areas where food debris accumulates and can not be cleared easily. The dissolution of enamel continues into dentine and pulp with increasing cavitations and loss of tooth substance and even associated with abscess formation due to secondary infection. The dental caries and tooth decay has increased significantly since nineteen fifties and according to the report of nation wide health check up programme for primary school children conducted from July 22 to July 27, 1996, dental caries is one of the common problems prevailing among the school children in India. Toothache is the common symptom of these condition. Around 50% school children has been found suffering from dental caries in urban areas of our country [3]. The periodontal disease (gingivitis and pyorrhea) level has also remained high over the years and 40-50 % of children have malocclusion and about 40% of all cancers reported in India are oral cancers [1]. Periodontal is a bacterial disease of soft tissues surrounding the teeth i.e. the gums, periodontal ligaments and bones which support the teeth and provide anchorage. The bacterial plaque which accumulates around the teeth undergoes calcification and forms tartar deposits favouring the growth of bacteria. This results in inflammation of gum tissues which usually bleeds following tooth brushing. In this condition, it is called as Gingivitis. If not treated early, it progresses to involve the surrounding tissues and the bone of the tooth supporting it, leading to a condition called Periodontitis or Pyorrhoea. It affects 90% of the Indian population leading to loose mobile teeth [4]. Painful ulceration and foul odour are two other prominent symptoms of this disease. In contrast, the dental personnel in the country are inadequate (1:43000). Again, most of the dental surgeons are clustered in urban areas where as the ratio

for rural remote places remain quite unfavourable. Infact, 80% of the dentists live in towns where as 80% of the population live in villages [1]. Although exact data is not available due to lack of any systematic study, the condition is no way better in Odisha as there is only one hospital for every 3300 sq kms and one doctor for 2720 persons in this state [5]. In this context regular brushing of teeth and cleaning the tongue is the first requirement for good oral and dental health. It is the advice of medicos to brush the teeth regularly especially after food, with a soft tooth brush using tooth paste. Those who can not afford it, particularly the rural people of low income group can clean their teeth with a 'dantun' i.e. soft young part of certain plant twigs [6]. This is the usual practice in rural India since ages. It costs nothing rather saves the rural mass from different oral diseases for its medicinal properties. Also people use different plants and plant parts for various tooth ailments. But this indigenous knowledge of the use of plants for dental and oral care is fast vanishing. It seems to exist among the rural people in oral folklore only. So, studies on ethnobotany in relation to dental care have become a necessity. Although much work has been done on this aspect in different states of India [7-18], reports from Odisha are nil. The present study was carried out to study and record the traditional phytotherapy of dental care in different districts of Odisha, India.

## 2. Materials and Methods

The field study was carried out from May 2005 to November 2007, and information on the use of medicinal plants was obtained through structured questionnaires, complemented by free interviews and informal conversations [19]. The interviews were individually carried out and, during the first contacts with the local population, "native specialists" were identified, in other words, people who consider

themselves, and are considered by the community as having exceptional knowledge about the use of plants. One hundred twenty two (89 men and 33 women) were interviewed. Among these interviewees, 10% were aged 21-40 years, 40% were 61 years old or more and half of the sample (50%) were in the 41-60 age range. Surveys were conducted in different villages of each district. Collections are valuable because they serve as voucher specimens, records of the plants that are known by community and function as specimens for systematic identification [20]. A voucher specimen facilitates the identification of the species encountered during the research and permits colleagues to review the results of the study [21-22]. Knowledgeable persons or medicine men, Kaviraj, experienced and aged persons, local healers of the villages were consulted for recording local name; parts of plants used, methods of drug preparation and

recommended doses. Personal interviews and group discussions with local inhabitants revealed some very valuable and specific information about the plants, which were further authenticated by crosschecking. In addition to crosschecking and recording folk names of plants through collecting voucher specimens, it is important to crosscheck information with different people and compare the results from different methods [23]. Interviews with people out of the village, pastures or forests were conducted on a systematic basis to know more details about species, their management and distribution. Plant species were identified by adopting standard procedures [24-29]. The medicinal plants collected are listed here with their botanical names followed by family name, their local names in Oriya and the parts used for medicinal purpose.

**Table 1.** Plant species used for dental and oral care in Odisha.

Sl No	Botanical name, family & local name	Parts used	Habit/habitat/ domestication	Form of use
1.	<i>Acacia catechu</i> (L.f) Willd. Mimosaceae 'Khaira'	Bark	Forest species	Powdered bark used as tooth powder to cure gum infection.
2.	<i>Acacia nilotica</i> (L.) Willd. Mimosaceae 'Babul'	Shoot	Medium sized tree in plains and rural areas	Tender shoot axis used as tooth stick. Powdered bark used for gum boil and pyorrhea.
3.	<i>Achyranthes aspera</i> L. Amaranthaceae, 'Apamaranga'	Stem	Under shrubs in Wasteland areas	Commonly used in Oriya festivals like 'Badaosha' and 'Kedarbrata' in which stems are used as tooth brush as a ritual. Also, it is believed to increase memory power
4.	<i>Aegle marmelos</i> (L.) Corr. Rutaceae 'Bela'	Shoot, leaf	Cultivated tree species A plant of great folklore, considered sacred and a common temple yard plant.	Shoot occasionally used as tooth brush Leaf on chewing removes bad breath and check infection

5. <i>Alangium salvifolium</i> (Linn.f.)Wagn Alangiaceae, 'Ankula'	Shoot bark	A small tree commonly found in wasteland and in hedges.	Young shoot axis used as tooth stick to check gum affection and haemorrhage. Powered bark used as tooth powder to get relief from pyorrhea.
6. <i>Alsotonia scholaris</i> (L.) R.Br. Apocynaceae 'Chatiana'	Latex	Common tree in coastal plains	Latex used as external lotion on tooth and gum to check caries infection and pyorrhoea.
7. <i>Artocarpus heterophyllus</i> L.Moraceae, 'Panasa'	Leaf	Cultivated small tree.	The leaf ash is used as tooth powder for dental care
8. <i>Atylosia cajanifolia</i> . Haines Fabaceae , Bana harada'	Shootbark	Wild shrub.	Shoot bark is chewed placing between the arching .teeth to get relief from caries infection and toothache
9. <i>Azadirachta indica</i> A.Juss.Meliaceae, 'Neema'	Shoot	A common tree in coastal and western part of Odisha.	Tender shoot used as tooth stick
10. <i>Bambusa vulgaris</i> L. Poaceae, 'Baunsa'	Shoot	A medium sized plant.	The young shoot (branch) used as tooth stick
11. <i>Barleria prionitis</i> L. Acanthaceae, ' Daskerenta'	Whole plant	A common roadside and wasteland herb .	Juice extracted from whole plant and taken orally with honey in equal proportions to cure pyorrhea.
12. <i>Brassica juncea</i> (L.) Czern.and Coss Brassicaceae, 'Sorisha'	Seed	A cultivated herb.	Oil from seeds (Mustard oil) gurgled for 15 minutes once a week to check all oral and dental affections.
13. <i>Breynia retusa</i> (Denn.) Alston.Euphorbiaceae 'Jajangi'	Shoot	Bushy shrub planted on village hedges.	The shoot axis used as tooth stick
14. <i>Butea monosperma</i> (Lamk.) Taub. Fabaceae, 'Palasa'	Shoot bark	A small tree in hills and plains.	Shoot bark is burned to ash used as tooth powder for pyorrhoea and gum affection.
15. <i>Cajanus cajan</i> (L.) Huth.Fabaceae, ' Kandula'	Leaf	A cultivated shrub.	Boiled aqueous extract of leaves used as tooth cleaning solution. .It is gurgled repeatedly to cure gum affection and spongy gums
16. <i>Calotropis gigantea</i> R.Br. Asclepiadaceae, 'Arakha'	Shoot	A tall wasteland shrub	The shoot axis used as tooth stick to check and cure caries infection and pyorrhea.
17. <i>Calotropis procera</i> (Ait.)R.Br.Asclepiadaceae, 'Sweta Arakha'	Shoot	A tall wasteland shrub.	The shoot axis used as tooth stick to check and cure caries infection and pyorrhea.
18. <i>Cinnamomum</i> <i>camphora</i> (L.) Prest. Lauraceae, 'Karpura'	Leaf	A small cultivated tree.	Leaf juice on external application cures caries and toothache.
19. <i>Cinnamomum</i> <i>tamala</i> Nees. Lauraceae, 'Tejapatra	Leaf	A small cultivated tree.	The leaf decoction is gurgled two to three times .a day to check toothache. Dry powered leaf used as tooth powder

20. <i>Curcuma longa</i> L. Zingiberaceae, 'Haldi'	Rhizome	A cultivated species common in tribal areas.	About 2 gm of dry rhizome powder with a drop of mustard oil and a and hill districts pinch of common salt used as tooth .powder to protect the enamel, clean the teeth and remove bad breath of mouth.
21. <i>Ficus hipsida</i> L.f Moraceae, 'Dimbiri'	Shoot	A common wasteland species	Parts of tender shoot used astoo th stick for dental care and protection.
22. <i>Guazuma ulmifolia</i> Lam.Sterculiaceae, 'Paniari'	Shoot	Village side tree.	Parts of tender shoot used as tooth stick.
23. <i>Helianthus annus</i> L. Asteraceae, 'Suryamukhi'	Seed	A common cultivated species.	Oil from seeds used for gurgling for 10-15 minutes weekly to protect teeth and to remove bad breath.
24. <i>Hibiscus rosa-sinensis</i> L.Malvaceae , 'Mandara'	Shoot	A common ornamental . garden plant	Stem used as tooth stick in some parts of south .Odisha to get rid of dreadful dreams and to ensure sound sleep
25. <i>Jasminum auriculatum</i> Vahl.Oleaceae, 'Jai'	Stem	A cultivated ornamental species.	Stem twig used as tooth stick in some festivals apart from its use against pyorrhoea
26. <i>Jasminum sambac</i> (L.)Ait.Oleaceae, 'Malli'	Shoot	Wild and cultivated sub- fructicose herb.	Matured shoot axis used as tooth stick which is believed to induce sound sleep removing dreadful dreams apart from dental care.
27. <i>Jatropha curcas</i> L Euphorbiaceae 'Baigaba'	Stem	A wasteland species.	Tender stems rich in latex invariably used throughout Odisha as tooth stick to protect teeth, remove bad breath and against pyorrhoea.
28. <i>Jatropa gossypifolia</i> L.Euphorbiaceae, ' NaliBaigaba'	Stem	A wasteland species smaller . in size than <i>Jatropha curcas</i>	Tender stems rich in latex invariably used throughout .Odisha as tooth stick to protect teeth, remove bad breath and against pyorrhoea
29. <i>Justicia adhatoda</i> L.Acanthaceae, 'Basanga'	Stem	A bushy shrub used for fencing and decoration	Stem used as tooth stick to cure gum affection. Dry powdered leaf. used as tooth powder
30. <i>Lantana camara</i> L. Verbenaceae , 'Nagabairi'	Stem	A wasteland weed.	Matured stem used as tooth stick for the dental care.
31. <i>Madhuca indica</i> Gmel. Sapotaceae, 'Mahula'	Stem	A forest tree	Parts of slender stem branches used as tooth stick in rural areas of Ganjam,Gajapati and Phulbani districts to cure dental ailments.Bark with latex is used to cure pyorrhoea.
32. <i>Mangifera indica</i> L. Anacardiaceae, 'Amba'	Shoot	A common forest as well as cultivated tree	Young shoot especially in winter and spring season is .used as tooth stick for the dental care.
33. <i>Manilkara zapota</i> (L.) Ruyen.Sapotaceae, 'Sapeta'	Shoot	A cultivated small tree.	Parts of slender stem branches used as tooth stick and latex believed to make the teeth strong.

34. <i>Mimosa pudica</i> L Mimosaceae, 'Lajakuli'	Root	A wasteland weed.	Roots chewed for toothache.
35. <i>Mimusops elengi</i> L. Sapotaceae, 'Baula'	Bark	Ornamental tree	Bark chewed or powdered bark used as tooth powder to cure toothache, pyorrhea, looseness of teeth and spongy gums. Sometimes bark decoction is gurgled.
36. <i>Ocimum sanctum</i> L. Lamiaceae, 'Tulasi'	Leaf	An aromatic herb of great folklore, considered temple yard plant.	Leaves from black and white varieties are chewed to prevent bad breath. sacred and a common
37. <i>Pandanus fascicularis</i> Lam. Pandanaceae, 'Kia'		A wasteland herb..	The stilt root is used as tooth stick in all coastal districts
38. <i>Phoenix sylvestris</i> Roxb.(L.) Arecaceae, 'Khajuri'	Root	A monocot unbranched tree	Macerated root applied on affected teeth to stop toothache.
39. <i>Phyllanthus emblica</i> L. Euphorbiaceae, 'Aonla'	Seed	Forest species, planted in country yards and temples	Dry pericarp is chewed to check haemorrhage on the gums.
40. <i>Pithecellobium dulce</i> Roxb.'Mimosaceae, 'Simakaina'	Shoot	A small tree planted in .	Parts of slender branches used as hedges tooth stick.
41. <i>Pongamia pinnata</i> . (L)Pierre Fabaceae,	Shoot	A tree species common Recently planted in towns for as an avenue	A commonly available, widely used in coastal plains and hills and marketed item of young shoots teeth stick. It checks pyorrheal as tree infection, caries and bad breath.
42. <i>Prosopis cineraria</i> (L.)Druce Mimosaceae 'Sami'	Shoot	Common in village periphery and foot hill forests.	Tender shoot used as tooth stick.
43. <i>Psidium guajava</i> L. Myrtaceae, 'Pijuli'	Shoot	A cultivated fruit plant.	Tender shoots widely used as tooth stick for dental and gum ailments.
44. <i>Pterocarpus marsupium</i> .Roxb. Fabaceae,Piasala'	Shoot	A timber yielding forest species.	Tender shoot used as tooth stick
45. <i>Scoparia dulcis</i> L. Scrophulariaceae , 'Bana ganjai'	Root bark	An erect branched herb common in waste ground.	Root bark chewed for toothache and dental caries. Collection is associated with spiritual welcoming (Abahana) and tantric rituals to enhance the effect of the drug.
46. <i>Sesamum indicum</i> L. Pedaliaceae, 'Rashi'	Seed	Oil yielding cultivated herb.	Oil from seeds gurgled for 15 minutes to get relief from pyorrhea. It is an excellent remedy for dental care
47. <i>Shorea robusta</i> Geartn.f Dipterocarpaceae,Sala'	Shoot	A timber yielding forest species.	Tender shoot axis widely used as good quality tooth stick for dental
47. <i>Shorea robusta</i> Geartn.f Dipterocarpaceae,Sala'	Shoot	A timber yielding forest species.	Tender shoot axis widely used as good quality tooth stick for dental care.

48. <i>Smilax zeylanica</i> L. .Smilacaceae, 'Muturi'	Shoot	A medium sized climber. and marketed item of young	A commonly available, widely used shoots for tooth stick.
49. <i>Solanum virginianum</i> L. Solanaceae, 'Chakada bheji'	Fruit and seed	A small wild shrub	The fruit and seeds are burnt and smoked like Cigarette. The smoke is allowed to pass through the affected teeth to get relief from toothache.
50. <i>Streblus asper</i> Lour Moraceae, 'Sahada'	Shoot	Common in village periphery .and foot hill forests	Tender shoot axis widely used as good quality tooth stick for dental care and cure to gum boils.
51. <i>Syzygium aromaticum</i> L. Myrtaceae, 'Labanga'	Flower	A spice yielding species.	Hypanthodium of flower buds after removing the flower parts(corolla and androecium) chewed to get relief from toothache, pyorrhea and mouth infections
52. <i>Syzygium cumuni</i> L. Skeels Myrtaceae, 'Jamkoli'	Shoot	forest species.	Slender shoot axis is used as tooth stick and macerated dry leaves used as tooth powder for dental care
53. <i>Terminalia chebula</i> Retz Combretaceae, 'Harida'	Fruit	A forest species.	Dried fruits are fried and hot pericarps are chewed to cure toothache, looseness of teeth, spongy gums and pyorrhea.
54. <i>Vitex negundo</i> L. Verbenaceae, 'Begunia'	Shoot	A small bushy shrub.	Tender shoot axis used as tooth stick to cure pyorrhea.

### 3. Results

A total of 54 plant species belonging to 48 genera and 32 families have been recorded to treat different oral and tooth ailments. Maximum number of species are reported from family Fabaceae (5) and Mimosaceae (5) followed by members of Euphorbiaceae (4), Moraceae (3), and Sapotaceae (3). The use of specific plant parts such as twigs as tooth stick for general brushing was highest (32). Besides, bark, leaf and rhizome as such or being processed are used as tooth powder. Also raw leaf, bark, root flower bud and pericarp are chewed to remove the bad breath

and infection. In few cases the latex, juice or oil extracted from seeds are either directly applied on the effected tooth and gums or gurgled for relief. Moreover, out of 54 plant species, 28 are exclusively used for tooth stick, 12 for toothache due to caries, 09 for gum diseases and 24 species for pyorrhea (Table 1). Some interesting use of plants have been recorded during the field study. Plants like *Achyranthes aspera* and *Jasmiun auriculatum* are reported to be used as tooth sticks on some specific religious festivals. Some tantric rituals are performed before uprooting certain plants for medicinal purpose. Oils

extracted from seeds of some plants like *Brassica juncea*, *Helianthus annuus* and *Sesamum indicum* are either gurgled or applied as lotion on inflammatory gums. And the seeds of *Solanum virginianum* are burnt and smoked like cigarette for relief from toothache. Moreover, the leaves of *Aegle marmelos* and *Ocimum sanctum* are chewed to prevent bad breath from mouth.

#### 4. Discussion and Conclusion

The present world markets are flooded with variety of tooth pastes, tooth brushes, gels mouth wash liquids and crores of rupees are spent on their advertisement, circulation and promotion. But, so far as the cost factor is concerned, few people in India can afford it when the population below poverty line in India and Odisha are 29.9 and 44.7 respectively [30]. The economic milieu of other developing countries is no way better than India. Moreover, the past idea about the ill effects of chewing sticks on oral and dental health has been rejected by a Saudi Arabian research team working at the Saudi University College of Dentistry, which reinforces the usefulness of chewing sticks (World Health Forum, Vol. 16, No: 2, 1995). Some cosmetic and medicine companies in

Egypt, India, Pakistan, Switzerland and U.K. have also been applied this knowledge for manufacturing tooth pastes. The most popular brand in India is 'Babool' which claims to contain the natural extracts of 'Babul' (*Acacia nilotica*) and manufactured by Besta Cosmetics Limited, Vapi, India. The present report on the use of plants for dental care draws support from earlier studies [14-18]. in different parts of India. Moreover, when the modern mouthwash solutions do nothing more than camouflaging the unpleasant breath for a limited period [6]. the leaves reported in this study are claimed to remove the foul smell from the mouth along with their other medicinal actions. The higher population explosion and limited resources in India demand that some alternative means of organizing oral health and care be examined and implemented [31]. In this context, phytotherapy resources for oral health care appears relevant as it requires no special resources, sophistication or expertise in production, preparation and usage. So it has become a necessity to collect record and pharmacologically evaluate the useful alkaloids, tannins, resins or any other beneficial plant product available from the local vegetation for better oral and dental care in Odisha.

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