

DEVELOPMENT AND ASSESSMENT OF HERBAL SYRUP FORMULA**Niranjan Babu Mudduluru^{*1}, Hari Krishna Mohan², Rahul A³**¹Department of Pharmacognosy, Seven Hills College of Pharmacy, Tirupati, A.P., India^{2,3}Department of Pharmaceutics, Seven Hills College of Pharmacy, Tirupati, A.P., India**Corresponding Author****Dr. M. Niranjan Babu Professor,**Department of Pharmacognosy, Seven Hills College of Pharmacy, Tirupati, A.P., India –
517561, Contact: 7702484513, Email: principal.cq@jntua.ac.in**Abstract**

Herbal medications are gaining global popularity for healthcare applications. Herbal toothpastes, made from natural ingredients, are increasingly regarded as a preferable option for oral hygiene compared to chemical or synthetic formulations due to their ability to prevent cavities and other dental issues. These toothpastes are used to treat dental cavities, tartar, periodontal damage, foul breath, and gum disease. The key to developing a stable and effective herbal toothpaste is the elimination of all artificial ingredients commonly found in these products. Herbal toothpaste has garnered significant interest for its potential to reduce gingivitis. Studies on the effectiveness of these toothpastes have shown mixed results, suggesting that herbal toothpastes perform comparably to non-herbal alternatives. For those looking to minimize exposure to chemicals that may harm both oral and general health, organic toothpaste is a prudent and healthier choice. This article provides a comprehensive overview of the antibacterial and anti-inflammatory properties of various herbs used in toothpaste formulations.

KEYWORDS: Herbal toothpaste, phytochemical analysis, anti-bacterial, anti-inflammatory activity, gingivitis

INTRODUCTION

A tooth consists of several anatomical components: dentin, pulp, enamel, and root. Common dental issues such as gum disease, tooth decay, and foul breath significantly impact oral health. Maintaining oral health involves managing microorganisms and achieving a dynamic balance, usually between the periodontal microflora and the host, to ensure a stable clinical state and minimal periodontal inflammation in the gingival tissues[1].

Toothpaste was first developed and produced in China and India between 300 and 500 BC, utilizing abrasives like crushed eggshells, bones, and shells for cleaning teeth. Modern toothpaste formulations emerged in the 19th century, with primary functions to clean, preserve, and improve dental health[2]. Toothpaste promotes good oral hygiene by acting as an abrasive to remove food particles and plaque from teeth, releasing active ingredients such as fluoride to prevent tooth decay and gum issues (e.g., gingivitis), and masking or

eliminating bad breath (halitosis). Most cleaning is achieved mechanically with a toothbrush and the help of toothpaste additives [3].

Toothpaste not only helps prevent tooth decay and gingivitis, which can lead to more severe dental problems, but it also maintains overall dental health. It comes in various flavors to keep breath and mouth fresh after brushing. However, chemicals in mouthwashes and toothpaste can negatively affect teeth color, taste, or even cause hypersensitivity reactions. Consequently, there is a growing demand for natural toothpaste ingredients that avoid artificial flavors, sweeteners, or preservatives [4].

Commercial toothpastes often include antimicrobial ingredients and compounds such as triclosan, propyl paraben, and sodium lauryl sulfate (SLS) to enhance their antibacterial properties [5]. To address the issues associated with chemical-based pastes, herbal-infused dental pastes are becoming increasingly popular. Herbal toothpastes, which have been used since ancient times, are a critical aspect of oral health care due to their natural ingredients and absence of harmful chemicals [6].



Figure 1: Herbal Toothpaste

Material and Method

Herbal toothpaste is produced using various natural substances. Clove oil acts as a dental painkiller, while fenugreek powder provides anti-inflammatory benefits. Neem powder is known for its antibacterial properties, and Aloe vera gel combats infections with its antifungal, antiviral, and anti-inflammatory attributes. Trikatu powder serves as an antimicrobial and anti-cavity agent[7].

To extract the antifungal, anti-inflammatory, and other beneficial properties from pomegranate peel, a mixture is prepared using a base. This base includes calcium carbonate as an abrasive, sodium fluoride as an anti-cavity agent, sorbitol as a humectant, sodium lauryl sulfate as a detergent and foaming agent, sodium CMC as a binding agent, sodium benzoate and methylparaben as preservatives, sodium saccharin as a sweetener, and peppermint oil as a flavoring agent. The formulated mixture is then compared and evaluated against commercially available herbal toothpastes[8].

MATERIAL

The weight of each component is determined based on previous research on herbal toothpaste manufacturing. All ingredients together make up 100% by weight, resulting in a total formulation of 100 grams of toothpaste. Commercially available herbal toothpastes such as Patanjali Dant Kanti, Dabur Red, Colgate Vedshakti, and Dabur Meswak were used for comparison. The contents of all toothpaste formulations are listed in Table 9.

Composition table of herbs- [9]

Sr.N.	Ingredients	Quantity in gram	Application
1.	Neem'S leaves	0.5	Antibacterial
2.	Black Peper	0.5	Antioxidant
3.	Babul's leaves	0.5	Astringent
4.	Clove oil	0.5	Anti- inflammatory
5.	Turmeric	0.5	Colourings agent
6.	Pippermint oil	0.5	Flavouring agents

Composition Table of chemical-(12,16,21)

Sr. .N	Ingredients	Quantity (gram)	Use
1.	Calcium carbonate	4.0	Abrasive
2.	Salt	0.5	Abrasive
3.	Camphor	0.5	Antiseptic
4.	Sodium lauryl sulfate	0.5	Foaming agent
5.	Methyl paraben	0.5	Preservative
6.	Water	Q.S.	Vehicle

Evaluation of Toothpaste

1. Physical Examination of Toothpaste:

- **Color:** The color of the toothpaste formulation was visually assessed and verified.
- **Odor:** The product's odor was detected by smelling it.
- **Taste:** The taste was verified by manually tasting the formulation.
- **Smoothness:** The smoothness was evaluated by rubbing the paste formulation between the fingertips .

2. Inertness of Tube:

- The herbal toothpaste container was stored under typical conditions, such as heating at $45\pm 2^{\circ}\text{C}$ for ten days. There was no observed corrosion or deterioration.

- To determine the tube's inertness, the inside surface of the tube was cut open and inspected for any signs of deterioration or chemical reactions within the container .
3. **pH:**
- Dispense 10 grams of toothpaste into a 50 milliliter beaker.
 - Add 10 milliliters of recently boiled and cooled (to 27°C) water to create a 50% aqueous suspension.
 - Stir well to ensure a complete suspension.
 - Measure the pH of the suspension within five minutes using a pH meter .
4. **Homogeneity:**
- The toothpaste should emerge from the collapsible tube or any other suitable container as a homogenous mass when normal force is applied at 27±2°C.
 - Most of the contents should also emerge from the crimp of the container before it is gently rolled .
5. **Determination of Sharp and Edge Abrasive Particles:**
- To check for the presence of any sharp or abrasive particles, the contents were placed on a finger and scraped across butter paper for a length of 15-20 cm.
 - This procedure was repeated ten times or more.
 - No sharp or edge-abrasive particles were discovered .

RESULT AND DISCUSSION:

Evaluation of Herbal Toothpaste

According to the guidelines provided by the Bureau of Indian Standards (IS 6356-1993) for herbal toothpaste samples (Vedshakti, Dabur Red, Patanjali, Dantakanti, Meswak, and the formulated toothpaste sample), the evaluation tests for the formulated herbal toothpaste were conducted. All samples complied with BIS standards and were determined to be of high quality[10].

Evaluation experiments were performed to compare various qualities between marketed and formulated herbal toothpastes. The results for all parameters were presented in tables. In this investigation, the formulated herbal toothpaste performed comparably to, and in some cases better than, the advertised herbal toothpastes[11].

PHYSICAL EXAMINATION

Sr.N.	Parameter	Observation
1.	Test of Colour	Greenish
2.	Test of Odour	Characteristic
3.	Taste	Characteristic
4.	Smoothness	Smooth

EXTRUDABILITY–

Sr.N.	Extrudability	Mean of tree tube
1.	Net wt. of Formuation in tube (g)	13.5
2.	Wt. of toothpaste extruded (g)	12.2
3.	Extrudability amount percentage	90.30

CONCLUSION

The present study leads to the following conclusion: Compared to chemical-based synthetic toothpaste, herbal toothpaste is less harmful and safer, playing a crucial role in maintaining dental hygiene and preventing cavities. Both lab-manufactured and commercially available herbal toothpaste products were evaluated against the standards set by the Bureau of Indian Standards. The formulated toothpaste demonstrated the ability to maintain oral hygiene and dental health through its antibacterial activity against microorganisms like E. coli. The study's results, along with comparisons to commercial herbal toothpaste formulations such as Colgate Vedshakti, Dabur Meswak, Patanjali Dantkanti, and Dabur Red, indicate that the formulated herbal toothpaste is equally effective and beneficial.

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