



Formulation and Evaluation of Poly Herbal Toothpaste using Fenugreek Powder: A Brief Review

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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 are prepared using herbs like Fenugreek powder, clove oil, neem powder, aloe vera gel, trikatu powder, pomegranate peel, etc.

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, Storage stability, Total flavonoid content estimation of Tooth paste Formulation, Stability study (Storage stability), Antimicrobial activity of toothpaste etc. The main objective of this review article is to compile the available information related to herbal toothpaste like its introduction, different formulations and different parameters on which these herbal toothpastes can be evaluated. This information can be used by many researchers who want to make research in this area.

Key words: Herbal toothpaste, Ginger, Neem, Kalmi Bark, Guava Leaves

INTRODUCTION

Herbal and Herbal based toothpaste has been used since many years ago in ancient life¹ and is one of the main important components of oral health care². The manufacturing and development of toothpaste formulations began in China and India, as 300-500 BC. During that period, squashed bone, pulverized egg and clam shells were utilized as abrasives as a part of tooth cleaning³. Modern toothpaste formulations were developed in the 19th century. After the development in the field of medicines, chalk and soap were incorporated to those formulations. Immediately after the independence, several formulation advancements of different detergents had begun, sodium lauryl sulfate had been used as an emulsifying agent¹⁻⁵. In the modern era, the focus has shifted towards the release of active ingredients during formulation developments to prevent and/or treat oral illness. Toothpaste is a dentifrice used to clean, maintain and improve the health of teeth. Toothpaste is mainly used to promote oral cleanliness and also acts as an abrasive that helps to prevent oral cleanliness and also act as abrasive that help to prevent the dental and food particle from the teeth aids in the removing and or veiling of halitosis and release active ingredient such as fluoride to aid in preventing tooth and gum disease. The majority of cleaning performance by the mechanical involvement of the toothbrush with the help of excipients used in toothpaste⁶⁻⁸. The use of many herbal formulations are very effective as they contain active chemical ingredients such as polyphenols, gums, alkaloids, glycosides etc. These formulations have also been investigated to have different biological activities⁸⁻⁹. This increases scope for formulating and evaluating new formulations of herbal toothpaste. The main aim of this comparative study is to compare and evaluate the Herbal toothpaste formulations and comparing with marketed toothpastes.¹⁰

IDEAL PROPERTIES OF TOOTHPASTE

- toxic and non-irritant
- Good abrasive effect
- Not expensive
- Easily available
- Acceptable taste
- With less side effects
- Keep the mouth clean and fresh
- Long lasting
- Do not impart stain on teeth

Anti-Microbial Potential of Herbal Toothpaste¹¹

S. Sabiha Shaheen et al evaluated antimicrobial efficacy of 10 commercially accessible herbal toothpaste against particular strains of micro-organism using standard diffusion process at a strength of 1:1 dilution for 24hours and the study concluded that the herbal toothpaste possess anti-microbial property being more effective as that of conventional toothpaste. A double blinded randomized clinical trial with parallel groups was designed to examine the efficacy of herbal toothpaste in gingivitis and plaque control. The efficacy of herbal toothpaste was compared

with conventional dentifrices however, no statistically significant variations were found between test and control groups and reported that the herbal based toothpaste found to be more efficacious as that of formulated conventional toothpaste.

H. Firdaus Fareen carried out in vitro anti-microbial study using 8 different herbal toothpaste and the efficacy was tested by observing the maximum zone of inhibition at 24 h on Muller Hilton agar media which was inoculated with microbial stain by disk diffusion method and the results obtained that toothpaste containing clove exhibited strong antimicrobial property than fluorinated toothpaste with ZOI of 22mm. Clinical study was done by Kuldeep Singh based on

3 criteria's such as calculus index, gingival bleeding index and debris index with 100 individuals of different age groups ranging from 25-50 years.

The comparisons of these parameters were made with non-herbal toothpaste by using statistical t test between unpaired 2 groups of non-herbal and herbal toothpaste. The results concluded that herbal toothpaste is more efficient in maintenance of oral hygiene. Anti- bacterial activity was estimated by cup well method using herbal dentifrice such as A rodent compared against standard Colgate by using cariogenic bacteria such as *L. acidophilus* and *S. mutans*. The standard dentifrice produced 10.17mm and 5.83mm zone of inhibition whereas herbal toothpaste produced 10mm and mm respectively. The data indicated that a rodent is effective toothpaste with good anti-bacterial activity

A randomized, double blind controlled trial was conducted in order to test the efficacy of herbal dentifrice in reduction of gingivitis and plaque. 48 persons with existing gingivitis were assigned randomly to both positive control group dentifrice with fluoride and triclosan and test group. There was no substantial difference at baseline in plaque scores between 2 groups. After 28 days test produced an average of 19.9% decrease in plaque on lingual surfaces and oral whereas control group showed 18.3%. The researchers reported that both dentifrices are helpful in reducing in gum inflammation and plaque.

Study designed by K Patel compared and evaluated in vivo effect on salivary bacterial counts of 2 commercially available herbal and non-herbal toothpastes in children aged between 5 to 10years with 3 to 6 decayed teeth. Forty children were randomly assigned into two groups like group 1 and 2. Group 1 was treated with fluoride containing toothpaste whereas group 2 with herbal toothpaste. Individuals were graded for plaque index and evaluated the efficacy of two

MATERIAL AND METHOD

One formulation of herbal toothpaste is prepared by using different ingredients like Fenugreek Powder for its Anti-inflammatory, Clove Oil as a Dental Analgesic, Neem Powder which has Antimicrobial property, Aloe Vera gel to prevent infections for its Antifungal, Anti- Viral and Anti- inflammatory, Trikatu Powder as Anti-caries, Anti-Microbial, Pomegranate Peel for its Antifungal, Anti-inflammatory etc. of this mixture is prepared and other preparation used and base containing, Calcium Carbonate as abrasive.

Sodium Fluoride as anti caries agent, Sorbitol as humectants, Sodium Lauryl Sulphate as detergent and foaming agent, Sodium CMC as a binding agent, Methyl Paraben and Sodium Benzoate used as a preservative, Sodium Saccharine as a sweetening agent, Peppermint Oil as a flavoring agent. This prepared formulation is compared and evaluated with marketed herbal toothpaste. A method used for the formulation of herbal toothpaste is homogenization by using mortar and pestle for formation base of toothpaste.

Materials:

The weight of every each ingredient was decided by review previous study formulation of Herbal toothpaste. The combination of percentage by weight of all the ingredients of this is 100%, which means the sum of quantity of toothpaste will formulate 100gm of toothpaste formulation. The ingredients of all toothpaste formulations are given in table 1 and Marketed Herbal tooth pastes Patanjali Dant Kanti, Dabar Red, Colgate Ved shakti, and Dabur Meswak were used 12-13.

Method of formulation:

There are two types of methods for formulation of toothpastes, viz.

- Dry gum method,
- 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 particle size.
- Further, these chemicals were subjected to mixing in mortar and pestle and triturated with accurately weighed sorbitol until semisolid mass formed.

Addition of herbal ingredients-

- Accurately weighed herbal extract in form of powders were sieved and added to the base along with Aloe Vera gel and clove oil.
- Peppermint oil was added as a flavoring at the end.

Sr.No	Ingredients	Quantity Given	Use
1	Fenugreek Powder	2.5gm	Anti-inflammatory
2	Clove oil	0.02gm	Dental Analgesic
3	Neem Powder	0.05gm	Antimicrobial
4	Aloe Vera gel	6gm	Antifungal, Anti-viral
5	Trikatu Powder	0.03gm	Antimicrobial
6	Pomegranate Peel	1.6gm	Antifungal

EVALUATION & COMPARISON OF HERBAL TOOTHPASTE ^{14,15,16}

Physical Examination:

Formulated toothpaste was evaluated for its colour, visually colour was checked. Odour was found by smelling the product. Taste was checked manually by tasting the formulation. The Smoothness was tested by rubbing the paste formulation between the fingers.

Inertness of Tube:

The container used for herbal toothpaste was not produce any corrosion or deterioration in normal storage conditions like heating temperature at 45 ± 2 0C 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.

PH:

Dispense 10 gm of the toothpaste from the container in a 50 mL beaker and add 10 mL of freshly boiled and cooled water (at 27⁰C) to make 50 percent aqueous suspension. Stir well to make a thorough suspension. Determine the PH of the suspension within 5 min, using a PH meter.



Fig. 1: pH meter

Homogeneity:

The toothpaste shall extrude a homogenous mass from the collapsible tube or any suitable container by applying of normal force at 27 ± 20 . 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.

Formability:

The foaming power (Foam ability) of herbal toothpaste was determined by taking 2g of toothpaste with 5ml water in measuring cylinder initial volume was noted and then shaken for 10 times. Final volume of foam was noted.



Fig. 2: Foam ability testing

Determination of Moisture and Volatile Matter:

Moisture and volatile matter was determined by using 5gm of herbal toothpaste was placed in a porcelain dish of about 6-8cm in diameter and 2-4cm in depth. Dried in an oven at 105⁰c.

Calculations:

$$\% \text{ by mass} = 100MI / M$$

MI- Loss of mass (g) on drying

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



Fig. 3: Determination of moisture and volatile content

Determination of Spread ability:

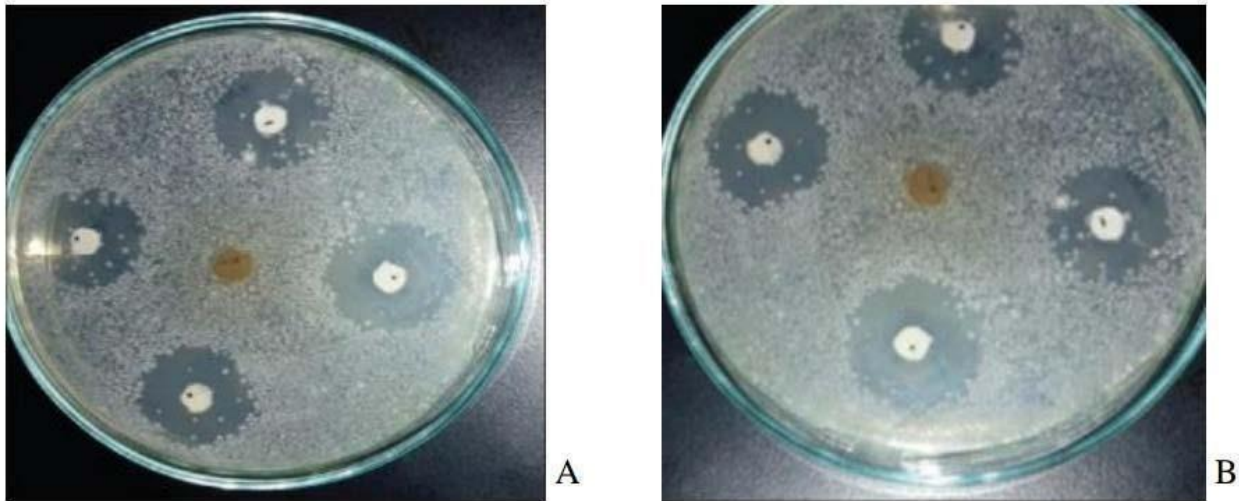
For determination of Spread ability method slip and drag characteristic of paste involve. The about 1-2g of herbal toothpaste was weighed and placed between two glass slides (10 x 10cm) one over each other (sliding, shall not

take place), and the slides were pulled in opposite direction. Measure the spreading (in cm) of the toothpaste after 3 minutes. Repeating the experiment and noted the average value of three readings.

Anti-Microbial Activity:

In-vitro anti-bacterial study of formulated paste was performed by disc diffusion method by using Soybean casein digest medium against a pathogenic bacteria strain E coil. E coil was initially cultured cells were tend to multiple in the agar plates. Initially plates were streaked with inoculum; bores were made with 5mm diameter into the medium using a sterile cork borer.

The surface of the agar plate was rotated to ensure an equal distribution of inoculums present around the bore. Then the formulated paste and marketed formulations were placed in the bores on the cultured plates. The plates were wrapped with paraffin, labelled, and incubated at 37°C for the 24 hour. Each plate was examined after incubation for 24 hrs. The diameter of zone of inhibition (ZOI) was measured in millimeters (mm) with a ruler.



Zone of inhibitions showing comparative antimicrobial activity of formulated herbal toothpaste in fig. A and zone of marketed herbal preparation shown in Fig. B.

RESULT

The formulated herbal toothpaste evaluation tests were carried out according to standard specified by bureau of Indian standard IS 6356-1993 for herbal toothpaste sample (Vedshakti, Dabur Red, Patanjali, Dantakanti, Meswak and Formulated toothpaste sample). All the samples were complied with BIS and they found to be good quality. Formulated herbal toothpaste evaluation tests were carried out to compare different properties of formulated herbal and marketed toothpastes. All the results of evaluating parameters were given in tables. In the present study, comparatively equal and rarely better result have been observe with the formulated herbal toothpaste than the marketed herbal toothpastes. Formulated herbal toothpaste was evaluated visually for its colour i.e. Yellowish brown. Odour was found by smelling the product i.e Aromatic and Characteristic. Taste was checked manually by testing the formulation.

CONCLUSION:

Following conclusion can be drawn from the results obtained in the present work of investigation. This herbal toothpaste is having prominent function in the maintaining the oral hygiene and preventing dental caries and is safer with minimum side effect than chemical based synthetic toothpaste. All the marketed herbal toothpaste and lab-made had been evaluated and compared with the standards specified by Bureau of Indian standards. Formulated toothpaste is capable to maintain the tooth and oral hygiene and shows antimicrobial activity against microbes like E. coli. Evaluation and comparison of results with commercial Herbal toothpaste are demonstrated that formulated herbal toothpaste is having equal helpful and fascinating over the marketed formulations (Colgate Vedshakti, Dabur Meswak, Patanjali Dantkanti and Dabur). This preliminary in-vitro study demonstrated that Herbal toothpaste was equally efficacious as marketed popular toothpastes in terms of all evaluation properties of toothpaste. The formulated herbal toothpaste has good scope in the future by increasing natural ingredients for manufacturing more and safer natural remedies, in the research and health of dental care of public, society and nation. It is concluded that formulated Herbal toothpaste was found to be of good quality.

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