



## Herbal Toothpaste Formulation and Evaluation Study

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### ABSTRACT:

Toothpaste is commonly used product by all individuals. Toothpaste is generally used for cleaning of teeth and mouth. It is also used to treat many disorders of teeth. Many dentists recommend to use toothpaste to treat disorder like sensitivity, Chronic gingivitis etc. Herbal toothpastes can be prepared using different herbal extract of many crude drugs having antibacterial, antimicrobial activity. Herbal formulation of toothpastes is prepared using herbs. These herbal toothpastes can be evaluated by different tests like Physical Examination, Relative density, Abrasiveness, Determination of spreadability, pH determination, Homogeneity, Foaming, Stability, Determination of moisture and volatile matter, Moisture content, Foaming character, Organoleptic evaluation, pH, Fragrance test, Shape retention, Stability study (Storage stability).

**Keywords:** Herbal toothpaste, Cinnamon powder, Clove oil, Neem oil, Basil oil, Menthol, Myrobalan powder.

### INTRODUCTION:

Toothpastes are the most common preventive means in oral health care. Many commercially available dentifrices claim to have antimicrobial properties, but little research has been conducted to investigate these claims. Therefore, this study was conducted to evaluate the efficacy of different toothpaste formulations in reducing the oral microbial load. The selected tooth paste formulations were effective in controlling the microbial load and therefore contributing to maintain good oral hygiene. However, practicing appropriate oral hygiene measures & brushing technique is of utmost importance in maintaining good oral health than the effectiveness of various ingredients in the toothpastes used. Chronic gingivitis is one of the most common oral diseases with high prevalence around the world. Dental plaque is the major etiological and initiating factor for the development of gingivitis. However, due to the limitation of mechanical methods, the addition of some safe and effective drugs to prevent gingivitis in toothpaste is also considered to be a good supplementary to the control of mechanical plaque. Studies have shown that certain chemicals, such as chlorhexidine or triclosan, are added to the toothpaste to directly inhibit the formation of plaque<sup>2</sup>. The active ingredient sodium fluoride is also known to have antibacterial properties. Natural toothpastes are those without triclosan or fluoride. They usually contain natural ingredients such as special mineral salts e.g. Sodium Fluoride and Sodium Chloride, and plant extracts like lemon, eucalyptus, rosemary, chamomile, sage and myrrh.<sup>4</sup>

### Preparation of base

1. The solid ingredients calcium carbonate, sodium lauryl sulphate, glycerin, sodiumbenzoate, sodium saccharin were weighed accurate sieved with sieve no.80 so as to maintain the particle size.
2. These ingredients were also mixed in a mortar and pestle, and then triturated with precisely weighed glycerin until a semisolid substance was created.
3. Addition of herbal ingredients-
4. Accurately weighed herbal extract in form of ginger oil were added to the base.
5. At the end, peppermint oil was added as a flavor.<sup>5</sup>



## Formulation

All herbal ingredients were dried and grounded using domestic mixer. There required quantity of ingredients was weighed and taken in mortar. Calcium carbonate, Sodium lauryl sulfate, methylcellulose, honey and glycerine were mixed in water. Acacia were added into the above mixture. This solution was added dropwise into mortar containing herbal ingredients and triturated well until a paste consistency is formed. <sup>6</sup>

### 1. Formulation of poly herbal toothpaste:

S.NO.	INGREDIENTS	QTY
1	Cinnamon powder	7
2	Clove oil	5
3	Neem oil	5
4	Basil oil	5
5	Sodium saccharin	0.25
6	Myrobalan powder	5
7	Para-hydroxyl benzoic acid	0.1
8	Amaranth	0.40
9	Calcium carbonate	45
10	Glycerin	22
11	Sodium lauryl sulphate	1
12	Menthol	1.5
13	Water	QS

## Evaluation of Toothpaste

### 1. Physical Examination

- Colour-Formulated toothpaste was evaluated for its colour.
- The visually colour was checked.
- Odour-Odour was found by smelling the product.
- Taste-Taste was checked annually by tasting he formulation.

### 2. Relative density

Relative density was determine by weight in gram taken in 10 ml formulation and 10 ml distilled water using RD bottle Evaluation Parameters.

### 3. Abrasiveness

Extrude the content 15-20cm long on the butter paper; repeat the same process for at least ten collapsible tubes. Press with the contents of the entire length with fingertip for the presence of sharp and hard edged abrasive particles. Toothpaste shall not contain such particles.

### 4. Determination of spread ability

In this method slip and drag characteristic of paste involve. Formulated paste (2g) placed on the ground slide understudy. The formulated paste placed like sandwich between this slide and another glass slides for 5minto expel air and to provide a uniform film of the paste between slides. Excess of the paste was scrapped off from the edges. The top plate was then subjected to pull of 80gwith the help of string attached to the hook and time (sec) required by the top slide to cover a distance of 7.5cm was noted. A short interval indicated better spread ability.

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.

## 5. pH determination

pH of formulated herbal toothpaste was determined by using pH meter. 10g of toothpaste placed in 150ml of beaker. Allow the 10ml of boiled and then cooled water. Stir vigorously to make a suspension.

### 1. Homogeneity

The toothpaste shall extrude a homogenous mass from the collapsible tube or any suitable container by applying of normal force at  $27 \pm 2^\circ\text{C}$ . In addition bulk of contents shall extrude from the crimp of container and the extruded it gradually.

### 1. Stability

The stability study was performed as per ICH guideline. The formulated paste was filled in collapsible tube and stored at different temperature and humidity conditions,  $25^\circ\text{C} \pm 2^\circ\text{C}/60\% \pm 5\% \text{RH}$ ,  $30^\circ\text{C} \pm 2^\circ\text{C}/65\% \pm 5\%$ .

$\text{RH}$ ,  $40^\circ\text{C} \pm 2^\circ\text{C}/75\% \pm 5\% \text{RH}$  for the period of three months and studied for appearance, pH and spreadability

### 2. Determination of moisture and volatile matter

5g of formulation placed in a porcelain dish containing 6-8cm in diameter and 2-4cm depth in it. Dry the sample in an oven at  $105^\circ\text{C}$ .

Calculation

$$\text{Bymass} = 100 \text{MI/MMI} - \text{Loss of mass(g) on drying M- Mass (g) of the material taken for the test.}^9$$

### 3. Moisture content

Toothpaste (10gm) weighted in a Porcelain dish and dried in the oven at  $105^\circ\text{C}$ . It was cooled in a desiccator. The loss of weight is recorded as percentage moisture content and calculated by the given formula.

$$\% \text{Moisture} = \frac{\text{Original sample weight} - \text{dry sample weight}}{\text{Original sample weight}}$$

### 4. Foaming character

1) 1 gm of tooth paste was poured into stoppered test tube (height 16 cm. diameter 6 mm) and volume of the liquid was adjusted with the water up to 10 ml. Tube was stoppered and shaken length wise, motion for 16 second, two shake/second.

2) Allowed to stand for 15 minutes and height of the foam produced was measured.

3) 10% solution of tooth paste was prepared.

4) 4ml of this solution was added to 146 ml of water at  $30^\circ\text{C}$ . The solution was agitated for 10 seconds. The foam was poured into a 100ml graduated cylinder to overflowing. A rubber stopper was gently dropped in to the foam. The time for the rubber stopper to pass two points (40ml- 80ml) was measured. Longer time of fall indicates the denser and more stable foam.

### 5. Organoleptic evaluation

Organoleptic evaluation (colour, taste) was done by sensory and visual inspection.



## Physical evaluation of Formulation

S.No	Parameters	Observation
1	pH	8.7
2	Spredability ( cm )	7.7cm
3	Viscosity ( CPS)	39751.6cps
4	Tube Excludability	Good

### 6. pH

pH was tested by dissolving 1gm product into 9ml of water and shaken vigorously then aqueous solution and pH is observed by pH meter.

### 7. Fragrance test

It was based on individual observation for its acceptability. 5 people were asked for acceptability of fragrance and their opinion was taken. And fragrance was evaluated based on

The below-described criteria;

- A) The fragrance was good, as good as the fragrance of reference toothpaste.
- B) The fragrance was not so good but comparable to the reference toothpaste.
- C) The fragrance of the toothpaste was poor than the reference toothpaste.

### 8. Shape retention

Toothpaste was squeezed out from the tube and put entirely of a tooth brush and hestate of the toothpaste after it was allowed to stand for 10 seconds was evaluated based on the below-described criteria; Shape just after the toothpaste is squeezed out on the toothbrush is maintained. Shape just after the toothpaste is squeezed out on the toothbrush is almost maintained. The toothpaste squeezed from the tooth brush and cannot maintain its shape.<sup>7</sup>

### 9. Storage stability

The toothpaste were filled in a toothpaste tube for storage and stored for 45 days at each of 5° C, room temperature and 40°C. The tube was then cut through and whether the liquid component was separated from the toothpaste or not was evaluated based on following criteria. Evaluation criteria of storage stability; A) Separation of a liquid component is not observed at all. B) Separation of a liquid component is observed slightly. C) Separation of a liquid component is observed obviously. Net content: net content was calculated by using following formula; Net content = weight of filled tube – weight of empty tube.<sup>8</sup>

Duration	pH	Foaming ability (%)	Spreadability (cm)	Cleaning ability
3 <sup>rd</sup> month	8.0 <sub>-</sub> +0.01	16.0 <sub>+</sub> _0.2	8.1 <sub>+</sub> _0.50	++
4 <sup>th</sup> month	7.9 <sub>-</sub> +0.02	16.0 <sub>+</sub> _0.1	7.9 <sub>+</sub> _0.20	++
5 <sup>th</sup> month	7.9 <sub>-</sub> +0.01	16.0 <sub>+</sub> _0.1	7.9 <sub>+</sub> _0.03	++

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Conflict of Interest Statement:

The authors have no conflicts of interest to declare.

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