

FORMULATION AND EVALUATION OF HERBAL TOOTHPASTE

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ABSTRACT

To maintain the health and beauty of our teeth, toothpaste is a paste or gel that is applied to them with a toothbrush as a cleaning agent, oral hygiene accessory, and dental care product. Sodium lauryl sulfate, a compound found in commercial toothpaste that is detrimental for our gums, is one of the many chemicals included in today's toothpaste. To replace these dangerous or expensive chemicals, we developed natural herbal preservatives and excipients, making our toothpaste more profitable than conventional toothpaste. They contain appropriate ingredients and are a homogenous, semisolid, smooth bulk that is ideal for preserving oral health. Natural ingredients used in toothpaste include clove (a disinfectant to fight microorganisms), aloe (a mitigating and antibacterial specialist), vajradanti (flushes the plaque arrangement), fenugreek (oil and dampen), turmeric (takes out pain and expands), cinnamon (forestalls toothache), pepper (decreases the risk of tooth rot), amla (astringent properties), and liquorice (stops the dying). We set out to create a toothpaste in order to boost oral health. toothpaste that is mild on teeth and the mouth in addition All extractions are prepared from volatile plant oils, and no chemical preservatives are used. Several dental conditions, such as gingivitis, tooth decay, cavities, bleeding gums, bad breath, and dental caries, can be treated with this toothpaste.

KEYWORD: Oral hygiene, Economically viable, Natural herbal extraction.

INTRODUCTION

Oral depression is the term used to describe the area of the mouth that is in contact with the inside of the jaw, located behind the teeth and gums, above the soft and hard palates, and below the tongue. The oral cavity is the beginning of the digestive system. There are several structures in the mouth: the tongue, the floor of the mouth (below the teeth), the cheeks, the bony roof, and the teeth. The term "oral health" refers to a person's mouth, which has a significant impact on their overall health. A person's ability to chew, bite, smile, converse, and be in excellent psychosocial health should all be present indicators of their oral wellness, which is a condition free from mouth and facial pain, oral infections and wounds, periodontal (gums) disease, tooth decay, tooth loss, and other illnesses and disorders. Oral health is mostly impacted by two diseases.

1. Cavities or gaps in teeth are caused by dental caries (tooth rot), which is caused by bacterial cycles that demineralize tooth surfaces.
2. Periodontal (gum) disease is a disorder in which inflammatory reactions to bacterial biofilm along the gum line cause damage to the tissues and bones that surround and support the teeth.

To protect, clean, and clean teeth, use toothpaste. It improves the effectiveness of oral hygiene. It has a pleasant flavor and aroma and freshens your breath. The key to maintaining a healthy mouth is to use toothpaste to brush your teeth two times every day. They might all be recalled for using a similar toothpaste;

- a. Plaque and math decreasing specialists
- b. Anti-bacterial substances
- c. Breath cleansers
- d. Desensitizing specialists
- e. Abrasives
- f. Whitening fixings

In order to separate food, teeth, which are calcified structures in the mouth, are used. Different tissues that vary in thickness and hardness make up teeth.

The crown and the root are two important components of a tooth. The mandible (lower jaw) or the maxilla (upper jaw) contain the implanted tooth roots, which are covered by our gums. The crown is the part of the tooth that is visible and rises above the gums.



Fig. no. 1

A lacquered, white, firm covering is used to protect the crown. The main component of polish is the mineral hydroxylapatite, a transparent calcium phosphate. Enamel is the body's toughest substance, yet it is also fragile, prone to damage, and vulnerable to erosion from abrasive substances or acidic foods. Dentin is the name of the layer that lies beneath the lacquer. Dentin is a calcified connective tissue with a natural collagenous protein framework that resembles bone. Despite being a protective layer, dentin is often not as hard as lacquer and is susceptible to decay. A healthy mouth, however, only has a little opening between the gums and enamel, revealing little to no dentin. The roof of a tooth is covered with cementum, a unique bone-like substance. About 45% of it is hydroxyapatite, 33% is collagen, and 22% is water. Cementum is expelled from cementoblasts in the crown of the tooth, and it is thickest there. It has a gentler yellowish hue than either the dentin or the veneer. Its crucial function is to provide as a conduit for the periodontal tendons to link to the tooth for stability.

Dental pulp refers to the central region of a tooth that is lined with delicate connective tissue. Veins and nerves are present in the pulp, which enters the tooth through an aperture near the peak of the root. Typically, the pulp is referred to as the tooth's nerve. After a thorough cleaning, a sparse biofilm known as the pellicle begins to coat the tongue, gums, and teeth very fast. Proteins in spit are what create the pellicle. Plaque, which resembles gel, develops on the pellicle as a result of bacterial growth and stains from food and drink. The calcium and phosphorus in tooth polish is broken down by the microorganisms in plaque when they consume the sugars and starches in food sources. Microscopic organisms can infiltrate the dentin and induce rot when enough demineralization has occurred. Another name for tooth decay or cavities is dental caries.

Gum disease, a mild gum condition caused by plaque that can be seen below the gum line, can irritate the gums.

Two to fourteen days after the formation of the plaque, the minerals in saliva will link with the plaque to create

calculus, often known as tartar, a calcified deposit. Only a qualified cleaner can get rid of the hardened tartar.

Dental caries, gingivitis, periodontal disease, bad breath, and other dental issues can all be avoided by oral hygiene, which is the practice of keeping the mouth clean. Both private and occupational care are included. Dental professionals advise routine tooth brushing at least twice daily (morning and night) and immediately following meals. Additionally, flossing is considered to be essential to maintaining dental hygiene. When used properly, dental floss eliminates plaque from the areas between teeth and along the gum line, where periodontal disease frequently starts and can result in cavities. A toothbrush can remove the majority of plaque and lower the pH of the tooth surface, neutralizing corrosive acids.

Regular cleanings, typically performed by dentists and dental hygienists, are a good time to eliminate tartar.

Even when you regularly brush and floss, tartar can still form. Scaling your teeth, which uses a variety of tools to remove stains from your teeth, is another service that a professional cleaning may offer.

Care for Teeth and Gums

Both teeth and gums can remain healthy for the rest of one's life with the right care. The risk of tooth decay and gum disease decreases with improved oral and gum health. To take care of your teeth and gums, follow these simple steps:

1. Brushing
2. Flossing
3. Rinsing
4. Eating right
5. Visiting the dentist

Tips for brushing teeth

Brush your teeth twice a day, ideally after each meal. It is recommended to wait 30 minutes after eating so that any lacquer that softened while you were eating due to corrosiveness might resolidify and prevent being brushed away. Plaque, a bacterial film that sticks to the teeth, is removed when you clean your teeth. Plaque-forming

bacteria release acids into the environment when they come into contact with food. Cavities are caused by these acids.

To scrub:

Use a soft toothbrush with a pea-sized amount of toothpaste on the head, and brush the teeth at a 45-degree angle up to the gum line. Make a mild circular motion with the toothbrush while you brush your teeth. While you brush each tooth independently, keep using this motion. Maintain a straight line between the gum line and the bristle tips. Do not apply pressure that flattens the bristles against the teeth. Cleaning teeth simply requires the toothbrush's tips.) The bristle should be allowed to slid between your teeth.

- Brush your teeth's biting surfaces thoroughly from top to bottom. Ensure that the fibers reach the craters and gaps.
- Brush the backs of the upper and lower teeth on the side that is exposed to the tongue in the same minutecircular motion.
- To clean between the bases of the front teeth, move the toothbrush in a small circle while directing the head in all directions toward the base of the mouth.
- Angle the brush head upward and downward, pointing the tip toward the roof of the mouth, when cleaning the interior of the upper front teeth. Be sure to make a little circle with the toothbrush.
- Start at the back of your tongue and lightly brush it up and down. No scouring, please. This enhances the flavor of your breath and helps to get rid of germs.
- After two to three minutes of tooth brushing, rinse your mouth with water.
- Replace your toothbrush at least every three to four months.

Gum disease can be prevented, fortunately, if bacteria are not removed from the mouth by frequent brushing and flossing. Gum disease prevention is made simpler by using toothpastes that prevent plaque from growing once again.

Normal tooth paste

Lighting circumstances, clarity, haziness, light scattering, glitter, and the human eye and mind are just a few of the many variables that play a role in how a tooth appears and is perceived.

Teeth's outer surface has a thin layer of polish. The polish layer, which is more white and hazy, brings hues like blue, pink, and green to the tooth tone. Dentin is beneath the surface of the enamel, and it is less translucent, yellow-brown in color, and darker than enamel. Dentin, which shapes much of the tooth's structure and significantly influences the color of the tooth as a whole, is the main component of the tooth. The core of the tooth contains the dental pulp, a delicate connective tissue. Because of its vascularity, the pulp appears pink or crimson, but until tooth wear (or occasionally internal resorption) reduces the thickness of these layers, it seldom ever protrudes through the enamel and dentin that cover it. tooth color variations due on race, gender, and location. Females often have slightly whiter teeth than males do. Female teeth are smaller than their male counterparts, and as a result, less dentin may be seen through the enamel. The larger molars and the canine (cuspid) teeth are frequently darker for the same reason. Child teeth, or deciduous teeth, are frequently whiter than the adult teeth that follow because of variations in the ratio of veneer to dentin.



Fig. no. 02

There are three stages of gum disease:

- **Gingivitis:** The gum inflammation that results from plaque buildup at the gum line is the first stage of

gum disease. Toxins are created that can irritate the gum tissue and lead to gingivitis if regular brushing and flossing are insufficient to clear the plaque.

While flossing and brushing, there may be some bleeding. Since the bone and connective tissue that support the teeth are still healthy at this early stage of gum disease, damage can be repaired.

- **Periodontitis:** At this point, the supporting bone and connective tissues that keep the teeth in place have suffered irreparable harm. The gums may start to develop a pocket below the gum line, which collects food and plaque. In most cases, more damage can be avoided with proper dental care and better at-home hygiene.
- **Advanced periodontitis:** During this stage of gum disease, the tissues and bone that support the teeth are lost, which can lead to teeth shifting or becoming loose. Your bite may be impacted, and if vigorous therapy is unable to save them, teeth may need to be improved.

Gums and Brushing technique:

In an effort to keep them clean, one would be tempted to brush their teeth as completely as possible. However, since gums are made of delicate tissue, brushing them incorrectly could harm them. The best toothbrush, whether it's an electric or manual model, has soft nylon bristles with blunted edges. Hard or medium-hard bristle brushes put teeth at danger of fracturing or chipping, which can result in swollen, burning, or red gums. Use gentle, circular motions when rubbing and cleaning the gums and teeth to avoid damaging them. Although this practice is common, it can hurt the gums and irritate them, making them unpleasant and increasing the likelihood that they will bleed or retreat.

Gums and Flossing technique:

Plaque can be taken out of places a toothbrush can't reach by flossing every day. Care must be taken when flossing to avoid inflamed or bleeding gums. Instead of forcing the floss between the teeth, carefully slide it up and down, following the shape of each tooth. To remove more plaque, floss at least once per day above the gum line.

We use our herbal toothpaste to treat a variety of comparable problems, such as advanced periodontitis, gingivitis, and dental cavities. This method can aid in avoiding issues with the gums and teeth. Due to the fact that they are made solely of herbal ingredients, they can be used to treat a variety of dental issues. Even the additives, which are also produced by extracting the spices, are flavorless. Medical toothpaste comprises herbal ingredients in addition to guava leaf powder, aloe, vajradanti, powders (fenugreek, curcumin, acacia, cinnamon, amla, sugarcane, licorice, and black pepper), oils (clove, coconut, neem, and peppermint), and honey. These straightforward adjustments not only benefit teeth but also assist keep the mouth clean and in good health.^[42-43]

Methods of crude herbal preparation: -

Psidium guajava: First, the leaves are gathered from the

college campus as needed, gently cleaned with distilled water, dried in the shade, and then ground in a blender. In order to achieve equal particle size, the powder is sieved before being put into an airtight container.

Aloe vera: Aloe vera in a gel form Aloe leaves should be plucked fresh from the plant, cleaned with distilled water, and then the tips and butts from the upper and lower aloe skin should be removed. The yellowish gelatinous liquid was then removed from the skin by peeling it, dipping it in water, and rinsing it. The gel is re-mixed until it is foamy and liquid after being scooped.

Barleria prionitis: (Powder) The leaves are carefully taken out of the garden, cleaned with distilled water, and dried in the shade before being ground up in a blender. The powder is placed in an airtight container for storage after being sieved to ensure consistent particle size.

Glycyrrhiza glabra: We get dried licorice roots from nearby herbal shops. They are further cleaned and dried to remove dust before being combined into a fine powder. Shift through to get homogenous particles. The powder has been gathered and placed in an airtight container.

Acacia gum: The powdered form of acacia gum is known as acacia arabica and is sold in herbal shops. The gums are dried even further. The required quantity of gum was measured, gathered in a mortar, and ground.

Powdered fenugreek: Fenugreek seeds that are acquired from nearby vendors are used to make the powder known as trigonella foenum graecum. To get the stones off, they are washed.

Cinnamon powder: To make cinnamon powder, place the cinnamon sticks in the blender and process on high for 30 seconds. Repeat after checking and stirring. Continue blending the remaining larger amount after sifting the powder into a dish. **Pepper:** Place the pepper on a dry pan. To dry roast, allow 4–5 minutes. It has begun to cook. Let it go. Blend it in a blender until a powdery substance develops.

Amla powder: Amla must be cut into pieces and dried in the sun for a few days before being combined with the remaining ingredients in a blender. The ingredients should be sifted through a sieve once you have a fine powder.

Formulation: Two different techniques are used to make toothpaste.

1. Dry gum method
2. Wet gum method

❖ Dry gum method:

The ingredients for the solid mixture, which included calcium carbonate, Fenugreek, liquorice powder, neem powder, amla, guava leaf, cinnamon powder, and black pepper powder, were precisely measured as directed in the recipe and sieved using sieve number 80 to maintain the particle size.

This mixture was then triturated with carefully weighed honey, aloe vera, and coconut oil to create a semisolid product, which was also mixed in a mortar and pestle.

The final touch was peppermint oil, which was followed

by the addition of clove oil.

Ingredients	Quantity(per20gmcontains)
Calcium carbonate (Abrasive agent)	10gm
Fenugreek powder ^[6-9] (surfactant)	0.6gm
Aloe vera ^[38-40] (Humectant)	6.5gm
Acacia gum ^[33] (Binding agent)	0.5gm
Coconut oil (Liquid phase)	1.1gm
Liquorice powder[31] (Sweetening agent)	0.1gm
Honey	2.5gm
Peppermint oil ^[43] (Flavouring agent)	0.5ml
Amla powder ^[35] (Preservative)	0.3gm
Cinnamon powder ^[30] (Anti-caries)	0.2gm
Clove oil ^[1-3] (Essentialoil)	1ml
Black Pepper Powder ^[26-27] (Anti-plaque)	0.2gm

Evaluation

In order to evaluate the herbal immune booster tea, organoleptic, physical, and phytochemical tests were conducted on the product.

Organoleptic test:

The manual tests for color, smell, look, smoothness, and texture that are part of the organoleptic test were carried out.

Sl. No.	Parameters	Observations
1	Colour	Yellowish
2	Odour	Characteristics
3	Appearance	Paste
4	Taste	Sweet
5.	Stability	Stable
6.	Spread ability	Easily spread
7.	Foamability	Good
8.	Abrasiveness	low abrasive

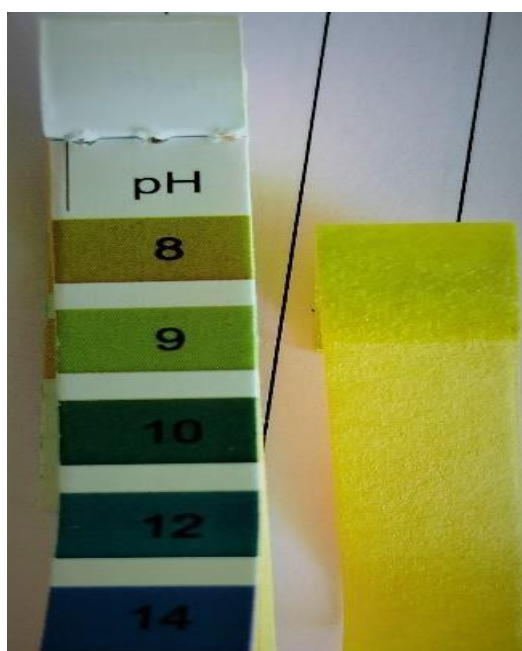


Fig: PH



Fig: Sharp edge

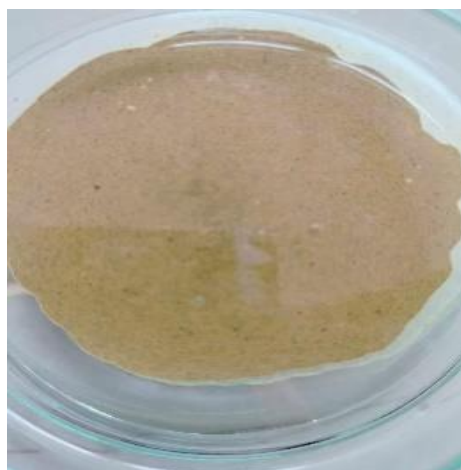


Fig: Spreadability



Fig: Foamability

Physical test:

PH: In a 50 mL measuring glass, add 10 mL of newly bubbled, cold water (at 27°C) to 10 grams of toothpaste to create a half-fluid suspension. To achieve the ideal suspension, thoroughly combine. Using a PH meter, quickly determine the suspension's PH.

Homogeneity: When average power is applied at 27°C, the toothpaste should discharge in a homogenous mass from the folding cylinder or another suitable holder. The weight of the contents should also be applied gradually and separated from the fold of the holder.

Sharp and Edge-grating particles: In order to search for any sharp or edge-grating particles, the objects were placed on the finger and scratched across the margarine paper for 15-20 cm. Many times, I went through a cycle like that. There weren't any angular or pointed particles.

Formability: Using 2g of homemade toothpaste and 5ml of water in an estimating chamber, the combustibility of the mixture was calculated. The mixture was then vigorously shaken multiple times. An estimate of the total amount of foam was made.

Assurance of Dampness and Unstable matter: To test for moisture and other unexpected materials, 5 grams of handmade toothpaste were placed in a porcelain dish with a diameter of 6 to 8 cm and a depth of 2 to 4 cm. It was dried at 105 degrees Celsius in a burner.

Assurance of spread capacity: The glue's slip and drag characteristics influence the spread capacity technique. No sliding was permitted, therefore two 10 x 10 cm glass slides were piled on top of each other with 1-2g of handmade toothpaste metered out and placed between them. After that, the slides were moved in restricting bearings. Determine how much toothpaste has spread (in cm) after three minutes. Repeating the analysis after calculating the three readings' average.

Tube Extrudability: A clean, collapsible plastic tube with a 5 mm nasal tip aperture was filled with the formulation, and pressure was applied to the tube using a finger. The tube's extrudability was then determined by measuring the amount of paste that emerged from the tip when pressure was applied to it.

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