



Herbal Toothpaste: A Review

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Abstract: A material used as a successful at-home care technique is toothpaste. It is a paste or gel dentifrice that patients use as an accessory with a toothbrush to clean and maintain the appearance and health of their teeth and improve oral hygiene. Many individuals are unaware that the majority of brand-name toothpaste contains a number of unhealthy substances. Herbal toothpaste is free of the fluoride, artificial flavours, and colors that many commercial products do. Using plant extracts from Neem leaves, Guava leaves, and cinnamon bark, current research attempts to create herbal toothpaste. Other constituents include camphor and honey. The plant extract's antimicrobial activities are present. The creation of herbal toothpaste can satiate every requirement for preserving oral cleanliness and preventing bacterial tooth decay. These herbal toothpaste varieties can be assessed using a variety of methods, including physical examinations, measurements of relative density, abrasiveness, homogeneity, foaming stability, moisture content determination, foaming character, pH determination, storage stability studies, formulation studies of the toothpaste, antimicrobial activity tests, and more. The physicochemical study of the toothpaste formulation revealed that all of the chemicals were safe, but more research is needed to enhance its quality and pinpoint the components that are responsible for its effectiveness.

Keyword: Herbal ingredient, Toothpaste, Anti-bacterial, Dentifrices.

Introduction

India has a long history of using local medicines for a variety of illnesses. People are now more likely to use non-alcoholic toothpaste and herbal formulations after learning about the disadvantages of commercial toothpaste. Herbal toothpaste does not contain artificial colours, flavors, or fluoride. Maintaining a good appearance, image, and confidence all depend on maintaining good oral hygiene ⁽¹⁾. Herbal toothpaste, which has been used for many years in ancient life, is one of the most important components of oral wellness. Between 300 and 500 BC, China and India were the first nations to produce and improve toothpaste formulas ⁽²⁾. Around that time, clam shells, crushed bones, and powdered eggs were used as abrasives to clean teeth. Sodium lauryl sulphate was utilized as an emulsifying agent in detergent formulation advances that started around 1945. The release of active substances during formulation development to prevent and/or treat oral sickness has become more important in recent years. ⁽³⁾. Toothpaste is a common item in our homes, and the majority of people don't really care what they're using. Toothpaste is a product that has been used as a successful at-home care system. It is a paste or gel dentifrice that patients use as an accessory with a toothbrush to clean and maintain the appearance and health of their teeth and improve oral hygiene. The usage of toothpaste encourages good dental health. Despite the fact that twice-daily

brushing and daily flossing are quite effective at removing plaque, more than 50% of adults have gingivitis on an average of three to four teeth. As bacteria in dental plaque are one of the main contributors to periodontal inflammation, plaque management is essential. However, most people only employ ineffective techniques to get rid of mechanical plaque. Individuals who require additional help in eliminating bacterial plaque utilize antimicrobial dentifrices in addition to regular mechanical oral hygiene practices ⁽⁴⁾.

Toothpaste is the most often used preventive dental care item. There hasn't been any research to support the claims that several commercially available dentifrices have antibacterial qualities. So, this study was conducted to ascertain whether toothpaste formulations were successful in lowering the microbial burden. In order to maintain proper oral hygiene, some toothpaste compositions were successful in lowering the microbial burden ⁽⁵⁾. Oral hygiene is crucial to total body health, starting with strong teeth. While traditional methods mostly entail the use of chewing sticks, different cultures use varied ways involving the use of toothpaste and toothbrushes, which have been used for decades. Another conventional technique for cleaning teeth is using one's finger to wipe different materials, such as natural powder, plant barks, ash, charcoal, oil, and salt, onto teeth ⁽⁶⁾. Oral disease and oral cavity are problems worldwide. therefore, it is a beneficial reduction by using herbal toothpaste and they give no side effects compared with other marketed products. Recently herbal toothpaste is increasing in demand worldwide because these are fewer side effects and is beneficial for oral cavity and tooth decay ⁽⁷⁾. Fluoridating teeth and reducing oral bacterial flora are toothpaste's two main goals. This is due to studies showing that fluoride, which is naturally found in many everyday objects including food and water, can guard teeth against bacterial diseases. Dental health should be improved by toothpaste that effectively lowers the number of bacteria in the mouth. Gum typically uses triclosan. It is a component that prevents gum disease due to its antibacterial qualities. The active ingredient sodium fluoride is also known to have antibacterial properties Natural toothpaste are those without triclosan or fluoride ⁽⁸⁾. The active chemical components included in herbal preparations, such as polyphenols, gums, alkaloids, glycosides, etc., make them particularly powerful. It has also been demonstrated that these formulations have various biological effects. ⁽⁹⁾.

Criteria for selection of herbal ingredients:

- It reduces inflammatory irritation and dental problem.
- It protects the soft tissue of the oral cavity
- It lessens the chance that the tooth may deteriorate.

Role of ingredients ^(10,11,12,13)

Sr.No.	Plant Name	Function	Figure
1.	Neem	<ul style="list-style-type: none"> • anti-bacterial properties. • prevent plaque from building up on teeth. 	
2.	Clove	<ul style="list-style-type: none"> • Prevent oral cancer. • Help to whiten our teeth. Help to relieve toothache. 	
3.	Fenugreek	<ul style="list-style-type: none"> • Treatment of gingivitis. 	
4.	Aloe vera	<ul style="list-style-type: none"> • Anti-inflammatory properties. • Treat gum infection. 	
5.	Pomegranate	<ul style="list-style-type: none"> • Plaque removing properties. • Feel fresh and cool mouth. 	
6.	Trikatu powder	<ul style="list-style-type: none"> • Anti-microbial properties. 	

Review of literature:

- **Puneet Gupta *et.al* (2012);** The goal of the current in vitro investigation was to compare the effectiveness of commercially available herbal over-the-counter dentifrices to traditional dentifrices on *Streptococcus sanguis*. By measuring zones of inhibition after 24 hours on blood agar plates inoculated with microbial stain using the disc diffusion method, dentifrices' anti-microbial activities were evaluated. All other dentifrices displayed zones of inhibition between 7 and 9 mm, respectively ⁽¹⁴⁾.
- **G Garg *et.al.* (2014);** Worked to combat the infection-related dental caries condition. The goal of this inquiry was to ascertain the physicochemical and physiochemical properties of the new formulation. Dental gel has been infused with aloe vera and other herbal substances, resulting in some intriguing new challengers for oral hygiene products ⁽¹⁵⁾.
- **Baibhabi Sahu *et.al.* (2019);** A microbial infectious illness, dental caries. The most discussed global health issue in recent years. To promote oral hygiene, toothpaste is a paste or gel dentifrice used in conjunction with a toothbrush. Toothpaste keeps teeth healthy, prevents tooth decay, keeps them appealing to look at, and promotes fresh breath. Use of toothpaste is necessary for good tooth brushing ⁽¹⁶⁾.
- **Amitha Ramesh *et.al.* (2020);** Gingivitis is an inflammation of the gingiva that mostly results from the build-up of bacterial biofilms and plaque on tooth surfaces. While there are other types of gingivitis, plaque-induced gingivitis is the most prevalent and is taken into account in this study. Plaque can be removed mechanically with the help of dental floss, toothpaste, and toothbrushes. To avoid synthetic ingredients, consumers have recently converted from ordinary to herbal toothpaste ⁽¹⁷⁾.
- **Urmila Nishad *et.al.* (2020);** Neem, Clove, Betel, Peppermint, Turmeric, and Guava are all examples of plants that have been used in this study that are typically used as traditional remedies. But throughout history, these herbs have also made significant contributions to ayurvedic treatment. They not only exhibit antibacterial properties for diseases with a natural course of progression, but they also include vital concentrations of bound phytochemicals that will benefit our bodies in various ways. In order to determine the antibacterial activity of these plant samples against some selected bacteria, phytochemical screening (qualitative - saponin, tannin, flavonoid, carbohydrate, protein, alkaloid, phenol, Quinones, terpenoids, and soluble starch) of these plant samples has been carried out during this project ⁽¹⁸⁾.
- **Prabhu K. Halakatti *et.al* (2020);** One of the most important needs for humans is oral hygiene. The first action in a person's daily life is practising good oral hygiene. Thus, toothpaste is crucial in this process. To counter some drawbacks of synthetic cleaning agents, many natural herbs can be used. Conclusion: To achieve better and more convenient oral hygiene, certain herbs can be successfully included into toothpaste formulas ⁽¹⁹⁾.

MATERIAL AND METHOD

- There are two types of methods for formulation of toothpaste
- 1. Dry gum method

- 2. Wet gum method

Dry Gum Method

Preparation of base: The solid ingredients calcium carbonate, sodium fluoride, SLS, sodium CMC, methyl paraben, sodium benzoate, sodium saccharine were weighed accurately as mentioned in the formula and sieved with sieve no.80 so as to maintain the particles.

Furthermore, a semisolid mass was created by triturating these compounds with precisely weighted sorbitol while they were mixed in a mortar and pestle.

Aloe Vera gel, clove oil, and precisely weighed herbal extract in the form of powders were sieved and added to the base.

Peppermint oil was added as flavoring at the end.

Sr.no.	Ingredients	Quantity
1.	Fenugreek powder	2.5gm
2.	Clove oil	0.02gm
3.	Neem Powder	0.05gm
4.	Aloe vera	6gm
5.	Trikatu Powder	0.03gm
6.	Pomegranate peel	1.6gm

Evaluation parameters:(2,20)

Physio-chemical test: Quality tests, such as physicochemical controls and visual assessment, were carried out to evaluate the generated formulations. Three copies of each analysis were run throughout.

Determination of pH: The pH of 2.5% toothpaste solution was determined at room temperature (25 °C), using a previously calibrated pH meter.

Determination of total solids: A defined quantity of toothpaste (0.1 g) was weighed on a petri dish and heated in an oven at 105 °C until the liquid portion was evaporated. Loss by desiccation was calculated from the initial and final weights difference.

Determination of foaming activity: By mixing a tiny amount of formulation with water in a measuring cylinder, noting the initial volume, and then shaking the cylinder ten times, the foamability of toothpaste formulations was assessed. The total amount of foam was recorded.

Spreading ability test: In this method slip and drag characteristics of paste involve. prepared paste (2g) was applied to the ground slide being examined. The formulated paste placed like a sandwich between this slide and another glass slide for 5min to expel air and to provide a uniform film of the paste between slides. The paste was scraped off the edges in excess. The top slide's travel time (measured in seconds) across a distance of 7.5 cm was then recorded when the top plate was pulled 80g by a line linked to a hook.

Formula was used to calculate spread ability: $S=M \times L / T$

Where, S= Spread ability M= Weight in the pan (tied to the upper slide) L= Length moved by the glass slide T=Time (sec) taken to separate the upper slide from the ground slide.

Cleaning ability test: The composition of the eggshell is very similar to that of teeth, both are made of calcium compounds. For this reason, we used hard-boiled and eggs for the cleaning test as reported in previous works, with slight modifications. In boiling water, we put one spoon of coffee, one spoon of tea, and 40 g of chocolate. After cooling, the baked eggshell was stained with this mixture for 12 h at room temperature. The stained eggshell was washed firstly with a wet toothbrush until there was no change in the color of the stain and secondly with a known amount of toothpaste. We used 5–10 brush strokes for each toothpaste (Each stroke is a complete back-and-forth motion) and if necessary, we used more brush strokes. We note that the brushing procedure should be as exact as possible for each tested toothpaste. The cleaning ability of specific toothpaste was observed and the results were interrupted as follows: ‘+++’ very high cleaning ability, ‘++’ high cleaning ability, ‘-’ bad cleaning ability.

Inertness of tube: The container used for herbal toothpaste was not produced any corrosion or deterioration in normal storage conditions like heating temperature at 45 ± 2 °C for ten days. Inertness of tube was observed by cutting the internal surface, open it and observing whether any sign of deterioration or chemical reactions occurred in the container

Homogeneity: The toothpaste shall extrude a homogenous mass from the collapsible tube or any suitable container by applying of normal force at 27 ± 20 °C. In addition, bulk of contents shall extrude from the crimp of container and then rolled it gradually.

Determination of sharp and edge abrasive particles: The contents on to the finger and scratched on the butter paper for 15-20cm long to check for the presence of any sharp or abrasive particles. Repeated the same process for at ten times. No sharp or edge abrasive particles were found.

Determination of moisture and volatile matter: Moisture and the volatile matter was determined by using 5gm of herbal toothpaste placed in a porcelain dish of about 6-8cm in diameter and 2-4cm in depth. Dried in an oven at 105°C. **Calculations:** % by mass = $100MI / M$

Conclusion: The study found that herbal toothpaste is safer with fewer negative effects than synthetic preparation, and it is more accepted in dental research. The toothpaste's formulation allows for both oral and dental hygiene, and it has anti-microbial activity against infections. The market preparation was contrasted with the formulation. Because of this, it exhibits an equal amount of patronizing and captivating devotion towards the promoted concoctions. The developed herbal toothpaste has a promising future in the study and development of natural medicines for public health.

Acknowledgment: The operation and personnel at Sri Sai College of Pharmacy in Badhani Pathankot are to be thanked by the authors for providing the essential installation and for their assistance in the council.

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