IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, July 2022
Impact Factor 6.252

To Formulate and Evaluate Herbal Toothpaste By using Various Herbal Drug

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Abstract: *In current scenario in oral dental care with use of herbal toothpaste containing natural ingredients are more acceptable in public belief than chemical based synthetic formulations due to their safety and efficacy in reducing dental caries, and preventing other dental issues to which this generation is prone to. In this formulation we utilizes aloe vera gel, clove oil, neem powder, turmeric powder and trikatu which are not yet used by 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 was done in order to get an idea of important physical parameters i.e. pH, stability, excrudability, Spreadability, foamability, homogeneity to make a successful more efficacious and stable formulation. The aim of this study is to compare and evaluate the herbal toothpaste with marketed toothpaste. This study disseminate that our herbal based toothpaste formulation having natural ingredients is as good as in terms of results compare to marketed herbal formulations.*

Keywords: Toothpaste, Trikatu, Excudability, Foamility, Clove oil

I. INTRODUCTION

1.1 Herbal Toothpaste

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 illness1-3.

1.2 Ayurvedic Concept of Teeth

Dentistry was not a specialized branch of Ayurveda, it is included in its Shalakya Tantra (system of surgery). In Ayurveda, dental health (danta swasthya in Sanskrit) is held to be very individualistic, varying with each person's constitution (prakriti), and climatic changes resulting from solar, lunar and planetary influences (kala-parinama). The body constitution is classified based on the predominance of one or more of the three doshas, vata, pitta and kapha. The dominance dosha in both the individual and nature determines health care in Ayurveda, including dental health.

1.1 Benefits of Applying Herbal Toothpaste

1. It helps in avoiding any tooth disease.
2. It cleans the teeth.
3. It re freshens the breath.
4. It prevents the gum diseases.
5. Herbal Toothpaste is made up of natural ayurvedic ingredients, natural oils, minerals, and herbal extracted

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compounds.

6. Regular use of Herbal Toothpaste it helpful for the tooth problems.
7. There are no side effects of the herbal toothpaste.
8. Natural toothpaste make the teeth look whitening and healthy

II. MATERIALS & METHODS

2.1 Fenugreek Powder (Trigonella Foenum-graecum)

Fenugreek has benefits for lowering blood sugar levels, boosting testosterone, Fenugreek may also reduce cholesterol levels, lower inflammation, and help with appetite control, Reduce inflammation, and Pain relief

2.2 Clove oil (Syzygium Aromaticum)

Oil of clove, also known as clove oil, is an essential oil extracted from the clove plant, Syzygium aromaticum. Clove oil is commonly used in aromatherapy and for flavoring food and some medicines. Particularly in South Korea and India, eugenol , a phytochemical extracted from clove oil, is used to relieve Toothache Applied to a cavity in a decayed tooth or tooth socket remaining after extraction, eugenol or clove oil may relieve toothache temporarily. In the United States, the FDA considers eugenol ineffective for treating dental pain, and has downgraded clove oil as an analgesic due to insufficient evidence to rate its effectiveness.

2.3 Neem Powder (Azadirachta indica)

Neem is awesome for teeth. This bittertasting herb is considered very important. Since it is antibacterial and antiinflammatory in nature, it can actually help in cleaning your teeth better and reduce plaque buildup in the long-term.

2.4 Aloe Vera gel (Aloe barbadensis miller)

Aloe Vera is a succulent plant known for being a rich source of antioxidants and vitamins. It heals burns and thin cuts, improves digestive function, and reduces arthritis pain with its anti-inflammatory and soothing properties. The aloe gel from the plant is a featured ingredient in cosmetics, food supplements, and even oral care products.

2.5 Trikatu Powder

It is a blend of equal parts of Pippali or long pepper (Piper Longum L), black pepper (Piper nigrum L) and dry ginger or saunthi (rhizomes of Zingiber officinalis). All the three herbs work together to stimulate Agni or digestive fire. Trikatu chiefly works by stimulating ‘Agni’, i.e. the digestive fire, improves the assimilation of nutrients in the body and reduces Kapha. It is also famed as a rejuvenator and tonic which helps pacify the aggravated Kapha in the respiratory and digestive tract and also regulates the path for the Vata, thus reducing bloating and abdominal distension.

2.6 Turmeric Powder (Curcuma Aromatica)

High in vitamin C and powerful antioxidants. Turmeric Powder with bitter taste contains almost double the amount of anti-oxidants that improves digestion. It can also be used as Natural moisturizer; Helps with pimples or acne. Turmeric extracts have been used to help hair loss. Good For Teeth Turmeric is one of the most essential ingredients in various tooth powders and toothpastes. ... Also, if you grind the Turmeric to make it a powder and then blend it with milk, then it will help you stay away from any diseases. In total, turmeric is great to keep your teeth clean and healthy.

2.7 Calcium Carbonate (CaCO3)

Calcium carbonate is a dietary supplement used when the amount of calcium taken in the diet is not enough. Calcium is needed by the body for healthy bones, muscles, nervous system, and heart. Calcium carbonate also is used as an antacid to relieve heartburn, acid indigestion, and upset stomach.

2.8 Sodium Fluoride (NaF)

Sodium fluoride is another type of fluoride you might see in oral health products, such as some toothpastes. It can help fight cavities while strengthening your enamel. However, it can't fight gingivitis, prevent tooth decay, and freshen your breath.

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2.9 Sorbitol (C6H14O6)

Sorbitol is an example of a humectant, an ingredient that prevents loss of water in the toothpaste. A humectant traps water in the toothpaste so that when you squeeze the tube, you get a nice, smooth substance. Along with sorbitol, other examples of humectants include glycol and glycerol.

2.10 Sodium lauryl Sulphate (CH3(CH2)10CH2(OCH2CH2)nOSO3Na)

Sodium lauryl sulfate is one of the most widely used synthetic detergents in toothpaste. Generally, surface active agents lower the surface tension, penetrate and loosen surface deposits and emulsify or suspend the debris which the dentifrice removes from the tooth.

2.11 Sodium CMC (C8H15NaO8)

Sodium Carboxymethyl Cellulose (CMC) is an anionic polymer with a clarified solution dissolved in cold or hot water. It functions as a thickening rheology modifier, moisture retention agent, texture/body building agent, suspension agent, and binding agent in personal products and toothpaste.

2.12. Methyl paraben (C8H8O3)

They preserve products to increase their shelf life, which proponents say is essential for consumer health and safety. Methylparaben, with its water solubility, is, therefore, the ideal paraben to use in things like mouthwash or toothpaste.

2.13. Sodium benzoate (C7H5NaO2)

Sodium benzoate is commonly used as a preservative in cosmetics and personal care items, such as hair products, baby wipes, toothpaste, and mouthwash. It also has industrial uses.

2.14 Sodium saccharine (C7H5NO3S)

Sodium saccharin is extremely sweet, so small amounts make toothpaste palatable and better tasting. Still, sodium saccharin is not linked to any benefits for oral health, so it's only function in toothpaste is to improve flavor.

2.15. Peppermint oil (C62H108O7)

Mixing peppermint oil with toothpaste while brushing can help clean the teeth and gums better which improve your oral health. While using peppermint oil can help hide bad breath, relieve the pain of minor toothaches and can help with gum inflammation, it does not make other problems go away forever.

III. METHOD OF PREPARATION

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

1. Dry gum method
2. Wet gum method

3.1 Dry Gum Method

(a) Preparation of base

- The solid ingredients calcium carbonate, sodium fluoride, SLS, sodium CMC, methyl paraben, sodium benzoate, sodium saccharine was weighed accurately.
- Sieved with sieve no.80.
- Mixing in mortar and pestle.
- Triturated with accurately weighed sorbitol until semisolid mass formed.

(b) Addition of Herbal Ingredients:

- Accurate weigh herbal extract in form of powders.
- Sieved with sieve no.80.
- Added to the base along with Aloe Vera gel and clove oil.
- Peppermint oil was added as a flavoring at the end.

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Table 1: Active Ingredients.

Sr. No	Ingredients	Quantity	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.	Turmeric Powder	1.6 gm	Antifungal, Anti-inflammatory

Table 2: Composition of Herbal Toothpaste

Sr. No	**Ingredients**	**Quantity**	**Uses**
1	Calcium Carbonate	41 gm	Abrasive
2	Sodium Fluoride	0.9 gm	Anti caries agent
3	Sorbitol	44 gm	Humectant
4	Sodium lauryl Sulphate	1.5 gm	Detergent and foaming agent
5	Sodium CMC	1.8 gm	Binding agent
6	Methyl paraben	0.2 gm	Preservative
7	Sodium benzoate	0.2 gm	Preservative
8	Sodium saccharine	0.1 gm	Sweetening agent
9	Peppermint oil	qs	Flavouring agent

IV. EVALUATION OF HERBAL TOOTHPASTE

4.1 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.

4.2 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.

4.3 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 270ºC) 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.

4.4 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.

4.5 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.

4.6 Foamability

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

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4.7 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 105ºC.

4.8 Determination of Spreadability

For determination of Spreadability 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.

4.9 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.

V. RESULT & DISCUSSION

In the present scenario, people need a cure for various teeth problems without side effects. Herbal ingredients opened the way to formulate cosmetics without any harmful effects. Herbal Toothpaste is considered as a good way of tooth cleaning. We found good properties for the herbal Toothpaste as a cosmetic product. Herbal Toothpaste is used to clean the teeth and kill the bacteria's. The advantage of herbal cosmetics is their nontoxic nature, reduction of allergic reactions, and time tested usefulness of many ingredients. This formulated Herbal Toothpaste was good quality and passed in all evaluation parameters.

5.1 Physical Examination (Color, Odour, Taste, Smoothness, Relative Density)

Formulated herbal toothpaste was evaluated visually for its colour i.e. Yellowish. Odour was found by smelling the product i.e. Aromatic and Characteristic. Taste was checked manually by testing the formulation.

Table 3: Visual inspection

Test	Result
a)Color	Yellowish
b)Odor	Aromatic and characteristic
c)Taste	Sweet
d)Smoothness	Good consistency & smooth texture

5.2 Inertness of Tube

The internal parts 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 have shown good tube inertness.

Table 4: Inertness of tube

Sr. No.	Parameter	Observation
1.	Inertness of tube	No sign of corrosion or damage

5.3 PH

The pH of formulated herbal toothpaste was found to be 7.35 and its ranges from 7-10.

Table 5: pH

Sr. No.	Parameter	Observation
1.	PH	7.30

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5.4. Homogeneity

In the homogeneity test of herbal Toothpaste it was observed that Toothpaste is homogeneous.

Table 6: Homogeneity

Sr. No.	Parameter	Observation
1.	Homogeneity	Toothpaste is homogeneous.

5.5 Determination of sharp and edge abrasive particles

No sharp or edge abrasive particles were found.

Table 7: Particle evaluation

Sr. No.	Parameter	Observation
1.	Particle evaluation	No sharp or edge abrasive particles were found.

5.6 Foamability

Foam Increase in 1.5cm to compared with initial volume.

Table 8: Foam Test

Sr. No.	Parameter	Observation
1.	Foam test	1.5cm

5.7 Determination of loss of drying

The weight of 10gm of herbal toothpaste weight was decrease in 2gm

Table 9: Loss of drying

Sr. No.	Parameter	Observation
1.	Loss of drying	2gm

5.8. Determination of Spreadability

1 gm of herbal toothpaste spread in 3 cm.

Table 10- Spreadability

Sr. No.	Parameter	Observation
1.	Spreadability	3cm

5.9 Anti-Microbial Activity

Formulated herbal toothpaste has good antimicrobial activity. Zone of inhibition (ZOI) was found to be 15mm.

Table 11- Anti-Microbial Activity

Sr. No.	Bacteria	Observation
1.	Escherichia coli	15mm

VI. CONCLUSION

Following conclusion can be drawn from the results obtained in the present work of investigation. This herbal toothpaste is maintaining the oral hygiene and safer with minimum side effect than chemical based synthetic toothpaste. 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.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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ACKNOWLEDGEMENT

Author take it as a privilege to sincerely express my gratitude to Dr. Subhash Kumbhar, Principle, Samarth Institute of Pharmacy, Belhe for providing project amenities and permission to carry out this work. This author is also thankful to respected Mr. Bhalekar Sachin M for his valuable guidance, support and encouragement.

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