

Review on herbal dentifrices

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ABSTRACT :

Dentifrices are the product used to maintain oral hygiene such as mouth freshness and prevent tooth decay. Oral hygiene can be maintained throughout the day by using various dentifrices made from herbal and synthetic ingredients. This work was carried out to produce a tooth powder that can be used as an aid for proper oral hygiene and to overcome the side effects of the traditional tooth powder that can be used as a tool for proper oral hygiene and to overcome the side effects of the traditional Tooth powder made from synthetic ingredients. Classic herbal toothpowders are used as a tooth cleaning agent and are also used for various oral diseases such as gum disease, tooth erosion, tooth sensitivity and toothache. The main goal of this work is the preparation, evaluation. Tooth powder is work like breath freshener and teeth whitening. It can help in elimination and masking. Oral hygiene is an important aid in eliminating and masking. Oral hygiene is important and gives confidence.

Keywords:- Herbal Ingredients, synthetic ingredients, oral hygiene, tooth powder, tooth decay

I. INTRODUCTION:-

Herbal preparations are gaining importance as they are safe, affordable, user-friendly and compatibility. The preparations which are used to endorse the appeal and to maintain the health of teeth are termed as dentifrices.(1)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.(2) According to WHO, 80% of the world's population especially those from the developing countries depend on plant derivative medicines for their healthcare and there has been an increased global interest in traditional medicine.Natural products are safe, economical and act as effective alternatives to currently used chemotherapeutics which exhibit increased bacterial resistance and adverse reactions.(3)

The use of plant products to improve dental health and to promote oral hygiene is in existence long since. The rise in the use of sugar diet, bakery products, and carbonated drinks increases the prevalence of dental caries. Lack of oral hygiene results in accumulation of plaque and calculus, which is the major etiology factors for gingivitis and periodontitis.(4)

Tooth powder promotes oral hygiene, serves as an abrasive that aids in removing the dental plaque and food from the teeth and also helps to prevent tooth and gum diseases like Gingivitis, cavities and stained teeth.(5)Tooth powder was historic used the romans to clean and whiten teeth, to fixthem when loose, to strengthen the gums and to use toothache. Oral hygiene is an important key to maintain good appearance, impression of individual and gives confidence.(6)

Diseases:-

Periodontal diseases is one of the most important concerns for dentists and patients. It is recognized as a major public health problem throughout the world and is the most common cause of tooth loss in adults.(7)

The Periodontium is the specialized tissues that both surround and support the teeth, maintaining them in the maxillary and mandibular bones. Periodontitis in comparison with gingivitis is a more severe inflammation, because not only it affects the tissues, but also, it affects the bottom of the teeth. If it is not treated at all, it may lead to a loss of teeth. (8,9)

Gingivitis is inflammation of the gums and is a non-destructive periodontal disease. The most common form of gingivitis is due to bacterial biofilms (plaque) which are adherent to tooth surfaces and hence known as plaque-induced gingivitis. In the absence of treatment, gingivitis may progress to periodontitis, which is a destructive form of periodontal disease.

Causesofgingivitis:- Bacterial plaque initiates the body's immune response which causes destruction of the gingival tissues, which leads to the destruction of the periodontal tissue.Plaque gets trapped in small gaps between the teeth and

accumulates the bacteria in them, which produce proteolytic enzymes and toxins which causes an inflammatory reaction in the gingiva. (10)

Role of herbs in management of periodontal disease :-

Neem :- The ancient Ayurvedic practise of using Neem to heal and rejuvenate gum tissue and to prevent cavities and gum disease is verified in modern clinical studies. Some of the observed anti-plaque activity of neem chewing sticks is attributed to the fibrous nature of these sticks resulting in mechanical plaque removal; however, neem plant also contain chemotherapeutic antiplaque agents. The presence of Gallo tannins during the early stages of plaque formation could effectively reduce the number of bacteria available for binding to the tooth surface by increasing their physical removal from the oral cavity through aggregate formation. Additionally, the effective inhibition of glucosyl transferase activity and the reduced bacterial adhesion to SHA, as seen with the presence of Gallo tannin extracts, suggest some potential anti-plaque activity.(11)



Neem

Tulsi :- Tulsi leaves are quite effective in treating common oral infections. Also few leaves chewed help in maintaining infections. Also few leaves chewed help in maintaining agents present in this plant. Sesquiterpene caryophyllene also severs the same purpose. This constituent is FDA approved food additive which is constituent is FDA approved food additive which is naturally present in Tulsi.(12) Tulsi contains Vitamin A and C, calcium, zinc and iron. It also has chlorophyll and many other phytonutrients. Deficiency of these nutrient has been associated with variety of oral diseases. (13)



Tulsi

Turmeric:- Massaging the aching teeth with roasted, ground turmeric eliminates pain and swelling.(14) A study concluded that chlorhexidine gluconate as well as turmeric mouthwash can be effectively used as an adjunct to mechanical plaque control methods in prevention of plaque and gingivitis. The effect of turmeric observed may be because of its anti-inflammatory action.(15)



Turmeric

Acacia :- A herbal tooth powder which removed plaque, stain or patches and cleaned and polished tooth surfaces without any abrasive action, comprised the powder of Acacia catechu, Menthol and camphor in the proportion of 91%, 2.7% and 6.3% respectively. The powder of Acacia catechu was used to remove tarter, plaque and stain and in cleansing and polishing tooth surface without any abrasionaction. (16)



Acacia

Clove:- Eugenol extracts from clove have often been used in dentistry in conjunction with root canal therapy, temporary fillings, and general gum pain, since eugenol and other components of clove (including beta-caryophyllene) combine to make clove a mild anaesthetic as well as an anti-bacterial agent. Eugenol, the primary component of clove's volatile oils, functions as an anti-inflammatory substance. Clove also contains a variety of flavonoids, including kaempferol and rhamnetin, which also contribute to clove's anti-inflammatory (and antioxidant) properties.(17)



Clove

Pomegranate :- Investigators noted that pomegranate's active components, including polyphenolic flavonoids (e.g., punicalagins and ellagic acid), are believed to prevent gingivitis through a number of mechanisms including reduction of oxidative stress in the oral cavity, (18,19) direct antioxidant activity; anti-inflammatory effects;(20,21) antibacterial activity;(22) and direct removal of plaque from the teeth.(23) In a study evaluating the effects of pomegranate on gingivitis, results showed a significant reduction in gingival bleeding after using a dentifrice containing the pomegranate

extract.(24) Yet in another similar study with a control group the effect of a gel with a pomegranate extract was tested on a group with experimental gingivitis which hardly mimics the naturally occurring gingivitis.(25) Pomegranate rinsing also lowered saliva activities of alpha-glucosidase, an enzyme that breaks down sucrose (sugar),(26) while it increased activities of ceruloplasmin, an antioxidant enzyme.(27) "The pomegranate extract induced increase in ceruloplasmin activity can be expected to strengthen antioxidant defences," noted investigators. Subjects who rinsed with placebo solution did not experience any of these changes. (28)



Pomegranate

Garlic :- Allicin is considered the most therapeutic constituent of garlic. Research performed using broth dilution method revealed that planktonic growth of the cariogenic, gram positive species *S.mutans*, *S.sobrinus*, and *Actinomyces oris* was inhibited by various allicin concentrations. Planktonic growth of the tested gram-negative perio pathogenic species *A.* and *Fusobacterium nucleatum* was also inhibited by allicin. (29)



Garlic

Mango :- Mango leaf contains ascorbic and phenolic acids which are known to possess antibacterial properties. Studies have shown that mango leaves (*Mangifera indica*) possess antibacterial properties against anaerobic dental microflora such as *P. intermedia* and *P. Gingivalis* and can effectively be used as adjunct for maintenance of oral hygiene.(30)



Mango

Gingivitis, periodontitis, and intra-canal medicine are all treated using plants' anti-inflammatory, anti-microbial, and anti-bacterial properties. No evidence is provided for the anticariogenic, sialagogue, or tooth-whitening effects.

Dental Diseases

Cavities, gum conditions, and oral cancer are the most prevalent diseases that affect our oral health.

1.1 Tooth Decay

dental Tooth decay is also known as dental caries or dental cavities. It is the most common problem that dentists see in patients. Tooth decay occurs when bacteria form a film, called plaque, on the surface of teeth.

Other symptoms of tooth decay may include:

- 1) Bad breath
- 2) Black or brown spots on your teeth
- 3) An unpleasant taste in your mouth

1.2 Cracked or Broken Teeth

Cracked or broken teeth are most often caused by:



Tooth Decay

Injury, chewing hard foods, Mouth piercings, grinding of teeth while you sleep A cracked or broken tooth can cause you a lot of pain, depending on the extent of the damage.



Cracked or broken teeth

1.3 Root Infection 7

The base or root of your tooth can become infected and swollen with bacteria. This most often happens because of cavities, cracks, or fractures in the tooth. Root infection can lead to damaged tissues and nerves of the tooth.



Root Infection

1.4 Gum disease 6

Gum diseases, called gingivitis, occurs when plaque accumulates between and around teeth and infects the gums, causing irritation and swelling. Gingivitis can progress to periodontitis, which can cause bleeding gums, painful chewing, receding gums, and tooth loss.



Gum Diseases

1.5 Tooth sensitivity

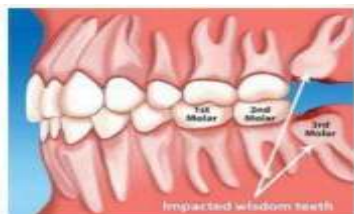
Tooth sensitivity can occur when the enamel of the teeth is damaged, allowing substances to reach the nerve endings. People with sensitive teeth may experience discomfort and pain when they eat cold or hot foods.



Tooth Sensitivity

1.6 Impacted teeth

An impacted tooth is a tooth that has failed to erupt, usually due to lack of space. It can cause jaw and gum pain, bad breath, and an inability to open the mouth easily.



Impacted Teeth

Plants that are employed for tooth care in India

:-

1. Acacia catechu(Katha) :- Catechu paste is used to treat the bleeding gums and for tooth hypersensitivity.
2. Azadirachta indica (Neem) :- Fresh twig is used as tooth brush to prevent gum diseases and pyorrhoea.
3. Cinnamomum verum (Dalchini) :- Powdered stem bark is applied to teeth in the treatment of caries and pyorrhoea.
4. Curcuma longa (Turmeric) :- Powder of rhizome is used in tooth powder for curing pyorrhoea.
5. Jugians regia (Akhirot) :- Stem bark is used in tooth powders to make the teeth healthy.
6. Ocimum Sanctum (Tulsi) :- Leaves are chewed as such for the treatment of bad breath and leaf paste is usefull or tooth hypersensitivity.
7. Piper betel (Pan) :- Leaf paste is suggested for dentinal hypersensitivity.
8. Potentilla fulgens (Vajardanti) :- Root powder is applied in gingivitis
9. Punica granatum (Anar) :- Stem bark or fruits rind is used as component of dental powder.
10. Syzygium aromaticum (Laung) :- Clove oil is applied for toothache, dental caries and pyorrhoea.
11. Spilanthes calva (Akarkara) :- Flowers chewed in toothache. Plant made into paste is applied in toothache.(31)

Tooth powder

Tooth powder can be used as prophylactic cosmetic for tooth to prevent tooth decay and bad breath. It can be prepared by synthetic and herbal ingredients now-a-days herbal formulations are high in demand due to its efficiency to avoid the side effects when compared with synthetic formulations.(32)

One of the oldest human inventions include oral cleansing products. Dental tooth powder was developed around 3000-5000 BC by ancient Egyptians. Variety of products like egg shells, oxen bones are powdered to ashes and has been used as tooth powder.(33)

First attempt at tooth cleaning included using abrasives such as crushed bones,crushed eggs and oyster shells, which were used to clean debris from teeth. Tooth powders were the first noticeable advance and were made up of elements like powdered charcoal, powder bark and some flavouring agents,applied to teeth using a simple stick.(34)

Ideal properties

1. Good abrasive effect
2. Non irritant and Non toxic
3. Prolonged effect
4. Keep the mouth fresh and clean
5. Impart no stain in tooth
6. Cheap and easily available
7. Economically offered
8. Preserve the mouth fresh and hygienic.(35)

Types of Tooth powder

1. Whitening tooth powder
2. Natural tooth powder
3. Herbal tooth powder
4. Homemade toothpowder

1. Whitening Tooth Powder

It's purpose is to freshen breath, heal gums and reduce the amount of inflammation in the mouth. Tooth powder also can polish and whiten a person's teeth.

2. Natural Tooth Powder

Ingredients like sea salt, which acts as an abrasive, natural chalu and certain essential oils like peppermint eucalyptus, and wintergreen are common ingredients in natural tooth powder.

3. Herbal Tooth Powder

Sore or bleeding gums also can benefit from herbal tooth powder. Herbal tooth powder can

have a of ingredients. Baking soda, powdered chalk and white clay are common. Herbal tooth powder has been around for centuries.

4. Homemade Tooth Powder

These powder also can be made at home. Homemade herbal tooth powder can be beneficial

because they may cost less and the persons making it will know exactly what ingredients he is putting in his mouth on the mouth on the mouth of his children.(36)

Ingredients :-

Sr no.	Botanical name	Common name	Activity
1.	Acacia Arabica	Babool	Astringent (37)
2.	Azadirachta indica	Neem	Anti-bacterial, Anti-inflammatory, Anti-oxidant, and Anti-malarial (38)
3.	Embllica officinalis	Indian gooseberry	Anti- oxidant (39)
4.	Mangifera indica	Mango	Anti-bacterial and Anti-oxidant (40)
5.	Salvadora persica	Mustard tree	Anti-bacterial and Astringent (41)
6.	Eugenia caryophyllata	Clove	Anti-bacterial and Local anesthetic (42)
7.	Cinnamomum verum	Cinnamon tree	Anti-microbial and Flavouring agent (43)
8.	Stevia rebaudiana	Sweet leaf	Sweaters(44)
9.	Punica granatum	Pomegranate	Anti- gingivitis (45)
10.	Aloe barbadensis	Aloe vera	Anti- gingivitis (46)
11.	Ficus benghalensis	Indian Banyan	Analgesic and Anti-oxidant (47)
12.	Syzygium cumini	Black plum	Anti-inflammatory (48)
13.	Hibiscus rosasinensis	Rose mallow	Antimicrobial (49)
14.	Glycyrrhiza glabra	Liquorice	Frothing agent (50)
15.	Arenga pinnata	Palm candy	Sweetener (50)

16.	Mentha arvensis	Mentha	Analgesic (50)
17.	Acacia Arabica	Acacia	Binding agent (26)
18.	Zanthoxylum Alatum	Prickly ash	Prevent tooth ache
19.	Quercus Infectoria	aleppo oak	Prevent tooth ache
20.	Piper Longum	pippali	Decongestant
21.	Anacycius Pyrethrum	Akarkara	Anti-inflammatory, Anti-oxident
22.	Piper Nigrum	black pepper	Anti-inflammatory
23.	Curcuma Longa	haldi	Anti-inflammatory, Anti-oxident
24.	Cinnamomum Camphor	kamphor	Antimicrobial, Anti-viral

Methods :-

A tooth powder mainly composed by acacia Arabica, azadirachta indica, zanthoxylum alatum, menthe spicata, quercus infectria, sodii chloridum, pippier longum, anacyclus pyrethrum, syzygium aromaticum, piper nigrum, curcuma longa, cinnamomum camphora, mentha piperita,

sepia officinalis, potash alum, charcoal and a market sample.

All ingredients should Indian standards. All herbal ingredients were dried and the required of the ingredients weighed and a mortar thoroughly until fine powder is formed. (51)

Tooth paste :-

Herbal and herbal-based toothpaste has been used in ancient life for many years and is one of the most significant aspects of oral health care. The manufacture and development of toothpaste formulations dates back to 300-500 BC in China and India. During that time, abrasives such as squashed bone, crumbled egg, and clam shells were used to clean teeth. In the nineteenth century, modern toothpaste compositions were created. Chalk and soap were added to those compositions after advancements in the realm of medicine. Following independence, multiple formulation developments of various detergents began, with sodium developments of various detergents began, with sodium lauryl sulphate serving as an emulsifying agent. The focus has switched in the current period to the release of active substances during formulation development order to prevent and/or treat oral disease.(52)

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.(53)

One of the common methods for effective plaque control is tooth brushing. Dentifrice is a general term used to describe preparations that are used with a toothbrush to clean and/or polish the teeth. Over the years, cleaning of teeth with toothbrush and toothpaste has been the most practiced method of oral hygiene across the world. While toothpaste is preferred over tooth powder due to its superior handling characteristics, tooth powder use is still dominant in countries such as India, typically in the rural and tribal pockets. This could be attributed to the cultural and lifestyle practices, and also to an age-old affinity towards herbal products in the country.(54)

Ideal properties of tooth paste

1. Not expensive
2. Easily available
3. Acceptable taste
4. With less side effects

5. Keep the mouth clean and fresh
6. Long lasting
7. Do not impart stain on teeth
8. Prolonged effect
9. Nontoxic and non-irritant
10. Good abrasive effect (55)

Material and method :-

The weight of each ingredient was determined based on the results of a previous study on the composition of herbal toothpaste. All of the ingredients in this toothpaste have a combined percentage by weight of 100%, which implies that the whole quantity of toothpaste will yield 100gm of tooth paste formulation. (56)

Method of formulation :-

There are two types of toothpaste formulation procedures :-

1. Dry gum method
2. Wet gum method (57)

Evaluation of Tooth Powder :-

- 1) Colour: The prepared tooth powder was evaluated for its color. The color was checked visually under normal lamp.
- 2) Odour: Odour was checked by smelling the product.

Stability: The stability study was performed as per ICH guidelines. The product was maintained in different temperatures conditions to check its stability. (58,59,60)

- 3) Moisture Content: 5gm of formulation placed in a porcelain dish containing 6-8 cm in a diameter and 2-4 depth in it. Dry the sample in an hot air oven at 100^o c for 5mins.

Calculation % by mass = $100 \times \frac{MI}{M}$ MI

MI = loss of mass[g] on drying, M = mass [g] of the material taken for the test.

- 4) Tapped Density: 20gm of powder was accurately weighed and carefully introduced into a 100ml graduated (1ml) measuring cylinder. Measuring cylinder was fitted on the tapped density apparatus. The instrument was switched on. It raised the cylinder on the base from a height of about 4 inches. Number of strokes given until further bulk volume was changed. Then, volume of powder was noted and the tapped density in gm/ml was calculated as

Tapped density = $\frac{\text{Wt. of drug}}{\text{tapped volume}}$.

5) Flow Property :- A funnel was taken and fixed with a clamp to the sand. A graph paper was kept below the funnel and the height between graph paper and bottom of funnel and the height between graph paper and bottom of weighed and poured into funnel by blocking the orifice of the funnel by thumb, the thumb was removed. The powder started flowing down onto the graph paper and formed a cone shaped pile until the peak of pile become touched to the bottom of the funnel stem. Then, the angle of repose was calculated by following formula. (61)

$$\tan \theta = H/R$$

H = Height of powder, R = Radius of graph paper

6) Bulk Density :- : 20gm of powder was accurately weighed and carefully introduced into a 100ml graduated (1ml) measuring cylinder. The cylinder was dropped at 2sec interval onto a hard surface three times from a height of a one inch to equalize upper surface of powder. Then, the volume of powder was noted and the bulk density in gm/ml was calculated as:

$$\text{Bulk density} = \text{Wt. of drug/bulk volume} \quad (62)$$

7) Anti-microbial activity: The formulated herbal preparation exhibited fairly good anti staphylococcus aureus activity as compared to the standard drug ciprofloxacin. The formulation exhibited an impressive zone of inhibition of 18.06mm at MIC of 500mg/ml, where as ciprofloxacin exhibited 23mm ZOI at MIC of 500mg/ml. Therefore, it may be concluded that formulated preparation have potential to exhibit antimicrobial activity. (63,64)

II. CONCLUSION :-

Within the limitations of the study, the newer custom-made natural tooth powder was found to have antimicrobial and antioxidant properties and found to be effective in oral hygiene maintenance. It could be an alternative to the commercially available natural tooth powder. Pharmacologically active phytochemicals useful for the prevention, treatment and maintenance of periodontal diseases have been widely identified. They may be tannins, terpenoids, flavanoids, alkaloids etc. Antimicrobial activities of these have been found to be particularly useful for periodontal diseases. Clinical trials for assessment of safety and efficacy of these herbal remedies are in its infant stage. These herbal remedies are expected to be a widely used in future. The herbal remedies have an

edge over conventional antibiotic treatment which suffer the limitation of low benefit to high risk as compared to herbal treatment which possess high benefit to low risk ratio.

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