



FORMULATION AND EVALUATION HERBAL TOOTHPASTE

*Rutik Appasaheb Chavan*¹ *Gavhale Jagdish Purushottam*² *Varsha Kisan Dubile*³ *Shivaneer Tupkar*⁴

¹Student of Yashodeep Institute of Pharmacy, Chhatrapati Sambhajnagar, Maharashtra, India.

²Student of Yashodeep Institute of Pharmacy, Chhatrapati Sambhajnagar, Maharashtra, India.

³Student of Yashodeep Institute of Pharmacy, Chhatrapati Sambhajnagar, Maharashtra, India.

⁴Head of department of Yashodeep Institute of Pharmacy, Chhatrapati Sambhajnagar, Maharashtra, India.

Email Id: rutikchavan90@gmail.com

Mobile No: 7517904507

ABSTRACT

These days, there is a huge demand for products with herbal ingredients, such toothpaste. Compared to synthetically produced toothpaste, consumers felt that toothpaste made with herbs was safer, more effective, and contained less harmful chemicals. Due to their safety and effectiveness in preventing dental cavities and other dental problems, herbal toothpaste formulations with natural ingredients are currently more widely accepted in the public perception than synthetic formulations based on chemicals.

The Plant-based toothpastes have drawn a lot of attention for their ability to reduce gingival inflammation. Studies on the efficacy of various toothpastes produce conflicting results.

The efficiency of poly herbal tooth paste formulations in reducing plaque and gingival irritation was evaluated in the current investigation. The majority of its components are employed in conventional medicine, with the Flower being the most crucial component. These active substances possess antimicrobial and anti-inflammatory activities.

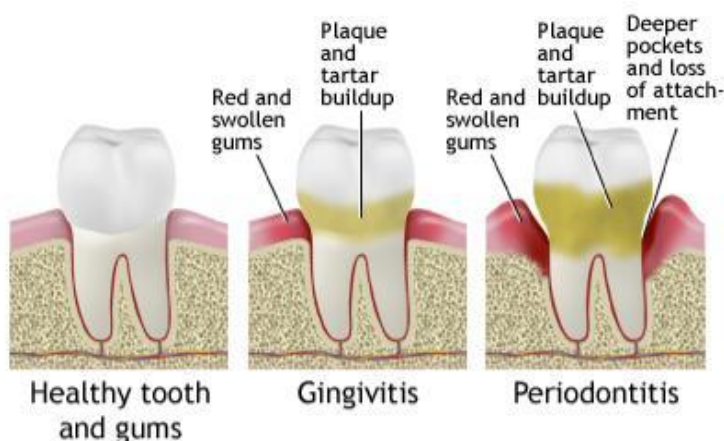
Keywords: - Formulation, Evaluation, herbal Toothpaste, antimicrobial, anti-inflammatory activities

INTRODUCTION :

“Toothpaste is semi-solid dental preparation used in conjunction with a toothbrush as an accessory to clean and maintain the health of tooth”

The state of our teeth, gums, and overall oral-facial system—which enables us to chew, speak, and smile is referred to as our oral health. Oral cancer, gum disease, and cavities are some of the most prevalent conditions that affect our oral health. Dental caries (tooth decay), periodontal disease (gum disease), tooth loss, and malignancies of the lips and oral cavity are the most common oral diseases. More than 3.5 billion people suffer from oral diseases, without any notable improvement of the situation between 1990 and 2017. With 2.3 billion affected, untreated dental caries in permanent teeth is the most common ailment worldwide. Severe periodontal disease, a major cause of total tooth loss, is estimated to affect 267 million people, particularly older people (WHO, 2020). For overall health and wellbeing, oral health is crucial.

1 Fig. Gingival Inflammation



Ayurvedic medicine, which was developed in ancient India, is still widely used today. The usage of various ayurvedic formulation for various disease and for Maintaining oral hygiene and health is prominent from ancient time and it's still Continuing in a modern way. The constituents of various plants are highly helpful for the Dental maintenance. This is commonly used in toothpaste that contains herbs.

With the use of a toothbrush, toothpaste a substance in the gel or paste formulation is used to clean teeth and maintain good oral hygiene. With the assistance of toothpaste excipients, the toothbrush is utilized mechanically to clean most of the surface. Since ancient times, toothbrushes have been a vital and indispensable part of oral health care. Modern toothpaste compositions were developed in the nineteenth century. Later on, those compositions were enhanced with the addition of soap and chalk. After 1945. Numerous developments in detergent composition had started, including the use of sodium lauryl sulfate as an emulsifying ingredient. In recent years, the focus has shifted towards the release of active ingredients during formulation developments to prevent or treat oral illness. Toothpaste is a dentifrice used to clean, maintain and improve the health of teeth. Toothpaste serves as an abrasive to assist remove food particles and dental plaque from teeth, although it is mostly used to maintain oral hygiene. the removing or veiling of halitosis, and release's active ingredients such as fluoride to aid in preventing tooth and gum disease like Gingivitis.



2.Fig.Gingival Inflammation

Plants have been known to have medicinal effects on dental health for thousands of years, all around the world. The advantages of traditional treatment outweigh the disadvantages, such as allergic responses. Neem is among the tropical trees whose developmental and medicinal roles have been examined the most. The component of neem extract was examined twenty years ago. Plants have been known to have medicinal effects on dental health for thousands of years, all around the world. The component of neem extract was examined twenty years ago.

Anti-inflammatory and anti-microbial properties, Akalkara is frequently used as a herbal alternative in dentistry; more recently, it has been used as an active ingredient in toothpaste formulations.

The goal of the current initiative is to use various plant parts to create herbal toothpaste formulations.

Advantages :-

- Herbal toothpastes have the ability to naturally eradicate oral bacteria without the use of hazardous chemicals.
- They are free of artificial flavoring and dyes.
- Natural toothpastes use natural ingredients like Dalchini and other herbs to freshen breath.
- Remove plaque, resist decay.
- Assist in restoring the enamel's strength after acid erosion. Clean and polish teeth.
- bacteria and germs, gingival irritation, cavities, plaque, and dental degeneration.
- Containing extracts of Neem, Clove and honey, this herbal toothpaste comes with a mouth spray also.
- These aid in the removal of microorganisms and maintain oral health.
- The natural and herbal toothpastes are safe, choosing a conventional brand of toothpastes means that there are added benefits and agents helping to reduce or prevent your risk of dental disease.

Disadvantages :-

- Reactions to some toothpaste constituents include canker sores, ulcers, rash, and swelling and redness around the mouth or tongue.
- This is often due to toothpaste flavoring, such as spearmint, or cinnamon, or such irritants as citric acid and other chemicals.
- The ingredients in toothpaste have the potential to irritate skin, leading to a dryness that may activate the face's oil glands.
- As a result, applying toothpaste that contains SLS to your gums could irritate them. Moreover, this may exacerbate the discomfort experienced by those who have mouth ulcers. For this reason, it could be wise to avoid SLS in toothpaste
- Pain and aching of bones.
- Discoloration of the teeth—white, brown, or black—occurs solely when a child's teeth are developing..

Ideal properties of toothpaste:

- Good abrasive effect
- Non irritant and non toxic
- Impart no stain in tooth
- Keep the mouth fresh and clean
- Prolonged effect
- Cheap and easily available

PLANT PROFILE

1. Anacyclus pyrethrum (Akalkara)

Botanical name:- Anacyclus pyrethrum

Synonym-Akalakari, Akarakara,Akalkara

Kingdome:- Plantae

Family :- Asteraceae

Chemical Constituents:- Alkaloids, Coumadin's, Flavonoids, Tannins, Free fatty acids, Sterols, Unsaturated amides, Pellitorin, Anacyclin, Phenylethylamine.

Uses:- It's believed to have antimicrobial properties, which could help combat oral bacteria and promote oral hygiene. Additionally, it may have astringent properties, which could help tighten gums.



3.Fig.Akalkara flower

2. Neem

Botanical name:- Neem

Synonym-Azadirachta indica

Kingdome:- Plantae

Family :- Meliaceae

Chemical Constituents:- Alkaloids: Nimbin, nimbidin, nimbinin, nimbidinin.

Flavonoids: Quercetin, kaempferol, rutin.

Uses: Neem helps to support healthy gums with its antibacterial properties. Additionally, it guards against the development of plaque, tooth decay, and gum infections. It is one of the most natural ways to maintain healthy gums and whiter teemat



4.Fig.Neem leaves

3. Dalchini

Botanical name:- *Cinnamomum verum*

Synonym- *Zingiber cardamomum*

Kingdome:- Plantae

Family :- Lauraceae

Chemical Constituents:- cinnamaldehyde, eugenol, and coumarin.

Uses: It's strong antibacterial and antiinflammatory properties are what make it perfect for your teeth in the correct doses



5.Fig.Dalchini

4. Ginger

Biological Name:- *Zingiber officinale*

Family :- Zingiberaceae

Synonym- *Zingiberis rhizoma*

Kingdome:- Plantae

Chemical Constituents:- gingerol, shogaol, and zingerone.

Uses:- It contains compounds like gingerol and zingerone, which have antimicrobial properties that can help fight oral bacteria, reducing plaque and gingivitis. Additionally, ginger has anti-inflammatory properties that may help soothe gum inflammation and promote overall oral health.



6.Fig.Ginger

5. Mentha (Pudina)

Biological Name:- *Mentha*

Family :- Lamiaceae

Synonym- *Mentha sylvestris*

Kingdome:- Plantae

Chemical Constituents:- menthol, menthone, and pulegone.

Uses:- Mint, is a popular ingredient in herbal toothpaste for several reasons. Firstly, it provides a fresh, cooling sensation and a pleasant flavor, helping to combat bad breath



7.Fig.Mentha

6. Cardamom

Biological Source:- *Mentha piperita*,

Family :- Zingiberaceae

Synonym- *Amomum cardamomum*

Kingdome:- Plantae

acetate, 1,8-cineole, and α -terpineol.

Chemical Constituents:- α -terpinyl

Uses:- Used in herbal toothpaste for its potential oral health benefits. It contains compounds like cineole, terpinyl acetate, and limonene, which have antimicrobial properties that can help fight oral bacteria, reducing the risk of cavities and gum disease. Additionally, cardamom has a fresh, pleasant taste that can help freshen breath. Its anti-inflammatory properties may also help soothe gum inflammation and promote overall oral health



8.Fig.Cardamom

7. Clove

Biological Source:- *Syzygium aromaticum*

Family :- Myrtaceae

Kingdome:- Plantae Chemical Constituents:- eugenol, eugenyl acetate, and beta-caryophyllene, among others.

Uses: Clove has unique antibacterial properties that helps in Fighting germs and preventing cavities. It is primarily used to prevent cavities due to its antibacterial and analgesic characteristics, which also assist prevent tooth decay. Dabur Herbal Clove has natural astringent like Blackberry bark that strengthens teeth and gums.



9.Fig.Clove

MATERIAL AND METHOD

1. IDENTIFICATION TEST

Sr.no	Chemical constituent	Test	Interference	Result
1.	Alkaloid	Mayer's Test	Apperance of Yellow Cream ppt	Positive
		Wagner's Test	Redish Brown Precipitate	Positive
		Hager's Test	yellowish white ppt	Positive
		Dragandroff s's Test	Red Precipitate	Positive
2.	Glycoside	Legal Test	Pink To Red colour form	Positive
		Baljet Test	Yellow Orange Colour	Positive
		Keller-killiani Test	Redish Brown Colour	Positive
3.	Tannin Ferric	Chloride Test	Black or Blue Colour Form	Positive
4.	Flavonoids	Shinoda test	Red To Pink Colour	Positive



10.FIG.IDENTIFICATION TEST

Materials:-

The combination of percentage by weight of all the ingredients of this is 100%, which means the sum of quantity of toothpaste will formulate 20gm of toothpaste formulation.

Formulation

Active Ingredients

Sr . No	Ingredients	Quantity
1	Anacyclus pyrethrum	2.5 gm
2	Clove oil	0.5 ml
3	Neem leaves	1.5g
4	Ginger	0.8g
5	Dalchini	1.5g
6	Chhoti Elaichi	1.0 g

Base Ingredients

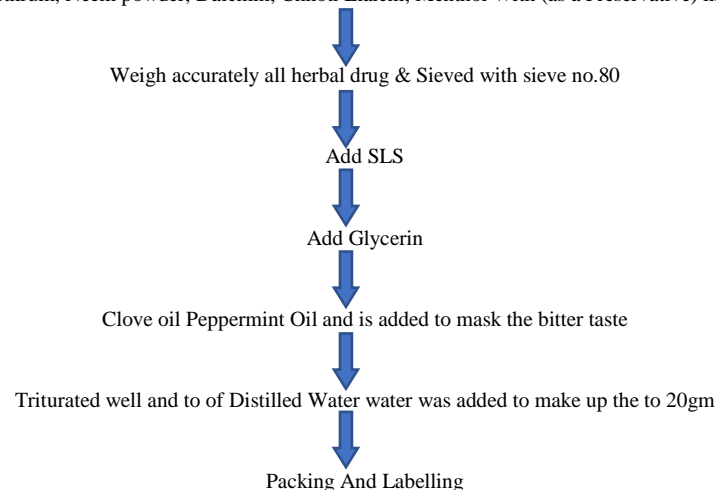
Sr . No	Ingredients	Uses	Quantity
1	Glycerine	Humectant	0.5 ml
2	Peppermint oil	Flavoring agent	1.5 ml
4	Honey	sweetening agent & Antibacterial	2 gm
5	Calcium Carbonate	Abrasive	5 gm
6	Sodium Lauryl Sulphate (SLS)	Foaming Agent	1.0 gm
7	Distilled Water		Q.s.

Method**Dry Gum Method**

1. **Accurate Weighing of Solid Ingredients:** Anacyclus pyrethrum Calcium carbonate, Neem powder, Clove oil, Dalchini, Chhoti Elaichi, and Ginger powder were precisely weighed according to the specified formula. Each ingredient underwent a sieving process with a No. 80 sieve to maintain uniform particle size.
2. **Homogeneous Mixing in Mortar and Pestle:**
The accurately weighed solid ingredients were meticulously mixed in a mortar and pestle. The blend was triturated with precisely weighed sorbitol until a semisolid mass with optimal consistency was achieved.
3. **Incorporation of Herbal Extracts:**
Herbal extracts, precisely weighed in powder form, underwent sieving to ensure uniformity. These herbal powders were seamlessly integrated into the prepared base, complemented by the addition of Neem Powder and clove oil.
4. **Final Touch with Peppermint Oil:**
The formulation received its aromatic finishing touch with the addition of peppermint oil, strategically incorporated at the final stage. Peppermint oil, renowned for its flavoring attributes, imparted a refreshing and pleasant taste to the herbal toothpaste.

PROCEDURE

Anacyclus pyrethrum, Neem powder, Dalchini, Chhoti Elaichi, Menthol With (as a Preservative) in a mortar-pestle.

**Evaluation Taste****1. Physical Examination taste, smoothness Colour odour.**

Formulated toothpaste was evaluated for its colour, visually colour was checked. Odour was found by smelling the product. By manually tasting the formulation, taste was verified. The smoothness was measured by rubbing the paste formulation between the fingertips.



11.Fig.Formulation

2. 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 27°C) to make 50 percent aqueous suspension. For a complete suspension, thoroughly stir. Using a PH meter, find the suspension's PH within five minutes.



12.Fig. pH Meter

3. Foamability

Using 2 grams of toothpaste and 5 milliliters of water in a measuring cylinder, the initial volume was documented and the cylinder was shaken ten times to determine the herbal toothpaste's foaming strength, or foamability. Final volume of foam was noted.



13.Fig. Foamability

4. Determination of Spread ability

The spread ability approach involves determining the paste's drag and sliding characteristics. Weighing the approximately 1-2g of herbal toothpaste, two glass slides (10 x 10 cm) were placed one over the other (sliding is not allowed), and the slides were pulled in opposite direction. After three minutes, measure the toothpaste's spreading (in centimeters).. Performing the experiment again and recording the mean of the three readings.



14.Fig. Spread ability

5. Antimicrobial activity

Two gram-positive bacteria (*Staphylococcus aureus* and *Bacillus cereus*) and two gram-negative bacteria (*Escherichia coli* and *Pseudomonas aeruginosa*) were included in panels of common pathogenic pathogens utilized in the investigation



15. Fig. Antimicrobial activity

Results And Discussion

The herbal tooth paste formulation was prepared from Neem leaves, Akalkara, natural ingredient and small amount of synthetic ingredient. The formulated herbal toothpaste greenish brown in colour and showed the good homogeneity with absence and good anti-microbial activity.

1 Table

Organoleptic Properties

Sr.No.	Parameters	Observations
1	Colour	Green
2	Appearance	Semisolid
3	Odour	Characteristic
4	Taste	Characteristic
5	Texture	Smooth

2 Table

Sr.No.	Parameters	Observations
1	PH	9.82
2	Foamability	Good
3	Spreadability	3.5cm/sec (Good)
4	Stability	Stable

Evaluation Result :- Formulation 1

CONCLUSION

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.

Formulated toothpaste is capable to maintain the tooth and oral hygiene and shows Antimicrobial activity against microbes. Herbal toothpaste has a bright future ahead of it thanks to its increased use of natural ingredients in the production of more and safer natural medicines, as well as in dental research and oral health.

REFERENCES :

1. Mangilal T and Ravikumar M. Preparation and Evaluation of Herbal Toothpaste and Compared with Commercial Herbal Toothpastes: An In-vitro Study. International Journal of Ayurvedic And Herbal Medicine.
2. Dange VN, Magdum C.S, Mohite SK and Nitlikar M. Review on Oral Care Product: formulation of toothpaste from various and Extracts of tender twigs of neem, J of Pharm Res.

3. WHO "Health topics: Oral health" Geneva, Switzerland; 2015
4. Nikhal S, Mahajan SD. Evaluation of the antibacterial and Antioxidant activity of *Mangifera indica* (leaves). *J Pharm Sci Res* 2010
5. Strassler, H. E (2013). Toothpaste ingredients make a Difference. *Benco Dental*
6. Abhay S, Dinnanath B. M, Hullatti K. K (2014). Formulation and spectral analysis of new poly herbal Toothpaste. *J Drug Delivery & Therapeutics*
7. Dange VN, Magdum C.S, Mohite SK and Nitlikar M. Review on Oral Care Product: formulation
8. Of toothpaste from various and Extracts of tender twigs of neem, *J of Pharm Res.*
9. Strassler, H. E (2013). Toothpaste ingredients make a Difference. *BencoDental*
10. Al-Kholani AI. Comparison between the efficacy of herbal and conventional dentifrices
11. On established gingivitis. *Dent Res J.* 2011
12. Kumar MKP, Priya NK, Madhushankari GS. Anticariogenic efficacy of herbal and
13. conventional toothpastes a comparative in-vitro study. *J Int Oral Health*
14. 2013
15. Lippert F. An introduction to toothpaste—its purpose, history and ingredients. *Monogr*
16. *Oral Sci* 2013
17. Orisakwe OE, Okolo KO, Igweze ZN, et al. Potential hazards of toxic metals found in
18. Toothpastes commonly used in Nigeria. *Rocz Panstw Zakl Hig* 2016
19. White DJ. Recent advances in clinical research on toothpastes and mouthwashes: Clinical efficacy of commercial products for gingivitis, tatar control and Antimicrobial activity. *J. Clin. Dent.* 1997
20. Abhishek KN, Supreetha S, Sam G, Khan SN, Chaithanya KH, Abdul N. Effect of Neem Containing Toothpaste on Plaque and Gingivitis—A Randomized Double Blind Clinical Trial. *J Contemp Dent Pract.* 2015
21. Herbal Toothpaste Market 2017 Key Growth Drivers, Challenges, Demand and Upcoming Trends by Forecast to 2023 – ABNewswire – Press Release Distribution Service – Paid Press Release Distribution Newswire [Internet]. Available from: