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## Review Article

# Systematic Review on Herbal Toothpaste

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### ABSTRACT

The document discusses the formulation and evaluation of herbal toothpaste. It covers the history of toothpaste, tracing its origins from ancient China and India to modern formulations. The text highlights the benefits of herbal ingredients like cardamom, guava, Tulsi, and others, which are used for their antibacterial, anti-inflammatory, and antioxidant properties. The use of natural ingredients avoids harmful chemicals, making the toothpaste safer. The document also describes the preparation process, evaluation parameters (such as pH, homogeneity, and antimicrobial activity), and the anatomy and physiology of teeth. Herbal toothpaste is presented as a safer, natural alternative for oral hygiene, offering benefits such as reducing plaque, strengthening gums, and maintaining tooth health without adverse effects.

## INTRODUCTION

Toothpastes are one of the most important and indispensable parts of oral health care, having been used since ancient time. Between 300 and 500 BC, toothpaste compositions were first created in China and India. During that period, squashed bone, powdered egg and clam shells were utilized as abrasives as a part of teeth cleaning<sup>[1]</sup> The nineteenth century saw the development of contemporary toothpaste formulas. Later on, same compositions were enhanced with the addition of soap and chalk. Sodium lauryl sulphate was utilized as an emulsifying ingredient in a number

of detergent formulation enhancements that started around 1945.<sup>[2]</sup> In order to prevent and/or treat oral illnesses, the attention has switched in recent years toward the release of active components during formulation development<sup>[3]</sup> A dentifrice called toothpaste is used to clean, preserve, and enhance the condition of teeth. In addition to being used primarily to clean teeth, toothpaste also serves as an abrasive to help remove food particles and dental plaque from teeth, helps to remove or mask halitosis, and releases active ingredients like fluoride to help prevent gum and tooth disease

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(such as gingivitis). With the aid of excipients included in toothpaste, the toothbrush is utilized mechanically to clean most surfaces.<sup>[4]</sup>Paste or gel dentifrice that works with a toothbrush to clean and preserve teeth's appearance and health is referred to as toothpaste.<sup>[5]</sup>Dentifrice is defined as a smooth, semisolid, homogenous mass that contains abrasives, humectants, binders, polishing agents, and other necessary ingredients to keep teeth healthy.<sup>[6]</sup> Having a "good appearance and impression" that boosts one's self-esteem is crucial to maintaining good dental hygiene.<sup>[7]</sup>People these days are more likely to utilize herbal and non-alcoholic formulations as they don't have artificial fluorides, colour, or flavour, which has a number of disadvantages.<sup>[8]</sup> In ancient days several parts of the world employed powdered ashes, eggshells, myrrh, crushed ostrich, crab shell, bones, and the horn of various animals. They developed a tooth powder around that time that had strong abrasive

effect and was later turned into toothpaste.<sup>[9-10]</sup>Maintaining good oral hygiene is essential to preventing cavities, tooth sensitivity, calculus, and periodontal disease, among other dental issues. Herbal toothpaste is referred to as an oral hygiene product to keep teeth in good condition. Most of the time, it is made of plant items or their derivatives, which are used to strengthen teeth and protect them without unwanted consequences. Because natural or herbal toothpaste mostly consists of plant-based compounds like lemon, eucalyptus, rosemary, chamomile, sage, and myrrh, it avoids negative consequences like carcinogenic activity by not including triclosan, fluorides, or other artificial chemical chemicals. People have been using toothpastes since prehistoric times. These are among the primary, indispensable elements of oral health care.<sup>[11-16]</sup>

#### Herbs Used In The Toothpaste: -

Herbs	Biological source	Family	Chemical Constituents	Medicinal use
Cardamom	The seeds of several plants in the genera Elettaria and Amomum.	Zingiberaceae	1,8-cineole, Linalol.	Antioxidant, Antibacterial, Anti-inflammatory, Antidiabetic.
Guava	The genus Psidium and the species Psidium guajava.	Myrtaceae	Vitamin E, Tetracosane.	Anti-bacterial, Anti-inflammatory.
Tulsi	Obtained from Ocimum sanctum plant.	Lamiaceae	Linalol, Eugenol, Methylcinnamat, Camphor, Citral.	Anti-inflammatory, Antioxidant, Antimicrobial.
Amla	Obtained from plant Phyllanthus emblica.	Euphorbiaceae	Tannins, Alkaloids, Fatty acid, Minerals.	Antibacterial, Anti-inflammatory, Astringent.
Clove	Obtained from dried flower buds of the Syzygium aromaticum tree.	Myrtaceae	Eugenol, Caryophyllene, Acetyeugenol, Flavonoids.	Toothaches, Cavity prevention, Antibacterial.
Honey	Obtained from Bees.	Apidae	Sugar, Amino acid, Minerals, Fructose.	Antibacterial, Pain relief, Dry mouth.

Neem	It is obtained from fully matured seeds of Azadirachta indica linn.	Meliaceae	Nimbin, Azadirachtin, Salannin, Gedunin, Nimbidol.	Anti-inflammatory, Cleaning teeth.
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**Other Constituents: -**

**1) Peppermint Oil:-**

The active ingredient in peppermint oil, menthol, provides a cooling sensation that can alleviate toothache pain. Peppermint oil contains natural bleaching agents that can help remove stains and discoloration from teeth.

**Medicinal Uses Of Peppermint Oil<sup>[17]</sup>**

Antiviral, Antioxidant, Antimicrobial, Antispasmodic, Antiseptic, Anticarcinogenic.

**2) Pomegranate Peel:-**

Pomegranate peel potent antibacterial property of pomegranate peels is well-known to treat mouth ulcers, tooth and gum diseases. Pomegranate peels are used as a popular treatment all over the world due to its high astringency, which is utilized in traditional medicine. Several kinds of phytochemicals that have been found in pomegranate fruits, seeds, and other components of the tree.<sup>[18]</sup>

**Medicinal Uses Of Pomegranate Peel:-**

- Pomegranate peel is recognized for its many health-promoting qualities and apparent wound-healing properties.

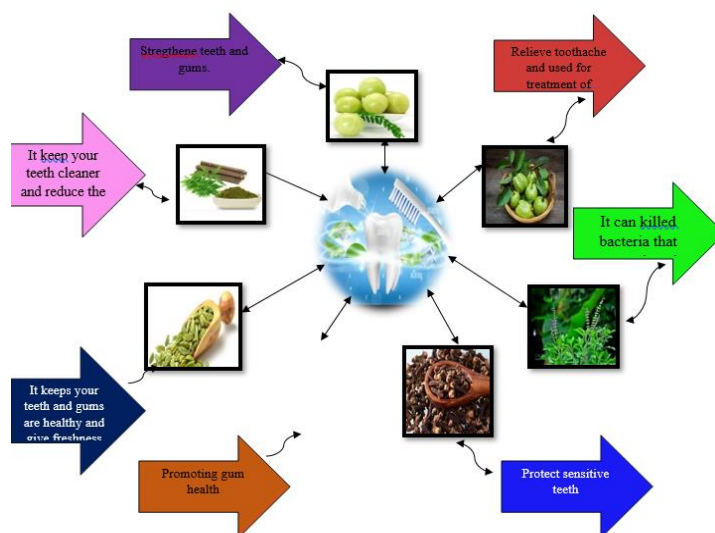
- Antimicrobial activity.
- Anticancer property
- Antioxidative capacities<sup>[19-22]</sup>

**MATERIALS AND METHODS: - <sup>[23-27]</sup>**

Homogenization using a mortar and pestle to generate the toothpaste base is one technique utilized in the production of herbal toothpaste.

- 1] We gathered all the ingredients needed to make the herbal toothpaste.
- 2] All of the ingredients were thoroughly dried and ground into powder.
- 3] The dried herb component was precisely weighed based on the required amount.
- 4] A solvent and humectant, was combined with the components to provide a basis for the formulation.
- 5] The mortar and pestle were filled with the foundation components and the herbal powder. Honey was then added as a sweetener.
- 6] The plant materials undergo thorough trituration until a paste-like consistency is achieved

**Advantages Of Herbal Ingredients: -**



### **Anatomy And Physiology Of Teeth: -**

The mouth has 16+16= 32 teeth, which are inserted into the sockets or alveoli of the maxilla (lower jaw) and mandible (upper jaw) alveolar ridges. The canines, molars, premolars, and incisors are the teeth in order from front to back. Teeth can be separated into three main sections:

- ◆ Crown: Enamel, the toughest material in the body, covers the area of the tooth above the gum line, shielding it from acids and abrasion.
- ◆ Neck: The neck, also known as the cervix, is the narrow point where the root and crown meet.
- ◆ Roots: One, two, or three projections implanted in a socket can make up the root. Molar teeth, which are larger teeth, contain many roots.

### **Three materials make up the tooth. They are:**

- ◆ Dentine: Comprising most of the tooth, it resembles bone in structure.
- ◆ Enamel: The tooth's enamel, which is tougher than bone, is the outermost layer covering the crown.
- ◆ Cementum: The neck, which is as tough as a bone. The gingivae, or gums, cover the alveolar processes and extend somewhat into each socket. The pulp cavity, which is encircled by dentine and contains blood, lymph, and nerve vessels, is located in the centre of the tooth.[29]

### **Function Of Teeth: -**

Mastication, or the process of cutting, combining, and grinding food so that the tongue and oropharynx may form it into a bolus that can be ingested, is the main job of teeth. The cutting teeth, or incisors and canines, are used to bite off food pieces. Food is ground or chewed by the large, flat surfaces of the premolars and molar teeth.[30]

### **Ideal Properties Of Toothpaste: -[31]**

- It's non-toxic and non-irritating
- It has a good abrasive effect
- It's inexpensive
- It's readily accessible
- It tastes good
- Less adverse effects
- Long-lasting fresh and clean mouth

- Prevention of tooth discoloration

### **Evaluation Parameters For Herbal Toothpaste: -[32]**

#### **1)Physical Examination (Colour, odour, taste, smoothness and relative density): -**

The colour of the toothpaste formulation was assessed and visually verified. Smelling the product allowed one to detect its odour. A manual taste test was conducted by sampling the formulation. By rubbing the paste formulation between the fingertips, the smoothness was evaluated.

#### **2)pH: -**

10 g of toothpaste should be dispensed from the container into a 50 mL beaker. 10 mL of recently boiled and cooled water (at 27°C) should be added to create a 50% aqueous suspension. For a complete suspension, stir thoroughly. Use a pH meter to ascertain the suspension's PH within five minutes.

#### **3)Homogeneity: -**

Using a normal force application at 27±20°C, the toothpaste should extrude a homogeneous mass out of the collapsible tube or other relevant container. The majority of the contents will also protrude from the container's crimp before being gently rolled.

#### **4) Determination of sharp and edge abrasive particles: -**

To remove any sharp or abrasive particles, place the contents on your finger and use it to scratch the butter paper over a length of 15-20 cm. made ten or more repetitions of the identical procedure. There were no particles that were edge-abrasive or sharp.

#### **5)Foamability: -**

By combining 2 grams of toothpaste with 5 millilitres of water in a measuring cylinder, the initial volume was recorded, and the cylinder was shaken ten times, the foaming power (or foamability) of herbal toothpaste was ascertained. The total amount of foam was recorded.



### 6) Determination of moisture and volatile matter: -

Using 5 grams of herbal toothpaste, the moisture and volatile matter content was measured in a porcelain dish with a diameter of 6 to 8 cm and a depth of 2-4 cm. dried at 1050°C in an oven.

Worksheets:

100 ml / m = % by mass

MI: Mass loss (g) while drying

M: The mass (g) of the sample used in the test

### 7) Determination of Spread ability: -

The spread ability approach involves determining the paste's drag and sliding characteristics. Weighing out one to two grams of herbal toothpaste, we sandwiched it between two 10-by-10-cm glass slides (sliding is not allowed) and pushed the slides in the opposite way. After three minutes, measure the toothpaste's spreading (in centimetres). Performing the experiment again and recording the mean of the three measurements.

### 8) Anti-Microbial Activity: -

Using soybean casein digest medium and a pathogenic bacterium strain E coil, an in-vitro antibacterial investigation of the prepared paste was carried out using the disc diffusion method. Initially, the cells in the E coil were grown and tended to multiply in agar plates. The inoculum was first applied to the plates, and then sterile cork borer holes of 5 mm in diameter were drilled into the medium. To guarantee that the inoculums were distributed equally throughout the bore, the agar plate's surface was rotated. Next, the developed paste and commercial formulations were added to the cultivated plates' bores. After labelling, paraffin wrapping, and a 24-hour incubation period at 37°C, the plates were prepared for use. After a 24-hour incubation period, each plate was inspected. The zone of inhibition's diameter (ZOI)

### CONCLUSION: -

Advantages of Herbal Ingredients: These include antibacterial, anti-inflammatory, and antioxidant properties, which promote gum health, reduce

plaque, and maintain tooth strength without adverse effects associated with chemical additives.

Evaluation Results: Parameters such as pH balance, homogeneity, foamability, and antimicrobial activity of the herbal formulation meet ideal standards for toothpaste effectiveness.

Production Process: A straightforward method using natural herbs ground into powder, mixed with solvents, humectants, and honey for sweetness, creates a toothpaste with desirable properties. Herbal toothpaste emerges as an efficient and eco-friendly oral care solution, avoiding harmful chemicals while maintaining efficacy.

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