

Formulation and evaluation of a Herbal toothpaste and compared with different marketed preparation

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ABSTRACT: The aimed of present research to formulate herbal toothpaste utilizing plant extracts like Karanja Stem and bark, Neem Stem and bark, Tulsi leaves, Spanish cherry Stem and bark, Guava leave, Cinnamon bark and other ingredient such as Camphor and Honey. Herbal toothpaste were prepared by using a different concentration of various ingredients. The herbal toothpaste formulated which can satisfy all the required condition to keep the mouth fresh and prevent tooth decay. The prepared toothpaste was evaluated for different parameters like homogeneity, spreadability, foaming power, stability, PH, moisture and volatile matter and etc. All these tested parameters were compared with marketed preparation. (Dauber red, Meswak and Dantkanti) with formulated herbal toothpaste. It has been a good scope in future dental research and dental health of public.

KEYWORDS: Herbal toothpaste, Pongamia pinnata, Mimosa elengi, evaluation

I. INTRODUCTION:

India has a rich tradition of indigenous medicines for various treatments. After studying the drawbacks of commercial toothpastes, people are now more inclined toward the use of nonalcoholic toothpastes and herbal formulations. Herbal toothpaste does not contain the artificial colors, flavors or fluoride. Oral hygiene is an important key to maintain good appearance, impression of an individual and gives confidence [1]. 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 utilization of the toothbrush with the help of excipients used in toothpaste [2-4]. The polyherbal and herbal formulations are very effective as they contain active chemical ingredients such as polyphenols, gums, alkaloids, glycosides etc. These formulations have also been proven to have different biological activities [5]. The main aim of this investigation is to evaluate the Herbal toothpaste formulations and comparing with three popular commercial toothpastes.

II. MATERIALS AND METHODS

Chemicals

Calcium carbonate (Balaji Chemicals), Sodium lauryl sulfate (Loba Chemicals), Amarnath, Camphor (Local market), Honey (Local market) were purchased from market.

Collection and authentication of Plant material

The plant materials required like Karanja Stem and bark, Neem Stem and bark, Tulsi leaves, Spanish cherry Stem and bark for the present study were collected from the Herbal garden of Jeypore College of Pharmacy campus, Jeypore, Rondapalli and local market of Koraput district (India) in the month of January 2020. All the plant materials were identified, confirmed and authenticated by the Biju Patnaik Medicinal Plants Garden and Research Centre, Dr. M. S. Swami Nathan Research Foundation, Jeypore, Koraput (District), Orissa (Letter No. MJ/SS/P-856/20, dated 5.2.2020). After authentication all the plant materials were dried and made into coarse powder by grinding in home grinder and stored in a closed air tight container for further use.

Formulation of herbal toothpaste:

Table no 1. Formulaton of Herbal toothpaste (Ingredients)

Slno.	Common name	Botanical name	Part used	catagory	Quantity(g m)
1	Karanja	Pongamia pinnata	Stem and bark	Antibacterial	0.5
2	Neem	Azadirachta indica	Stem and bark	Preservative	0.5
3	Tulsi	Ocimum basilicum	leave	Prevent bad breath	0.5
4	Spanish cherry	Mimusops elengi	Stem and bark	Prevent tooth ache	0.5
5	Guava	Psidium guajava	leaves	Anti-inflammatory	0.5
6	Cinnamon	Cinnamomum zeylanicum	Bark	Flavoring agent	0.5
7	Calcium carbonate	-----	----	Abrasive	3.5
8	Glycerin	-----	-----	Humectant	2.0
9	Sodiumlaurayl sulphate	-----	-----	Detergent	0.5
10	Honey	-----	----	Sweetening agent	0.5
11	Camphor	-----	----	Antiseptic	0.5
12	Amarnath	-----	-----	Colouring agent	0.50
13	Distil water	----	----	vehicle	q.s.

Formulation of herbal paste

All herbal ingredient were dried and grounded using domestic mixer. The required quantity of ingredients were weighed and taken in mortar. Calcium carbonate, Sodium lauryl sulfate , camphor , honey and glycerine were mixed in water. Acacia were added into the above mixture. This solution was added drop wise into mortar containing herbal ingredients and triturated , at last colouring agent was added to the formulation and again titrated well until a paste consistency is formed

Evaluation of Herbal tooth paste

Colour: The prepared toothpaste was evaluated for its colour. The colour was checked visually.

Odour: Odour was found by smelling the product.

Taste: Taste was checked manually by tasting the product.

Determiration of sharp and edge abrasive particles

Took the contents on to the finger and scratched on the butter paper for 15-20 cm long to check for the presence of any sharp or abrasive particles. Then repeated the same process for at ten times. No sharp or abrasive particles were found.

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, a bulk of contents shall extrude from the crimp of the container and then rolled it gradually.

Determiration of Spreadability

One gram of toothpaste placed on a glass slide (10 x 10 cm), cover with another glass slide. Then carefully place two kg weight of on covered glass slide (sliding, shall not take place). Measure the spreading (in cm) of the toothpaste after 3 minutes. Repeating the experiment and note the average value of three readings

pH determiration

Weighed 10 g of toothpaste placed in 150 ml beaker. Added 10 ml of boiled and then cooled water. Stirred vigorously to make a suspension. Measured the pH of the suspension using pH meter.

Foaming power

Taken a suspension of the material in measuring cylinder and shake the suspension for 12 times and measured the volume of the foam produced after shaking for 5 minutes. Procedure: weighed 5 g of toothpaste in a 100 ml glass beaker. Add 10 ml of water, covered the glass beaker with a watch glass and stand for 30 minutes. Stirred the suspension with glass rods and transferred it to 250 ml measuring cylinder. Transferred the residue retained in the beaker to measuring cylinder by adding of 5- 6 ml of water. Then make up the

cylinder with 50 ml of water. Stirred the contents with up-down movements to get uniform suspension at 30 ° C. after shaking, keep the cylinder stand for 5 minutes. And final note the volume obtained with foam + water.

Stability

The toothpaste shall be stable, but not to be deteriorating, ferment and segregate during normal storage conditions and usage. Stability of toothpaste can be tested when it exposes to 45±20° C for a period of 28 days. After storage, no phase separation, fermentation, and gassing can be observed. Also exposed to cool conditions such as 5 ° C for 1 hour, no obstruction of executable form from the container is observed.

Determination of moisture and volatile matter

Weighed 5 g of a sample placed in a porcelain dish containing 6-8 cm in diameter and 2-4 cm depth in it. Dried the sample in an oven at 105°C.

Determination of fineness

Weighed accurately about 10g of toothpaste and placed in a 100 ml beaker. Added 50 ml of water, and allowed to stand for 30 min with stirring until the paste is completely dispersed. Transferred the solution to 150µ & 75µ IS sieves and washed with a slow stream of tap water. Allowed the running tap water to drain of completely and dried the sieve at 105±2 ° C by placing it in an oven. Transferred the residue particle present on the sieve on to a watch glass and weighed it.

Determination of fluoride ion

Fluoride ions are determined using potentiometer containing fluoride ion sensitive electrodes. Calculation: a graph is plotted on a log scale, taking the concentration of fluoride (x-axis) Vs potential in mV (y-axis). From the calibration curve, the fluoride ion concentration (in mg) of test solution is measured. fluoride ion concentration (ppm) $M = 2 a \times 10000$

a = mg of fluoride ion calculated from graph

M= Mass of sample taken in gram

Table no. 2: Evaluation tests for Lab made and commercial Herbal toothpastes

Sno.	Properties	Lab-made	Dabur red	Meswak	Dantkanti
1.	Hard and sharp edged abrasive particles	Absent	Absent	present	present
2.	Abrasiveness	4	3	3.2	3
3.	Spread ability	5.4	5.0	4.5	5.2
4.	pH	8.3	7.2	8.2	8.3
5.	Stability(45±2C for 128 days & at 5 C for 1 hour)	Good	Good	Good	Good
6.	Fineness(%by mass)	0.42	0.36	0.38	0.41
7.	Moisture and volatile matter(%by mass)	1.5	1.4	1.2	1.5
8.	Foaming ability	74	75	66	71
9.	Stability	Stable	Stable	Stable	Stable
10.	Fluoride ion, ppm,max.	41	52	35	43

III. RESULTS AND DISCUSSION:

Evaluation of toothpaste were carried out according to the standards specified by the Bureau of Indian standards IS 6356-1993 for Herbal toothpaste samples (Dabur red, Meswak and Dantkanti) and Lab made toothpaste sample. All the samples complied with BIS and they found to be of good quality. The different ingredient used with their concentrations for a formulation of toothpaste is given in table no.1 . Evaluation tests were carried out to the different properties of Lab made and commercial toothpaste. All the results of evaluating parameters were given in table no.2. In

the present study, comparatively equal and rarely better results have been observed with Lab made formulation than marketed formulations. Increased activity in terms of abrasiveness and spreadability was appeared in Lab made formulation (fig no.1). Comparison of the abrasiveness of marketing pastes with Lab made formulation suggests that Lab made formulation has more abrasiveness than marketed pastes. All the toothpastes were having good consistency and smooth texture. The foaming ability of lab-made formulations is more than commercial (fig no.2). All the formulations produced equal fineness (%), but moisture and

volatile matter (%) is more in case of formulation than that of marketed (fig no.3).

IV. CONCLUSION:

Herbal toothpastes all ways play a vital role in maintaining the oral hygienic as well as preventing dental caries. Lab made Herbal toothpaste was formulated by selecting suitable ingredients to get the formulation more stable. Evaluation and comparison of results with commercial Herbal toothpaste demonstrated that the Lab made toothpaste is having equal patronizing and engrossing passion over the marketed formulations (Dauber red, Meswak and Dantkanti). All the marketed Herbal tooth pastes and Lab made Herbal toothpaste are evaluated and compared with the standards specified by Bureau of Indian standards. The study demonstrated that Lab made Herbal toothpaste was equally efficacious as three commercially popular toothpastes in terms of all evaluation properties of toothpaste. Hence, it is concluded that Lab made Herbal toothpaste formulated in a laboratory was found to be of good quality.

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