

# Formulation and Evaluation of Herbal Toothpaste

Miss. Vaishnavi Wayal<sup>1</sup>, Miss. Sapana Mhaske<sup>2</sup>, Miss. Harshada Tribhuvan<sup>3</sup>,  
Miss. Pratiksha Varpe<sup>4</sup>, Dr. Subhash Kumbhar<sup>5</sup>

Samarth Institute of Pharmacy, Belhe, Pune, Maharashtra, India <sup>1,2,3,4</sup>  
Principal, Samarth Institute of Pharmacy, Belhe, Pune, Maharashtra, India<sup>5</sup>

**Abstract:** *In today's world, the herbal toothpaste that contains natural ingredients are more preferable to be used than chemical based synthetic toothpaste. Herbal dental care products are always safe and effective which reduces and cure dental disorders. The objective of this research work was to formulate and evaluate the natural and safe herbal toothpaste which has anti-inflammatory, antimicrobial, antifungal and teeth whitening effect. In this formulation there would be the introduction of new flavoring agent i.e., Dill seed oil in conjugation with other herbal ingredients like fenugreek powder, neem powder, triphala powder, pomegranate peel powder, basil and guava leaves powder. The formulation was subjected to various evaluation tests like pH, spreadability, foamability, homogeneity, moisture and volatile content and tube inertness. Use of herbal toothpaste is the best way to protect the teeth and prevent the development of dental diseases. The Evaluation studies gives the satisfactory result. Thus, in present work, the lab made herbal toothpaste was found to be of best quality.*

**Keywords:** Herbal toothpaste, Fenugreek, Dill seed oil, Anti-microbial, Dental disorders

## I. INTRODUCTION

### 1.1 Dental Health

Dental health is one of most integral part of our overall health as well as well-being. Poor dental health leads to various dental disorders. Dental disorders are caused by an imbalance in the doshas (mainly kapha), according to Ayurveda. A balanced dosha system in the mouth ensures that all of the doshas' duties assist our overall health. Distinct elements of each of the doshas correspond to different areas of the mouth. Because teeth are bones that are a part of our skeletal system, kapha dosha can also be located within the mouth. Vata dosha is also located within the pores of bones, and hence within the pores of teeth. Biting, chewing, and swallowing food all require the Vata dosha. The blood arteries that nourish and protect the gum tissue include pitta dosha. Various oral care products helps to protect the oral cavity and prevents formation of dental diseases. Generally adult human mouth contains 32 teeth and they are classified as incisors (8), canines (4), premolars (8), molars (8), third molars (4). The structure of teeth generally contains three layers – outer layer (enamel), middle layer (dentine), outer one is the (root).

### 1.2 Toothpaste

The toothpaste is defined as a semi-solid material that is used in conjunction with a toothbrush to remove naturally occurring deposits from teeth. Fluoride-containing toothpastes are beneficial in preventing tooth decay. Toothpastes may also aid in plaque control and removal, promoting healthy gums. Regular usage of toothpaste helps to avoid dental issues. Egyptians have been making tooth powder from powdered bovine hooves, myrrh, powdered and burnt eggshells, and pumice, since 5000 BC. Crushed bones and oyster shells were added by the Greeks and then the Romans to enrich the formulation of toothpaste. Toothpastes or powders became popular in the nineteenth century. Burned bread was used in an 18th-century toothpaste in the United States and the United Kingdom. Around this period, another formulation used dragon's blood (a resin), cinnamon, and burned alum.

Herbal and Herbal based toothpaste has been used since many years ago in ancient life and is one of the main important components of oral healthcare. Herbal toothpaste is the oral care product which contain various herbal active ingredient along with bases. The natural ingredients present in toothpaste provides the protection to teeth and maintain the dental health

**A. Ideal Properties of Toothpaste**

- Excellent abrasive properties.
- Non-irritant and non-toxic
- Provides fresh breath
- Reducing tooth sensitivity
- Reducing gum disease
- Significant reduction in plaque.
- Provides germ protection.
- Gum bleeding should be reduced

**II. MATERIAL AND METHODS**

**2.1 Active Ingredients**

**Table 1:** Composition of active ingredients in herbal toothpaste

Sr. No.	Ingredients	Scientific name	Properties	Quantity (50gm)
1	Fenugreek powder	Trigonella foenum-graecum	Anti-inflammatory	1.25gm
2	Neem powder	Azadirachta indica	Antimicrobial	0.025gm
3	Triphala powder	-	Prevent gum and dental problem	0.1gm
4	Pomegranate peel powder	Punica granatum	Antifungal and Anti-inflammatory	0.8gm
5	Basil leaves powder	Ocimum basilicum	Teeth whitening, Antibacterial	0.3gm
6	Guava leaves powder	Psidium guajava	Antiplaque, Antimicrobial	0.1gm

**2.2 Base**

**Table 2:** Composition of base in herbal toothpaste

Sr. No.	Ingredients	Properties	Quantity (50gm)
1	Calcium carbonate	Abrasive	20.5gm
2	Sorbitol	Humectant	22gm
3	Sodium Lauryl Sulphate	Detergent and foaming agent	0.75gm
4	Sodium fluoride	Anti-caries agent	0.45gm
5	Methyl paraben	Preservative	0.1gm
6	Sodium saccharin	Sweetening agent	0.1gm
7	Titanium dioxide	Opacifier	0.25gm
8	Sodium CMC	Binding agent	0.9gm
9	Distilled water	Vehicle	QS
10	Dill seed oil	Flavoring agent	1.5ml

### III. METHOD OF FORMULATION

Following method is used for the preparation of herbal toothpaste. It basically contains two steps:

#### 3.1 Preparation of Base

1. Firstly, the bases like calcium carbonate, sodium fluoride, sodium lauryl sulphate, sodium CMC, methyl paraben, sodium saccharin, titanium dioxide are weighed according to their quantity mentioned in formula then they sieved with sieve no.80 to maintain the particle size.
2. In the next step, above chemical bases were mixed in mortar and pestle and triturated with sorbitol solution until it reaches to semisolid consistency.

#### 3.1 Addition of Herbal Ingredients

1. After that, accurately weighed herbal ingredients in form of powder were firstly sieved and then added to the base.
2. Dill seed oil was added as a flavouring agent at the end.



Fig.1 Formulated herbal toothpaste

### IV. EVALUATION OF HERBAL TOOTHPASTE

#### 4.1 Physical Examination (Colour, Odour, Taste, Smoothness)

The colour of the toothpaste that had been created was assessed visually. Smelling the product revealed odour. By tasting the formulation, the taste was manually checked. By rubbing the paste formulation between the fingers, the smoothness was determined.

#### 4.2 Inertness of Tube

Inertness of tube was observed in normal storage conditions like heating temperature at  $45 \pm 2^{\circ}\text{C}$  for ten days, by cutting the internal surface, open it and observing whether any sign of deterioration or chemical reactions occurred in the container.

#### 4.3 Determination of pH

To generate a 50 percent aqueous suspension, pour 10 gm of toothpaste from the container into a 50 mL beaker and add 10 mL of freshly boiled and cooled water (at  $27^{\circ}\text{C}$ ). To ensure a complete suspension, stir vigorously. Using a pH metre, determine the pH of the solution within 5 minutes.



Fig. 2 Determination of pH

#### 4.4 Homogeneity

By applying normal force at 27°C, the toothpaste should extrude a homogeneous mass from the collapsible tube or other suitable container. Furthermore, the bulk of the contents must extrude from the container's crimp and be rolled out gradually.

#### 4.5 Determination of Sharp and Edge Abrasive Particles

To check for the presence of any sharp or abrasive particles, place the contents on your finger and scratch on the butter paper for 15-20cm. Repeat the same procedure for at least ten times.

#### 4.6 Determination of Foamability

To measure the foaming power (foamability) of herbal toothpaste, 2g of toothpaste was mixed with 5ml water in a measuring cylinder, the initial volume was noted, and the cylinder was shaken 10 times. The total volume of foam was calculated.

#### 4.7 Determination of Moisture and Volatile Matter

To measure moisture and volatile matter content, 5gm of herbal toothpaste was placed in a porcelain dish with a diameter of 6-8cm and a depth of 2-4cm. It was dried at temperature 105°C.

#### Calculation:

% by mass =  $100MI/M$

MI - Loss of mass(g) on drying.

M - Mass (g) of the material taken for the test.

#### 4.8 Determination of Spreadability

The slip and drag characteristics of paste are used to determine the Spreadability of paste. About 1-2g of herbal toothpaste was weighed and placed between two glass slides (10 x 10cm) that were stacked one on top of the other (no sliding was allowed), and the slides were moved in opposing directions. After 3 minutes, take a measurement of the toothpaste spreading (in cm). Repetition of the experiment with the average value of three readings reported.

#### 4.9 Antimicrobial Activity

The modified agar well diffusion method was used to test the antibacterial properties of prepared toothpaste. 0.2 ml of *S. aureus* 24 hrs broth culture was seeded onto nutrient agar plates. The agar plates were left to solidify. In each plate, a sterile 8 mm borer was utilised to cut equidistance wells. The well was filled with 0.5 mL of formulations. The plates were incubated for 24 hours at 37°C. The zones of inhibition were used to assess the antibacterial activity.



**Fig. 3** Zone of inhibition

**V. RESULT AND DISCUSSION**

**Table 3:** Result

Sr. No.	Parameter	Result
1.	Physical examination	
	1. Colour	Brownish yellow
	2. Odour	Characteristics
	3. Taste	Sweet
	4. smoothness	Smooth texture
2.	Inertness of tube	Inertness of tube
3.	pH	8.6
4.	Homogeneity	Homogenous
5	Determination of sharp and edge abrasive particles	No sharp or edge abrasive particles were found.
6.	Determination of foamability	Foam increases 1.2 cm from initial volume.
9.	Determination of moisture and volatile matter	20%
11.	Antimicrobial activity (S. Aureus)	10mm

The formulated herbal toothpaste was evaluated by various evaluation parameter the result shows that, formulated toothpaste was brownish yellow in colour, having characteristic odour and smooth texture. The PH of toothpaste was found to be 8.1 and there was complete absence of sharp and edge abrasive particles. Loss on drying was found to be 20%. Formulation shows good foaming ability. It having good antimicrobial activity and zone of inhibition was found to be 10 mm.

**VI. CONCLUSION**

From the present study it proved that, the formulated herbal toothpaste is effective for anti-microbial, antifungal and tooth whitening effect. The formulated herbal toothpaste is safe with minimum side effect than chemical based synthetic toothpaste. It also proved that the formulated herbal toothpaste is maintaining oral hygiene and provides fresh breath. The formulated herbal toothpaste has pH in a range of pH of oral cavity. The present formulation has good organoleptic, spreading, foaming, abrasive property and in vitro antimicrobial properties. It also has the advantage of absence of harmful chemicals & presence of herbal powders with wide spectrum of natural compounds beneficial for teeth & oral cavity compared to conventional toothpastes. It concluded that formulated herbal toothpaste was found to be of good quality. It is suggested that the prepared formulation was physico-chemically stable and possessed characteristics of standard dental formulation. The formulated herbal toothpaste has good scope in the future by increasing natural ingredients for manufacturing safer natural remedies for dental health. It concluded that formulated herbal toothpaste was found to be of good quality.

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**VIII. CONFLICT OF INTEREST**

The author declared no conflict of interest.

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