

Formulation and Evaluation of Herbal Tooth Powder

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ABSTRACT: Dental hygiene is essential for maintaining one's appearance, fostering confidence, and creating a positive self-image. Tooth powder application as tooth decay and bad breath can be avoided with the use of a preventative cosmetic for teeth. Ayurveda has identified numerous natural components that have a beneficial impact on oral hygiene and have also found their way into dentistry. A herbal tooth powder with natural components like neem, clove, and mango leaves demonstrated the possibility for successful oral care products based on conventional medical procedures. The synthesis and assessment of the synthesised herb tooth powder were carried out for the current investigation. The herb powder's physical and chemical characteristics were assessed to find out its pH, moisture content, ash value, and inorganic matter content. The paper concludes by stressing the value of dental cleanliness and health, as well as the advantages of utilising tooth powder as a preventative cosmetic to preserve oral health and ward off dental problems

KEYWORDS:Herbal tooth powder, Mango leaves, oral health, dental cleanliness

I. INTRODUCTION

Good dental hygiene is essential for maintaining one's appearance, fostering confidence, and creating a positive self-image. Tooth powder not only maintains dental health but also works as an abrasive to help brush away food particles and plaque. Moreover, it aids in the prevention of cavities, gingivitis, and discolored teeth. Tooth powder application as tooth decay and bad breath can be avoided with the use of a preventive cosmetic for teeth.

Maintaining proper dental health is essential for maintaining one's attractiveness, self-esteem, and self-respect. The tooth's root and crown are its two constituent sections. The strongest tissue in the tooth is found on the crown, which is covered in enamel on the outside.

Hydroxyapatite is the primary ingredient in enamel. Water and keratin make up the remainder. The hydroxyl apatite compound that makes up enamel's underside is called dentine. Seventy percent of the collagen water is also included in it. The main ingredient in dentine is fluorine.

The main substance suggested to lubricate food and preserve a suitable environment in the mouth is saliva. A variety of glands, including the larger and smaller lingual, buccal, palatal, and labial glands, combine to make saliva, which is continuously produced to maintain the dynamic condition of the dental environment. Saliva contains inorganic substances such as calcium, sodium, potassium, chloride, phosphate ions, proteins, enzymes, microorganisms, and mucous polysaccharide. The three main dental problems are periodontal disorders, calculus, and plaque.

Calculus is mainly brought on by bacterial action, and mineralized deposition is the outcome. Since inadequate oral hygiene is the primary cause of many diseases, they can be avoided and managed with regular brushing and the use of toothpaste and tooth powder. Dentifrice can be applied to teeth as a preventative cosmetic to help prevent cavities and foul breath. Both synthetic and herbal substances can be used to make dentifrice; however, due to the efficiency of herbal formulations and the lack of negative effects they have over synthetic formulations, the latter are more in demand these days.

Based on their abrasive qualities, toothpaste and tooth powders are applied to the teeth in order to rub against them and remove accumulated food particles and minerals. "A high quality of life and good health rely on dental health".

WHO oral health fact sheet, 2012. All of these facts draw attention to Ayurveda, our ancient medical system, which includes numerous herbal and mineral medications that are well-known for their ability to improve oral hygiene.

Because natural medicines are thought to be safer and have less adverse effects than synthetic ones, they are more widely accepted.

A growing number of people in society are choosing to rely on naturally occurring substances for health care, even though many toothpaste formulations with antibacterial qualities are effective. Ayurveda has identified numerous such herbs that have a beneficial impact on oral hygiene and have also found their way into dentistry.

Information

Dental Care

The sticky mixture of bacteria and food known as plaque is the cause of gum disease and tooth decay. Within a few minutes of eating, teeth begin to build plaque. If teeth are not sufficiently cleaned every day, plaque buildup can lead to gum disease or tooth decay. If plaque is not removed, it solidifies into a deposit known as tartar that becomes lodged at the tooth's base. The gums get irritated and inflamed by plaque and tartar.

Gums can become infected due to bacteria and the poisons they release.

- infected
- Swollen
- Tender

It is possible to avert issues like gum disease (gingivitis or periodontitis) and tooth decay (caries) by maintaining appropriate oral hygiene. In order to assist your kids, preserve their teeth, you should also start teaching them how to brush and floss at a young age.

II. MATERIALS

[1] MANGO LEAVES



Fig 1

Biological Source: *Mangifera indica*, commonly known as mango, is a species of flowering plant

Family: Anacardiaceae.

Chemical Components: mangiferin, benzophenones, phenolic acids, and other antioxidants such as carotenoids, flavonoids, ascorbic acid, and tocopherols are in order of preference.

Applications: Mango leaves have been shown to have some oral hygiene benefits, including reducing plaque and improving gingival health. Mango leaves contain mangiferin, which has antibacterial properties against certain strains of bacteria

[2] CLOVE



Fig 2

Synonyms: Caryophyllum, Clove flower, Clove buds.

Biological Source: *Eugenia caryophyllus* flower buds are dried and used to make clove.

It should contain not less than 7.0 per cent (w/w) Of eugenol calculated on dried basis.

Family: Myrtaceae

Chemical Constituents: Clove contains about 15 to 20 percent of volatile Oil, 10 percent to 13 percent of tannin (gallotannic acid), resin, chromone and eugenin. The volatile oil of the drug contains eugenol (about 70 to 90 percent).

Applications: Clove is used as a dental analgesic, carminative, stimulant, flavoring agent, an aromatic and antiseptic.

[3] CINNAMON



Fig 3

Synonyms:

amber, bay, beige, bister, brick, bronze, buff, chestn

Biological source: The dried inner bark of Cinnamomum zeylanicum Nees coppiced shoots is used to make cinnamon., belonging to

family : Lauraceae

Chemical Composition : various essential oils, cinnamon, cinnamate, and cinnamic acid

USES: It can lower blood sugar levels, reduce heart disease risk factors and has a plethora of other impressive health benefits. Just be sure to use Ceylon cinnamon, or if you use the Cassia kind, limit your dosage.

[4] AMLA POWDER



Fig 4

Synonyms: Indian gooseberry

Biological Source: Phyllanthus emblica tree

Family: euphorbiaceae

Chemical Components: polyphenols, flavonoids, kaempferol, ellagic acid, and gallic acid. The fruits are also rich in vitamin C (ascorbic acid) and contain carbohydrates, tannins, alkaloids, and phenols.

Applications : Amla has antibacterial, astringent, and anti-inflammatory properties. It can help strengthen teeth, improve cell survival, and reduce

free radical production. Amla can also help prevent dental caries by increasing salivary pH and inhibiting bacteria that cause caries.

[5] FENNEL



Fig 5

Synonyms: sauf

Biological source: fennel, (Foeniculum vulgare), perennial herb of the carrot.

Family : Apiaceae

Chemical constituents: Fennel contains volatile oil (1-4%), fixed oil (9-12%) and proteins (20%).

Uses: Fennel is used for various digestive problems including heartburn, intestinal gas, bloating, loss of appetite, and colic in infants.

[6] NEEM



Fig 6

Synonyms: Holy tree, Margosa

Biological Source: Azadirachta indica Linn.

Family: Meliaceae.

Chemical Components: Both unsaturated and saturated fatty acid glycerides are present. The predominant fatty acids are 20% and 50% stearic and oleic acids. It has nimbidin, nimbin, nimbidol, and nimbinin in it. There is 0.03 percent nimboesterol in the unsaponifiable portion.

Applications: Nimbin, nimbidin, and similar substances have antiviral properties. It is a non-edible oil that is used to make soap and stearic and oleic acids. Additionally, it is indicated in

rheumatism. both in medicinal soaps for skin conditions and as a pesticide.

[7] PEPPERMINT



Fig 7

Synonyms: Oleum mentha piperita, Colpermin, Mentha Oil.

Biological Source: Mentha piperita Linn.

Family: Labiatae

Chemical Components: Menthol makes up 70% of the content of peppermint oil. The compounds menthone, menthofuran, jasmone, and menthyl acetate are additional significant components of peppermint oil.

Application -People take stevia to treat a variety of ailments, including diabetes, high blood pressure, obesity, and many others, but these claims are not well-supported by research. While stevia leaves and extracts are accessible as supplements in the US, their usage as sweeteners is not authorized.

[8] TRIPHALA



Fig 8

Synonyms: Vara ,phalatrika

Biological Source: polyherbal Ayurvedic medicine made from the fruits of three plants: Amalaki, Bibhitaki, and Haritaki. These fruits belong to the myrobalans family, which includes Emblica officinalis (Amalaki), Terminalia bellerica (TB; Vibhitaka), and Terminalia chebula (TC; Haritaki).

Chemical Components: tannins, gallic acid, ellagic acid, and chebulinic acid, which are potent

antioxidants that may account, at least in part, for the observed immunomodulatory activity of the formula.

Applications :Triphala is an Ayurvedic herbal formulation that can be used in dental practices. It has anti-microbial, antioxidant, and anti-inflammatory properties that can help prevent plaque formation, a common cause of cavities and gingivitis.

[9] ROCK SALT



Fig 9

Synonyms: Halite, saindhavalavana, rock salt

Biological Source: Salt known as sendhanamak is created when salt water from lakes or seas evaporates, leaving behind vibrant sodium chloride crystals.

Chemical Constituents: Calcium, magnesium, iron, zinc, potassium, and sodium chloride

[10] SODIUM BICARBONATE



Fig 10

Sources: Baking soda can be made from both trona and nahcolite. But trona ore needs to be treated with carbon dioxide after being transformed into soda ash. Conversely, nahcolite requires less processing to be usable because it is a naturally occurring type of sodium bicarbonate.

Usage of Pharmaceuticals

neutralizes excess stomach acid and is used to treat acid reflux, heartburn, and sour stomach.

It can be applied to treat duodenal or stomach ulcer symptoms.

• Stomach acid is decreased by sodium bicarbonate.

[11] CALCIUM CARBONATE



Fig 11

Synonyms: Calcite, Aragonite, Chalk, Paris white, Marble stone, Vaterite,

Source: Calcium carbonate (CaCO₃) is a naturally occurring compound that is mined from limestone, chalk, or marble.

Applications : whitening abrasive, white colorant, thickener, remineralization, and oral buffering. Regarding safety, it's most likely among the safest ingredients in products for dental hygiene.

[12] ACTIVATED CHARCOAL



Fig 12

Use: Food-grade charcoal in its purest form, activated charcoal aids in removing stains from teeth. It is a fantastic and safe substitute for teeth-whitening treatments that include dangerous synthetic colors and flavors. Activated charcoal is utilized for the immediate treatment of some types of poisoning. It assists in halting the body's absorption of the toxin from the stomach.

III. FORMULATION OF HERBAL TOOTH POWDER (FOR 75 gm)

Sr No.	INGREDIENTS	QUANTITY TAKEN	ROLE OF INGREDIENT
1	Mango leaves	10 gm	Antibacterial
2	Rock salt	10 gm	Cleaning of teeth
3	Clove powder	8gm	Dental analgesic
4	Triphala	8 gm	Antioxidant
5	Cinnamon powder	7 gm	analgesic
6	Fennel powder	7gm	Prevent bad breath
7	Peppermint	7 gm	Bactericidal, prevent bad breath
8	Neem powder	5 gm	Antiseptic, antibacterial, Anti-inflammatory
9	Amla powder	5 gm	Antioxidant
10	Calcium carbonate	5 gm	Whitening abrasive
11	Sodium bicarbonate	3 gm	Abrasive
12	Activated Charcoal	0.1 gm	Whitening agent

Table no 1

The plants like Mango [Mangifera indica] & Neem [Azadirachta indica] were collected from PRES'S College of Pharmacy (for women) Chincholi, Nashik. The sample was washed thoroughly with the fresh water to remove dust particles. The plant material dried under sunlight for 4 to 5 days. Then the dried plant material was crushed, sieved to get nearly fine amorphous powder & Fennel, Clove, Cinnamon powder is made by with the help of mortar-pastle and mixture. Then Amla, Calcium Carbonate (CaCO₃), Rock salt, Activated Charcoal, Triphala powder is

collected from market. All these powder was sieved separately from sieve no. 85.

IV. EVALUATION OF HERBAL TOOTH POWDER

A number of characteristics, including organoleptic, physic-chemical, and rheological evaluations, were assessed for the synthesised herbal tooth powder.

1 Organoleptic Evaluation

Organoleptic characteristics for various sensory characters like color, odour, taste was carefully noted down as illustrated. The raw drugs and powder were

Organoleptic and morphological characteristics, such as colour, texture, smell, and appearance, were examined independently.

Color: The prepared tooth powder was evaluated for its colour. The colour was checked visually under normal lamp.

Odour: Odour was checked by smelling the product.

Taste: The product was manually tasted to determine the taste.

2 Physico-chemical Evaluation

The herbal tooth powder's physical and chemical characteristics were assessed to find out its pH, moisture content, ash value, and inorganic matter content.

PH

A pH metre was used to measure the PH of the prepared herbal tooth powder. 100ml of beaker with 5g of tooth powder in it. After the 10 millilitres of boiling water, let it cool. Measure the pH after giving it a good shake to create a suspension.

Moisture Content

(10 gm) of tooth powder were weighed, dried at 105 degrees Celsius in the oven

The loss of weight is recorded as percentage moisture content and calculated by the given formula % Moisture content = $\frac{\text{initial weight of sample} - \text{Weight of a dry sample}}{\text{initial weight of sample}} \times 100$

3 Rheological evaluation

Bulk Density

A 100ml graduated (1ml) measuring container was carefully filled with 20g of precisely weighed powder. Then, the volume of powder was noted and the bulk density in gm/ml was calculated as;

Bulk density = $\frac{\text{Wt. of drug}}{\text{bulk volume}}$
= $\frac{20}{45}$
= 0.4

Tapped Density –

A 100 ml graduated (1 ml) measuring cylinder was carefully filled with 20g of precisely weighed powder. A measuring cylinder was

installed on the device for tapping density. The device was turned on. It lifted the base's cylinder to a height of roughly 4 inches. number of strokes administered up to a change in bulk was made.

Following the notation of the powder's volume, the tapped density in gm/ml was computed as follows:

Tapped density = $\frac{\text{Wt. of drug}}{\text{Tapped volume}}$
= $\frac{20}{35}$
= 0.5

Hausner's ratio

Hausner's ratio = $\frac{\text{bulk density}}{\text{tapped density}}$
= $\frac{0.44}{0.57}$
= 0.77

Ash value

Precisely measure out three grams of the medication powder in a silicon crucible. Gradually increase the heat to incinerate the powdered medication until it is carbon-free, then cool and store it in a desiccator. Weigh the ash and determine the proportion. relative to the air-dried sample, of total ash.

Flow property

A funnel was brought and clamped to the stand. The height between the graph paper. A graph paper was kept below the funnel and the height between graph paper and bottom of the funnel was measured. Then 50gm of powder was weighed

Test for foam

To test the product's foamability, 2 grams of tooth powder and water were added to a measuring cylinder; the initial volume, designated as v1, was then shaken 10 times. The final foam volume was recorded as v2.

Foaming power = $V1 - V2$

V. RESULT AND DISCUSSION

Herbal tooth powder was created and assessed for the current investigation. The organoleptic property had a sweet taste and an aroma with a brownish green hue. The powder's moisture content is 1.65%. The powder's bulk density is 0.4g/ml.

In order to determine the flow property, the angle of repose was found, and the results show good flow property.

It was discovered that the formulation had a pH of 5.

The most prevalent oral infection in both youngsters and the elderly is dental caries. The

removal of carcinogenic germs from the oral cavity, suppression of their plaque production, and augmentation of tooth resistance to

demineralization constitute the prophylactic strategy against dental caries.

Table no 2 Organoleptic Evaluation

Sr no	Parameters	Result
1	Colour	Brownish green
2	Odour	Characteristics
3	Taste	Sweet
4	Texture	Fine powder

Table no.3 Physicochemical evaluation

Sr no	Parameters	Result
1	PH	5
2	Ash value	0.60
3	Moisture content	1.65

Table no 4 Rheological evaluation

Sr no	Parameters	Result
1	Bulk density	0.4 gm/ml
2	Tapped density	0.5 gm/ml
3	foam	Present

VI. CONCLUSION

The essay concludes by stressing the value of dental cleanliness and health, as well as the advantages of utilising tooth powder as a preventative cosmetic to preserve oral health and ward off dental problems. The creation and assessment of a herbal tooth powder with natural components like neem, clove, and mango leaves demonstrate the possibility for successful oral care products based on conventional medical procedures.

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