

Comprehensive Review on Herbal Toothpaste

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ABSTRACT

Herbal products for general as well as for oral health care have gained prominence around worldwide. People who aspire towards the use of herbal products often consider these products are relatively safer than products containing synthetic ingredients. Based on increased usage of herbal cosmetics we tried to make a comprehensive review on herbal toothpaste that helps to maintain a proper oral hygiene and free from periodontal disorder, reduce stain, gingivitis, calculus and caries. The present review gives basic information regarding antimicrobial potential of various herbs, formulation excipients, that can be used in preparation of toothpaste.

Key Words: Herbal toothpaste, Anti-microbial screening, Periodontal disorder, Gingivitis, calculus, Dental caries.

INTRODUCTION

In developing countries, the intensity of infections caused by certain pathogenic microorganisms that may leads to mortality as well as morbidity in immune-suppressant patients [1]. Multiple abrasives, scent, green lead was used to remove the stain from teeth until mid-19th century. In Medieval period rock salt, fine sand were the key ingredients used by Arabs for tooth cleaning. In the period 1950 AD, Dr. Washington Wentworth Sheffield, a dentist

invented the toothpaste [2]. Toothpaste is a semi-solid dosage form used with an aid of toothbrush to enhance oral hygiene[3].

The anatomical component of the tooth comprises of cap, root, enamel, dentine, and pulp. Many of problems associated with the teeth are gum disease, caries, bad breath, Maintenance of health is often accomplished by preserving residual number of microorganisms under regulation and dynamic balance typically between the periodontal microflora and the host that results in a stable clinical condition with low periodontium inflammatory alterations in peripheral gingival tissues[4]. Dental caries is an contagious microbial disorder that ends with localized fragments and degradation of calcified teeth tissue, undiagnosed treatments can cause tooth loss, pain, infection and eventually death in extreme conditions. *Streptococcus mutans* is regarded as the causative bacteria in dental plaque and dental caries and these *S mutans* producing acids cause damage by dissolving tooth structures in the form of fermentable carbohydrates such as sucrose, fructose and glucose. The acid, bacteria, food debris, and saliva get associated in the mouth and results in formation of plaque. Dental disease results in severe pain, perhaps most significantly it has been related to heart disease, diabetes, and high blood pressure. The pain can be worsened by the heat, cold or even by drinks and sweet foods [5]. Mechanical plaque control is time consuming and some instances may lack motivation for these practices. To prevent these diseases and maintenance of good oral hygiene is possible by use of oral care products such as dentifrices, mouthwashes that contain antimicrobial properties [6].

Nature still stands as a glorious sign to illustrate the incredible phenomenon of symbiosis and it provides complete store house medicines to eradicate human ailments. Various medicinal herbs have been used for decades in the traditional system and these herbs serves as a health promoter. As per World health organization [WHO] 80 percent of population relies on medicinal plants for their primary healthcare treatment. Out of 3,50,000 species less than 0.5 percent have been scrutinized for the pharmacological and phytochemical potential. Chemical agents used in the formulation of mouth rinses or toothpastes may obtain adverse effects such as taste alteration, toothstaining or hypersensitivity reactions. Thus, use of natural ingredients free from artificial sweeteners, odors, preservatives do not harm buccal cavity [7-8]. Neutrophils are white blood cells that propagate in the bloodstream and travel to the site of infection to combat infectious microbes and the amount of white blood cells in the gingival exudate represents its intensity of inflammation. As a result, the number of neutrophils in the gingival sulcus rises during gingivitis. Children below 6 years are recommended not to use toothpaste that contain fluorides because that may result in caries and dental fluorosis. All these circumstances are taken into consideration and greater attention being paid to the use of herbal dentifrices with less side effects[9]

Ideal Properties of Toothpaste

- Nontoxic and non-irritant
- Good abrasive effect
- Not expensive
- Easily available
- Acceptable taste

- With less side effects
- Keep the mouth clean and fresh
- Long lasting
- Do not impart stain on teeth[10]

Classification of Toothpaste

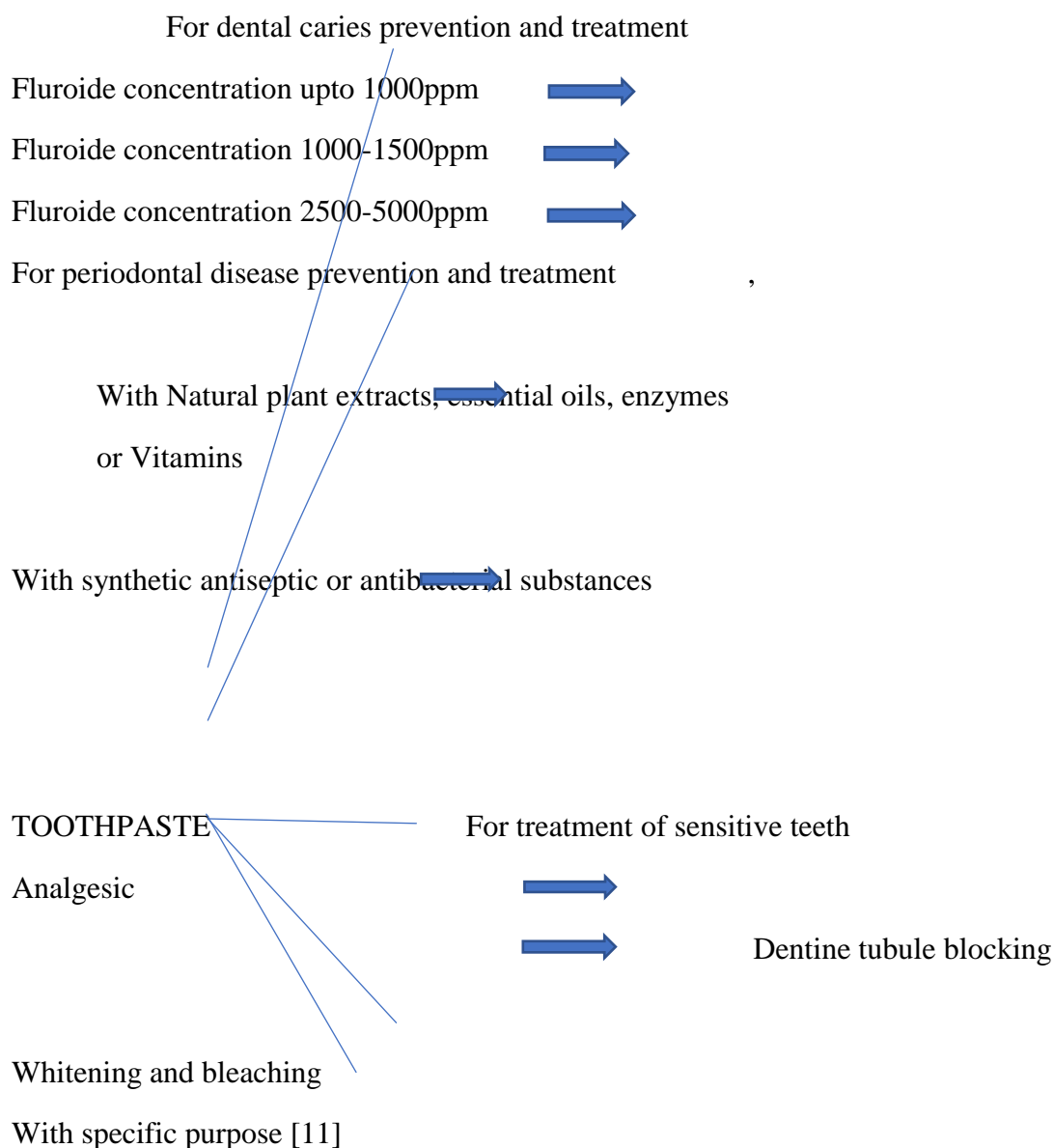


TABLE 1: Formulation excipients used intoothpaste

Sl.no	Excipients	Concentration range	Types	Uses
1.	Abrasives	9-13%	Dicalcium phosphate, Alumina, calcium carbonate	Remove food debris, stains as well as polishes the tooth surface.

2.	Humectants	37-45%	Glycerol, xylitol, water, PEG 8[Polyethylene glycol esters]	Provide moisture content and prevent formation of plug-in nozzle tube.
3.	Binding agents	0.8-2.5%	Agar, Carrageenan, Gum tragacanth, Isapgol mucilage	Stability and consistency of the toothpaste can be maintained
4.	Preservatives	0.05-0.5%	Formaldehyde, Benzoic acid, Parabens, Phenolics, citric acid.	Prevents growth of micro-organisms and provide stability
5.	Foaming agents	1-2%	Sodium lauryl sulphate, Sodium stearyl lactate, Amine fluorides, Dioctyl sodium sulfosuccinate	Assist in penetration of plaque deposition and enables dispersion
6.	Flavors	1-6%	Cloveoil, aniseed, Peppermint, Eucalyptus, Fennel, Spearmint	Key constituent that impact on consumer acceptability
7.	Colors	1-2%	Titanium dioxide, chlorophyll	Impart colour to the toothpaste
8	Sweeteners	18-24%	Saccharine, Aspartame, Sorbitol, xylitol	Mask palatable taste ^[12-16]

TABLE: 2 Herbs used in Dentistry

Maintenance of appropriate oral hygiene of course a very difficult process in treating periodontal disease. Q-10 coenzyme a natural supplement helps to improve the oxygenation of tissue in the body that leads to good flow of blood to the gums. There are several natural approaches to treat periodontal disease some of which assist in avoiding it from arising and variety of herbs that can help in removal of infection and inflammation that is associated with periodontal diseases [17].

Sl.no	Herbs	Chemical constituents	Uses	References
1.	Aloevera	Aloin, flavonoids, sterols, aminoacids, aloeride.	Used in treatment of mouth ulcer, Denture adhesive, Osteitis [18]	[18]
2.	Chirata	Swertanone, Swertianin,	Decreases increased	

		Swerchirin	level of Pro-inflammatory cytokines	[19]
3.	Clove	Gallic acid, oleanolic acid, Ellagic acid	Control of gingivitis, halitosis, Plaque	[20]
4.	Guduchi	Alkaloids, tannins, phenols, Glycosides	Used in treatment of aggressive and chronic periodontitis	[21-22]
5.	Turmeric	Bisdemethoxycurcumin, demethoxycurcumin, curcuminoids	Relief from gum inflammation and act as an anti-bacterial agent.	[23-24]
6.	Green tea	epicatechin, epigallocatechin-3 gallate, epigallocatechin-3 gallate	Suppresses gum inflammation and gingival oxidative stress.	[25]
7.	Morindacitrifolia	Amino acids, vitamins, proteins, minerals, anthraquinones	Inhibits dental caries caused by streptococcus Mitis and S. mutans	[26-27]
8.	Piper betle	Leaves consist of starch, sugar, diastases, volatile oil includes safrole, piper betol, eugenol	Exhibit anti-microbial property against wide spectrum of microorganisms such as Proteus vulgaris, <i>Pseudomonas aeruginosa</i> , <i>Staphylococcus aureus</i> , <i>Streptococcus pyrogen</i> . [28]	[28]
9.	Triphala	Triphala consists of thiamin, riboflavin, ascorbic acid, β -sitosterol, galloyl glucose, chebulagic acid, chebulinic acid.	Having anti-oxidant, anti-microbial properties. It is used in ulcerated and bleeding gums as well as in dental caries [29]	[29]

10	Citrus medica	Citric acid, d-limonene, hesperidin, diosmin, eriocitrin	Used to treat scurvy, bleeding gums due to rich Antioxidant potential [30]	[30]
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Anti-microbial potential of Herbal toothpaste over conventional toothpaste

S. Sabiha Shaheen et al. evaluated antimicrobial efficacy of 10 commercially accessible herbal toothpaste against particular strains of micro-organism using standard diffusion process at a strength of 1:1 dilution for 24 hours and the study concluded that the herbal toothpaste possess anti-microbial property being more effective as that of conventional toothpaste [31]. A double blinded randomized clinical trial with parallel groups was designed to examine the efficacy of herbal toothpaste in gingivitis and plaque control. The efficacy of herbal toothpaste was compared with conventional dentifrices however, no statistically significant variations were found between test and control groups and reported that the herbal based toothpaste found to be more efficacious as that of formulated conventional toothpaste [32]. H. Firdaus Faren carried out *in vitro* anti-microbial study using 8 different herbal toothpaste and the efficacy was tested by observing the maximum zone of inhibition at 24 h on Muller Hilton agar media which was inoculated with microbial stain by disk diffusion method and the results obtained that toothpaste containing clove exhibited strong antimicrobial property than fluorinated toothpaste with ZOI of 22 mm [33]. Clinical study was done by Kuldeep Singh based on 3 criteria's such as calculus index, gingival bleeding index and debris index with 100 individuals of different age groups ranging from 25-50 years and comparisons of these parameters were made with non-herbal toothpaste by using statistical t test between unpaired 2 groups of non-herbal and herbal toothpaste. The results concluded that herbal toothpaste is more efficient in maintenance of oral hygiene [34]. Anti-bacterial activity was estimated by cup well method using herbal dentifrice such as Arodent compared against standard Colgate by using cariogenic bacteria such as *L. acidophilus* and *S. mutans*. The standard dentifrice produced 10.17 mm and 5.83 mm zone of inhibition whereas herbal toothpaste produced 10 mm and 5.5 mm respectively. The data indicated that Arodent is an effective toothpaste with good anti-bacterial activity against both bacterial strains [35]. A randomized, double blind controlled trial was conducted in order to test the efficacy of herbal dentifrice in reduction of gingivitis and plaque. 48 persons with existing gingivitis were assigned randomly to both positive control group dentifrice with fluoride and triclosan and test group [herbal dentifrice]. There was no substantial difference at baseline in plaque scores between 2 groups. After 28 days test produced an average of 19.9% decrease in plaque on lingual surfaces and oral whereas control group showed 18.3%. The researchers reported that both dentifrices are helpful in reducing in gum inflammation and plaque [6]. Study designed by K Patel compared and evaluated *in vivo* effect on salivary bacterial counts of 2 commercially available herbal and non-herbal toothpastes in children aged between 5 to 10 years with 3 to 6 decayed teeth. Forty children were randomly assigned into two groups like group 1 and 2. Group 1 was treated with fluoride containing toothpaste whereas group 2 with herbal toothpaste. Individuals were graded for plaque index and evaluated the efficacy of two

toothpaste and they found that there was no statistically significant difference between two toothpaste [36].

TABLE:3 Antimicrobial efficacy of Commercially available Toothpaste

Sham S. Bhat et al compared 7 different commercially available Herbal toothpaste with 4 different strains of microorganism by standard diffusion test and observed zone of inhibition in mm at 24 and 48hrs respectively [37]

Sl No.	Microorganisms	<i>S. Sanguis</i>		<i>S. mutans</i>		<i>C. albicans</i>		<i>A.viscosus</i>	
		24h	48h	24h	48h	24h	48h	24h	48h
	Dentifrice								
1.	Himalaya	0	0	5.4	5.9	0	5.4	6.2	6.4
2.	ViccoVajradanti	0	0	5.2	5.8	0	5.6	6.1	6.5
3.	Dabur Meswak	0	0	6.5	5.6	0	0	6.3	6.5
4.	Colgate Herbal	0	0	6	6.6	0	0	6.1	6.5
5.	Dabur Babool Neem	0	0	5.5	5.9	0	0	6.5	6.5
6.	Dabur Red	0	0	6	5.7	0	5.4	6.5	6.6
7.	K.p. Namboodari's	0	0	5.5	7	0	0	6.4	6.7
8.	Colgate Cibaca	5.4	5.5	7	7	0	0	6.3	6.4
9.	Colgate total	17	19	13	14	0	0	6.2	6.5

Conclusion

Teeth are the strongest part of human body and it is essential to maintain oral hygiene in order keep our mouth fresh and free from micro-organism we use toothpaste in our day-to-day life. Present review comprises of various herbs used in formulation of Dentifrices, as herbs consists huge number of medicinal properties for numerous disorders. Toothpaste comprising different herbs are considered to be relatively safe, readily accessible, with good abrasive effectand anti-microbial potential as that of conventional toothpaste. The herbal toothpaste plays a key role in treatment of various dental disorders such as Dental plaque, Dental caries and gingivitis.Hence it is concluded that the bioactiveprinciples responsible for the antimicrobial activity againstdifferent microorganismsmust be isolated identified and elucidate its structure to invent a new lead of therapeutic interest to cure human illness.

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