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Formulation, Evaluation and Comparison of Lab made Toothpaste with Marketed Brand of Toothpaste

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Abstract: *Toothpaste is a paste or gel useful to maintain dental health and preventing dental disease like cavities and promote oral hygiene it is an abrasive that aids in removing dental plaque and food from the teeth, assists in suppressing halitosis. It contains surfactants and active ingredients (most commonly fluoride) to help prevent tooth decay (dental caries) and gum disease (gingivitis). Large amounts of swallowed toothpaste can be toxic. The aimed of current research to formulate herbal toothpaste utilizing plant extract like Neem leaves, Guava leaves. The plant extract ingredient posses the anti-bacterial and antiseptic properties. The herbal toothpaste formulated which can satisfy all the required condition to keep the mouth fresh and prevent tooth decay by bacteria. The formulated herbal toothpaste compared with marketed preparation. The formulated herbal toothpaste compared with marketed preparation. Physical examination: Colour-greenish green, smooth in nature, ph-8.2, spreadability- Good and stable formulation. The outcome of this research herbal toothpaste shows equal patronizing and engrossing passion over the marketed preparation it was consider after the comparing the marketed preparation(Colgate, Dabur Red, Dantkanti) with formulated herbal toothpaste. It has been good scope in future dental research and dental health of public.*

Keywords: Toothpaste, Neem leaves, Guava leaves, dental caries, hygiene

I. INTRODUCTION

Toothpastes have been used since the ancient past and are one of main irreplaceable components of oral health care. The design 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 cleaning. Modern toothpaste formulations were developed in the 19th century. Later on, chalk and soap were Incorporated to those formulations. After 1945, several formulation advancements of different detergents had begun, sodium lauryl sulfate had been used as emulsifying agent (2,3). In recent years, 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 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 (e.g. Gingivitis). The majority of the cleaning is performed by the mechanical utilization of the toothbrush with the help of excipients used in toothpaste. The Main aim of this investigation is to evaluate the Herbal toothpaste formulations and comparing with three Popular commercial toothpastes.

Dental caries is an infectious microbial disease that Results in localized dissolution and destruction of the calcified tissues of the teeth. The untreated Condition may lead to pain, tooth loss, infection and Finally death in severe cases. Today, caries remains One of the most common diseases throughout the World.

Streptococcus mutans is known as the Causative bacteria in the formation of dental plaque and dental caries. The acid producing S. mutans causes damage by dissolving tooth structures in the presence of fermentable carbohydrates such as

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Sucrose, fructose, and glucose. The food debris, Acid, bacteria, and saliva combine in the mouth to a sticky substance called "plaque" that adheres to the teeth.

Dental disease is painful, and most importantly, it has also been suggestively metrical passages of the Atharvaveda (2nd Millennium BC). Recent natural remedies with the Use of medicinal plants, which are good reservoirs Of chemotherapeutants are being becoming as an Alternative for antibiotic adverse effects such as Hypersensitivity reaction, supra infections, and Teeth staining. Despite several anticaries agents Being available commercially, the search for an Effective natural agent still continues. Natural products have shown to be a good alternative to Synthetic chemical substances for caries prevention.

II. FORMULATION OF TOOTHPASTE

All herbal ingredients were dried and grounded using domestic mixer. The required quantity of Ingredients were weighed and taken in mortar. Calcium carbonate, Sodium lauryl sulfate, turmeric 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 well until a paste consistency is formed. Table 1 shows plant extracts and composition of chemicals.

FORMULATION

Sr. no	Excipients	Quantity in (gm)
1	Neem Extract	3
2	Clove	2
3	Peppermint	2
4	Guava	3
5	Betel	3
6	Turmeric	2
7	Calcium Carbonate	20
8	Glycerine	5
9	Sodium Lauryl Sulphate	1
10	Acacia	0.5
11	Sodium Chloride	0.5
12	Para Hydroxide Benzoic Acid	1
13	Sodium Saccharin	0.5
14	Distilled Water	60-80ml Q.S.

Procedure:

3gm of the Neem extract, 2gm of Clove extract, 2gm of Peppermint extract, 3gm of Guava extract, 3gm of Betel extract, 2gm of turmeric extract were triturated with 1gm of Para hydroxyl benzoic acid and 0.5 gm of sodium chloride (as a preservative) in a Mortar-pestle.

1gm of the sodium lauryl sulphate are using as foaming agent and sodium saccharin are added as a sweetener agent. Further 5 ml of Glycerine was added as humectant and acacia gum are used as a binder, triturated well and to adding 80 ml of demineralized water was added to make up the to100gm.

pH is adjusted with a solution of sodium hydroxide. Clove oil is added to mask the bitter taste.

AIM AND OBJECTIVES:

Aim:

To Perform Formulation, Evaluation and Comparison of Labmade Toothpaste with Marketed Brand of Toothpaste

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Objectives:

- Realizing the importance and common use of toothpaste it is worth to prepare and evaluate herbal toothpaste.Keeping the above observation in view, consequently decided to:
- Prepare herbal toothpaste formulation as per the methodology.
- Evaluate for Pharmaceutical and Physico-Chemical parameters as perguideline.
- Result analysis and compilation of thesis report.

III. MATERIAL AND METHODS

Material:

Sr. no.	Ingredients	Uses
1	Neem Extract	Antimicrobial
2	Clove	Dental analgesic
3	Peppermint	Flavouring agent
4	Guava	Anti bacterial
5	Betel	Mouth freshener
6	Turmeric	Anti inflammatory
7	Calcium Carbonate	Abrasive
8	Glycerine	Humectants
9	Sodium Lauryl Sulphate	Detergent and foaming agent
10	Acacia	Cleaning action
11	Sodium Chloride	Abrasive
12	Sodium Saccharin	Sweetening agent

Instruments:

- Weighing Balance
- pH Meter
- Mortar and pestle
- pipette
- Measuring Cylinder
- Glass Slides
- Drying Oven

Methods

Trituration method:

The solid ingredients calcium carbonate, sodium chloride, sodium lauryl sulphate, saccharine and para hydroxy benzoic acid were weighed accurately as mentioned in the formula.

The binder is premixed with solid abrasive and triturate, which is then mixed with the liquidphase containing humectants, oils, then add preservative and sweetener into a mixer.

After formation of homogeneous paste, the flavour and the detergent added last under slow speed agitation to minimize foaming, mixed, milled deaerated and tubed.

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Fig no: 01

IV. EVALUATION OF HERBAL TOOTHPASTES

physical examination:

Colour-

Toothpaste was evaluated for its Colour. The visually colour checked.

Odour-

Odour was found by smelling the product.

Taste-

Taste was checked manually by tasting the formulation.

Evaluation Parameters:

Sharp And Edges Abrasive Particles–

Extrude the content 15-20 cm 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.

Determination of spreadability -

In this method slip and drag characteristic of paste involve. Formulated paste (2g) placed on the ground slide under study. The formulated paste placed like sandwich between this slide and another glass slides for 5min to 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 80g with 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 spreadability.

Formula was used to calculate spreadability:

$$S=M\times L/T$$

Where,

S= Spreadability

M= Weight in the pan (tied to the upper slide)

L= Length moved by the glass slideT=Time (sec) taken to separate the upper slide from the ground slide

pH determination

pH of formulated herbal toothpaste was deter-mined by using pH meter. 10g of toothpaste placed in 150ml of beaker. Add 10ml of freshly boiled and cooled water (at 27-degreecelsius) to make 50% aqueous suspension. stirred well to make a thorough suspension. After that the pH was determined by using pH meter.

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Foaming -

The foamability of formulated toothpaste evaluated by taking small amount of formulation with water in measuring cylinder initial volume was noted and then shaken for 10 times.

Final volume of foam was noted Determination of froth power Foaming power = V1–V2

V1- Volume in ml of foam with water. V2- Volume initial

Moisture Content:

Weigh 5 g of sample put down in a porcelain dish containing 6-8 cm in diameter and 2-4 cm depth in it.

Dry the sample in an oven at 105°C.

Calculation

% by mass = M2/M1 * 100

M2 -loss of mass (in grams) on drying

M1- Mass (in grams) of the material taken for the test

V. RESULTS AND DISCUSSION

The herbal tooth paste formulation was prepared from Neem leaves, Guava leaves, cinnamon bark, natural ingredient and small amount of synthetic ingredient. At the trial phase of formulation three batches were performed due to the problem like homogeneity, spreadability and foamability the two-batch discarded permanently and only single batch was selected for next steps. The formulated herbal toothpaste greenish brown in colour and showed the good homogeneity with absence of lumps and good anti-microbial activity.

Physical Examination of Lab made Preparation:

Sr. no.	Parameters	Observation
1	Colour	Greyish Green
2	Odour	Characteristic
3	Taste	Sweet
4	Texture	Smooth

Evaluation Results of Lab made preparation:

Sr. no.	Parameters	Observation
1	pH	8.2
2	Foamability	55ml
3	Moisture content	14%
4	Spreadability	4.6
5	Sharp And Edges Abrasive Particles	Absent

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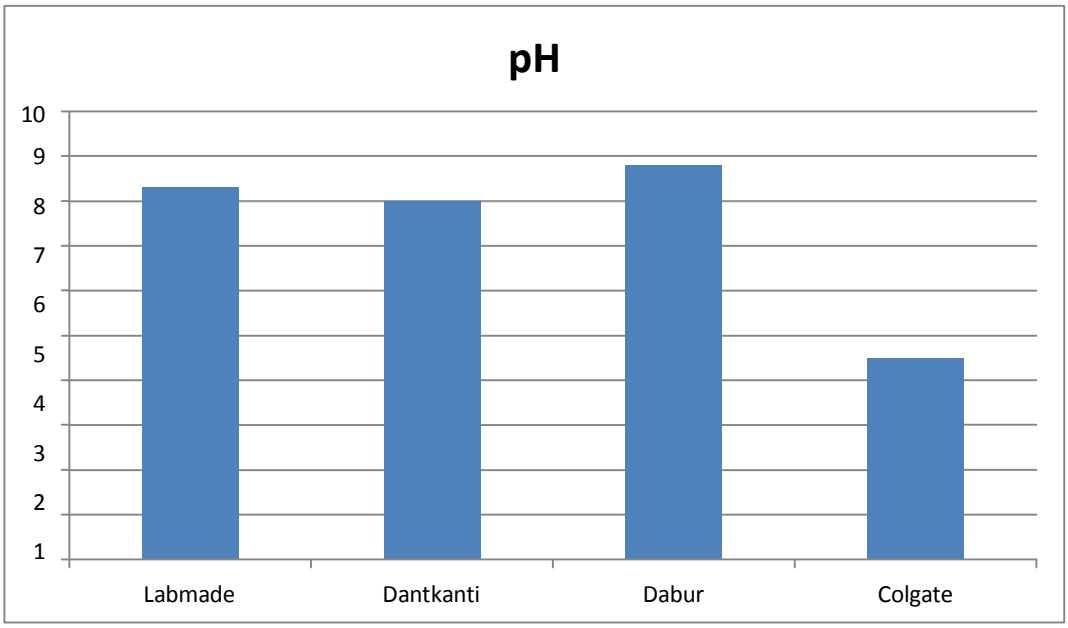
Comparative Study: Formulated herbal preparation withmarketed preparation: Physical Examination comparative Study:

Physical Examination	Labmade	Dantkanti	Dabur	Colgate
Appearance	Semisolid	Semisolid	Semisolid	Semisolid
Colour	Greyish Green	Brownish	Reddish Brown	White
Odour	Characteristic	Characteristic	Characteristic	Characteristic
Taste	Sweet	Aromatic	Aromatic	Minty
Texture	Smooth	Smooth	Smooth	Smooth

Evaluation Parameter Comparative study:

Evaluation Parameter	Labmade	Dantkanti	Dabur	Colgate
pH	8.2	8	8.8	4.5
Foamability	55	40	50	55
Moisture Content	14%	18%	10%	6%
Spreadability	4.6	4	5.1	5
Sharp And Edges Abrasion Particles	Absent	Absent	Absent	Absent

pH of Labmade and marketed formulation:



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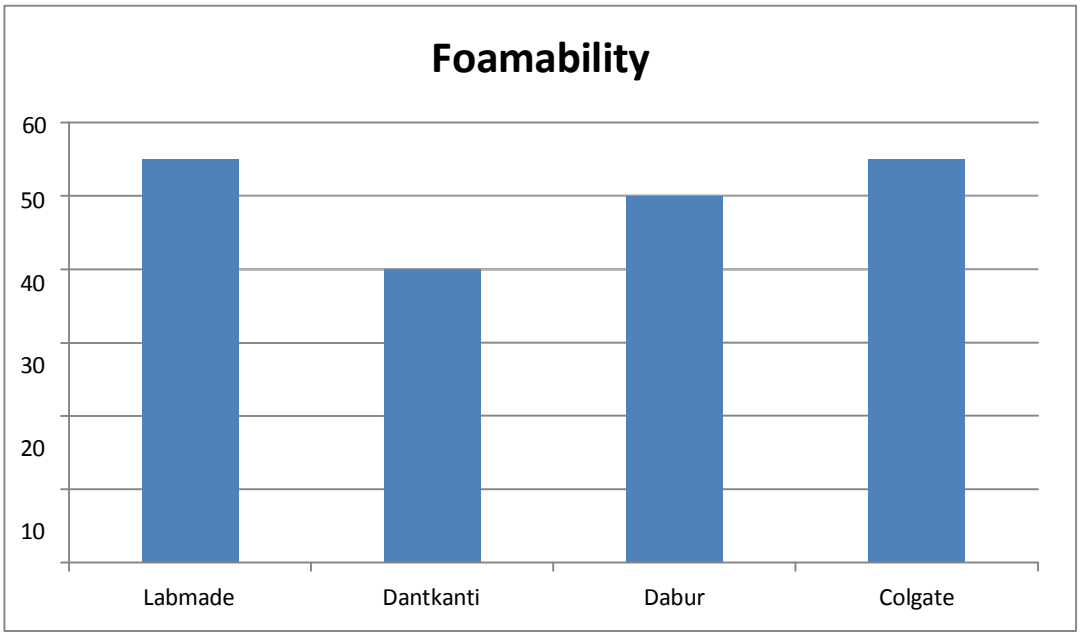
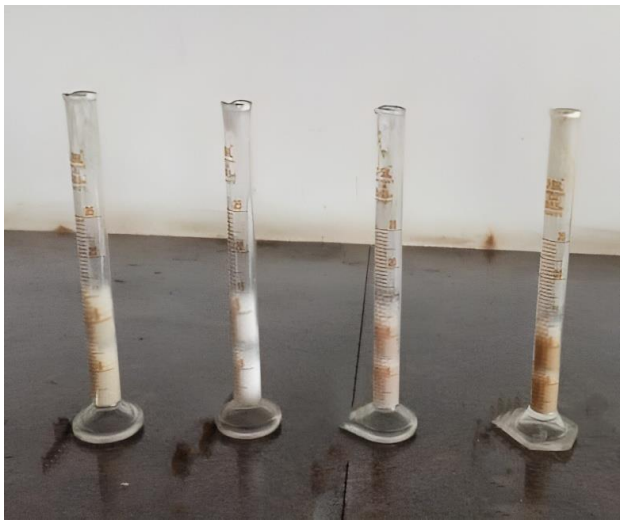
Foamability of Labmade and marketed formulation:





Name Of Formulation	Foamability
Labmade	55
Dantkanti	40
Dabur	50
Colgate	55

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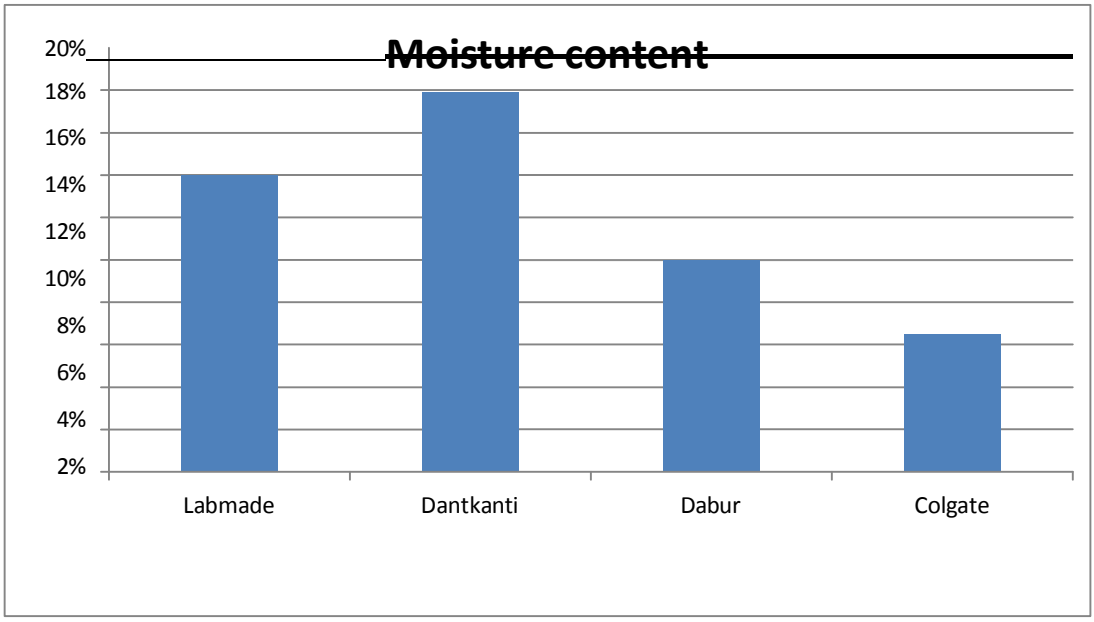
Moisture Content of Labmade and Marketed formulation:



%of moisture content = (Initial weight of sample – final weight of sample) *100
(Initial weight of sample)

Labmade:
% of moisture content= (5 - 4.3) / (5) *100 0.7/5=0.14
0.14*100 = 14%

DantKanti:
% of moisture content =(5 – 4.1)/ (5) *100 0.9/5 = 0.18
0.18*100 = 18%

Dabur:
% of moisture content = (5 -4.5)/ (5) *100 0.5/5 = 0.1
0.1*100 = 10%

Colgate:
%of moisture content = (5 – 4.7)/ (5) *100
0.3/5 = 0.06 0.06*100 = 6%

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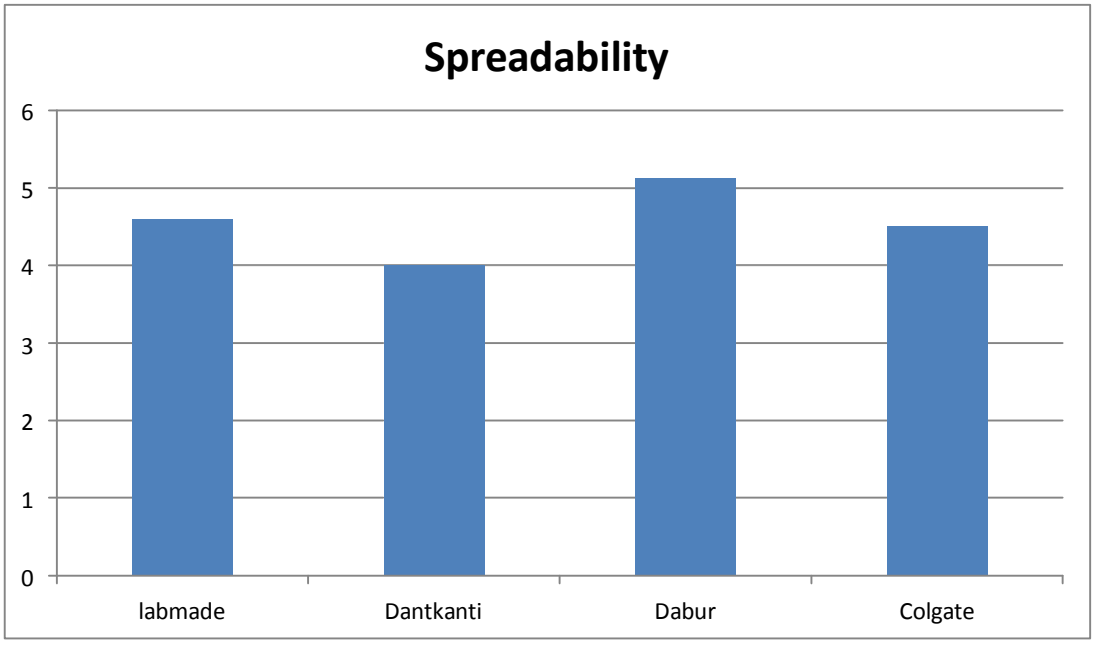
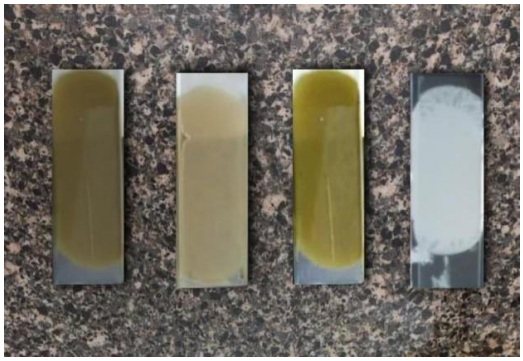
Spreadability of labmade with marketed formulation:





Spreadability:

M*L/T

Where,

M=Weight of pan (tied to the upper slide) L= Length moved by glass slide

T-= Time in(sec) taken to discrete the upper slide from ground slide

Labmade:

S= 8*6.4/11

51.2/11=4.6

Dantkanti:

S= 8*6/12

48/12= 4

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Dabur:
S= 8*6.4/10
51.2/10 = 5.1

Colgate:
S= 8*5.1/9
40.8/9= 4.5

Name Of Formulation	Spreadability
Labmade	4.6
Dantkanti	4
Dabur	5.1
Colgate	4.5

Sharp edges and Abrasive Particles of labmade with marketed formulation:

Name Of Formulation	Sharp edges and abrasive Particles
Labmade	Absent
Dantkanti	Absent
Dabur	Absent
Colgate	Absent

VI. CONCLUSION

Usually Herbal toothpastes having a highlight role in the maintaining the oral hygienic nature as well as preventing dental caries. Based on this design, Lab made Herbal toothpaste was formulated by pick up suitable ingredients to get the formulation more stable. Evaluation and comparison of results with commercial Herbal toothpaste are demonstrated that Lab made toothpaste is having Equal patronizing and engrossing passion over the marketed formulations (Dantkranti, Himalaya, Babool and Colgate). All marketed Herbal tooth pastes and Lab made Herbal toothpaste which has beenevaluated, compared with standard and specified by Bureau ofIndian standards. This preliminary invitro study demonstratedthat LabmadeHerbal toothpaste was equally efficacious as three commercially popular toothpastes in terms of all evaluation properties of toothpaste. Hence, by the evidence of in vitro studies, it is concluded that Lab made Herbal toothpaste formulated in a laboratory was found to be of good quality.

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