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Research Article

Research On Preparation, Evaluation And Comparison Of Herbal Toothpaste With Marketed Herbal Toothpaste

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ABSTRACT

In current scenario in oral dental care with use of herbal toothpaste containing natural ingredients are moreacceptable in public belief than chemical based synthetic formulations due to their safety and efficacy inreducing dental caries, and preventing other dental issues to which this generation is prone to. In this formulationwe utilizes aloe vera gel, clove oil, neem powder, pomegranate peel powder and trikatu which are not yet usedby any other research work. These extracts possess many activities like anti-ulcer, anti-caries, anti- bacterial,wound healing along with which it imbibes certain special additional properties like anti-cancer and anti-fungal.Along with this herbal based formulation, a comparative study of previously marketed herbal toothpastes wasdone in order to get an idea of important physical parameters i.e. pH, stability, extrudability, spreadability,foamability, homogeneity to make a successful more efficacious and stable formulation. The aim of this study isto compare and evaluate the herbal toothpaste with marketed toothpaste. This study disseminate that our herbalbased toothpaste formulation having natural ingredients is as good as in terms of results compare to marketedherbal formulations.

INTRODUCTION

Herbal and Herbal based tothpaste 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

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clam shells were utilized as abrasives as a part of tooth cleaning3.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 illness1-3. 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 the dental plaque and food particles from the teeth, aids in the removing and/or veiling of halitosis, and releases active ingredients such as fluoride to aid in preventing tooth and gum disease (eg. Gingivitis). The majority of the cleaning is performed 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.

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 humectant, Sodium Lauryl Sulphate as a 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.

Table 1: Batch Formula:

Active Ingredients

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

Base

Sr. No	Ingredients	Quantity	Uses
1	Calcium Carbonate	41gm	Abrasive
2	Sodium Fluoride	0.9gm	Anti caries agent [12]

3	Sorbitol	44gm	Humectant
4	Sodium lauryl Sulphate	1.5gm	Detergent and foaming agent
5	Sodium CMC	1.8gm	Binding agent
6	Methyl paraben	0.2gm	Preservative
7	Sodium benzoate	0.1gm	Preservative
8	Sodium saccharine	0.2gm	Sweetening agent
9	Peppermint oil	q.s	Flavoring agent

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 Vedshakti, and Dabur Meswak were used 11.

METHOD OF FORMULATION:

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

1. Dry gum method,
2. Wet gum method,
3. Dry Gum Method:

Preparation of base:

1. 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.
2. 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-
3. Accurately weighed herbal extract in form of powders were sieved and added to the base along with Aloe Vera gel and clove oil.
4. Peppermint oil was added as a flavoring at the end12, 13.

EVALUATION AND COMPARISON OF HERBAL TOOTHPASTE9, 10

1. **Physical Examination (Colour, odour, taste, smoothness, relative density):**

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.

2.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.

3.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 make50 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

4.Homogeneity:

The toothpaste shall extrude a homogenous mass from the collapsible tube or any suitable container

by applying of normal force at 27±20C. In addition bulk of contents shall extrude from the crimp of container and then rolled it gradually.

5.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.

6.Foamability:

The foaming power (Foamability) 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: Foamability testing

7.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:

% by mass = 100Ml / M

Ml -Loss of mass (g) on drying

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

Fig. 3: Determination of moisture and volatile content

8.Determination of Spreadability:

For determination of Spreadability method slip and drag characteristic of paste involve. The about 1-2g of herbal toothpaste wasweighed 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.

9.Anti-Microbial Activity:

In-vitro anti-bacterial study of formulated paste was performed by disc diffusion method by using Soyabean casein digest medium against a pathogenic bacterial 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 37oC 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.14, 15, 16

Fig. 4: Zone of inhibitions showing comparative antimicrobial activity of formulated herbal toothpaste in fig. A and zone of marketed herbal preparation shown in Fig. B.

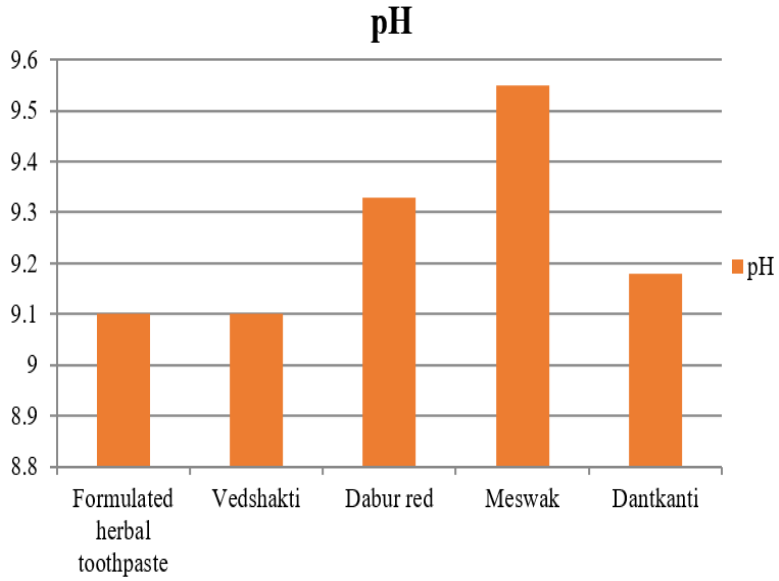

Fig. 5: pH of formulated herbal toothpaste and marketed herbal tooth paste.

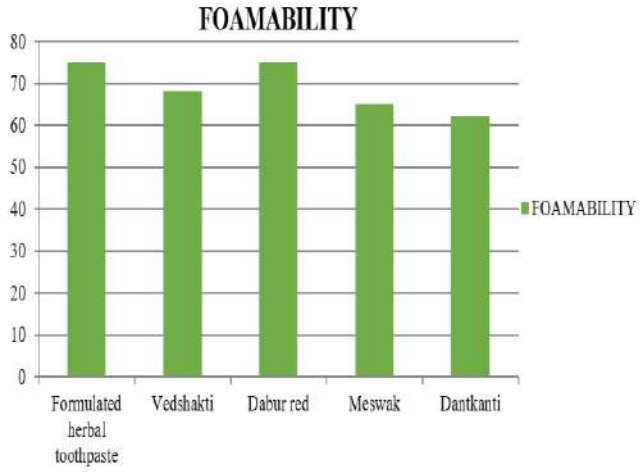

Fig. 6: Foamability of formulated herbal toothpaste and marketed herbal toothpaste.

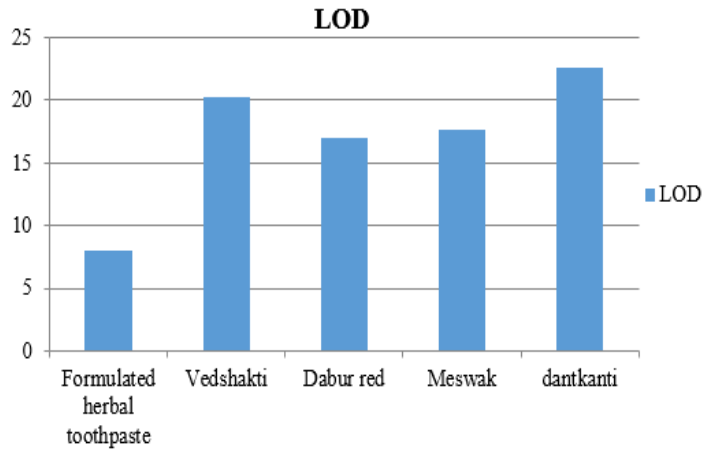

Fig. 7: Loss on drying (LOD) of formulated herbal toothpaste and marketed herbal toothpaste.

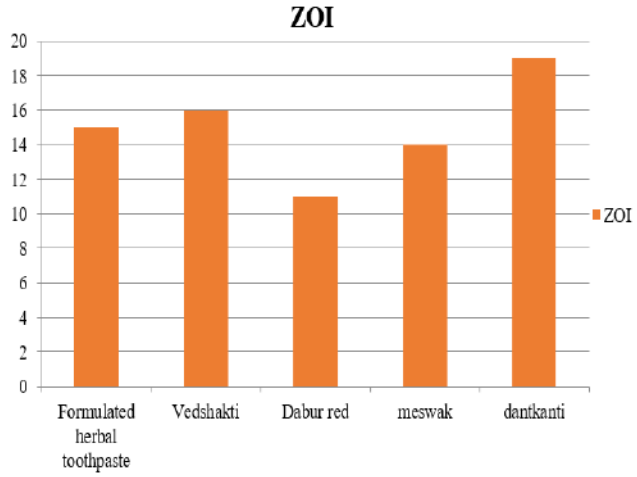

Fig. 8: Zone of inhibition (ZOI) of formulated herbal toothpaste and marketed herbal toothpaste.

RESULT AND DISCUSSION:

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. We found that all the toothpastes were having good consistency and smooth texture and also shown no symptoms for deterioration such as phase separation, gassing, fermentation when all samples were place at temperature of 34 +/-30C for period of 30 days. It confirmed that the toothpaste is stable. The internal part of all collapsible tubes have given no sign of corrosion or damage during normal storage conditions at a temperature of 45±20C for 10 days. So it was confirmed that the containers of formulated herbal toothpaste as well as all marketed herbal toothpaste i.e. Colgate Vedshakti, Dabur Red, Dabur Meswak and Patanjali Dantkanti have shown good tube

inertness.The Smoothness was tested by rubbing the paste formulation between the fingers. The pH of formulated herbal toothpaste was compared to other herbal marketed formulations and it was found to be 9.10 and therefore it complied with BIS limit given in figure 5. The foamability of formulated herbal toothpaste is more than commercial formulation. Loss on drying of formulated herbal toothpaste was found to be minimum than other marketed herbal formulation. While zone of inhibition of formulated herbal toothpaste was found to be 15mm fig 6. The activity increases in terms of abrasiveness and spreadability. Comparison of abrasiveness of marketed pastes with formulated herbal toothpaste suggests that formulated herbal toothpaste has more abrasiveness than the marketed pastes. The loss on drying of formulated herbal toothpaste as compare to other marketed toothpaste is less and is observed that formulated herbal toothpaste decreases chances of loss than other figure 7. Antimicrobial activity of formulated herbal toothpaste were compared with marketed herbal toothpaste. It was observed that, formulated herbal toothpaste has good antimicrobial activity and same efficacious with that of marketed one.

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 are 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 red). 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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