HERBAL TOOTHPASTE: AN OVERVIEW

G. Sridhar[1*], S.A. Vadivel[1], R. Elayakathiravan[2], B. Parthiban[2], M. Sivasakthi[2], M. Thrisha[2]

[1]Research scholar, Smt. Gandhimathi College of Pharmacy, Tiruvannamalai.*
[1]Department of Pharmaceutics, Smt. Gandhimathi College of Pharmacy, Tiruvannamalai.
[2]Student, Smt. Gandhimathi College of Pharmacy, Tiruvannamalai, Tamil Nadu.

[*]Corresponding author:
G. Sridhar
[*]Research scholar, Smt. Gandhimathi College of Pharmacy, Tiruvannamalai.
Mail ID: sripharma1995@gmail.com., cell no. 8012079773.

ABSTRACT

Herbal products are universally popular for oral and general health care. People who prepare to use herbal products generally considered this product to be relatively safer than products containing synthetic ingredients. in current, context oral care by using herbal tooth paste with natural ingredients were discussed. It is more acceptable promotion then using synthetic based chemicals products due to safety reasons. And their effectiveness in reducing toothache, tooth decay and preventing other dental problems that. This generation is sensitive to. Based on increased use of herbal cosmetics. we have tried to make extensive use of herbal tooth paste to help maintain good. Oral hygiene and prevent periodontal disease. This review provides backgrounds information on the anti-bacterial potential of various herbs in used in tooth paste formulation.

KEY WORDS: *Herbal tooth paste, anti-bacterial activity, dental caries*

INTRODUCTION

Herbal and herbal based toothpaste are widely used products since in the ancient times. It plays amajor role in the maintenance of oral health. The raise of the toothpaste begun in the year of 500 BC at China and India. On that period, many of people uses crushed bones, powdered eggs and clam shells were used as abrasives, which are used for cleaning the teeth. (1)

Multiple abrasives, fragrance agents, green lead were majorly utilized to remove strains from teethuntil the middle of the 19th centurial. Arabs strongly believe in rock salt and fine sand were used to clean their teeth. in the year of 1950, Dr. Washington Wentworth Sheffield, a dentist, developedthe toothpaste. (2)

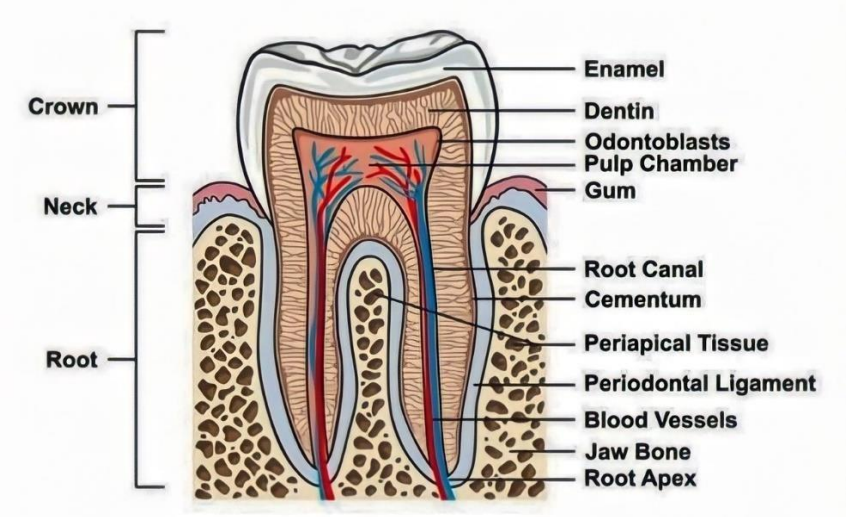
In modern-day, the addition of active ingredient during development and treatment of oral diseaseshas gained more important. Dentifrices, powder and paste are utilized to clean and improves the oral hygiene. In addition, the abrasive help in the removal and veiling of halitosis. The toothpastereleases the active ingredients like fluoride, which helps in the prevention of various teeth and gumdiseases and primarily used to promote oral hygiene. Toothpaste is a semi-solid dosage form applied by using the toothbrush to enhance oral care with the help of excipient. (3)

Each herb contains their own active chemical ingredient such as alkaloids, glycosides, gum and polyphenols. That possess a variety of biological functions. Thus, the production of new herbal toothpaste has increases. (4)

According to WHO, herbal plants are widely used by 80% of the people population as the primaryhealthcare treatment. Many synthetic formulations contain the chemical agents. That causes toothstain, altered taste and hypersensitivity reactions. So that, in search of alternative for the synthetictoothpaste, the herbal preparation plays a major role as they don't contains any artificial chemicalagents such as sweeteners, odor and preservatives. (5,6)

Under six years old children used the fluoride containing toothpaste, which leads to the risk of dental caries and fluorosis condition. To produce effective herbal supplements with lesser side effects, the above factors are taken into consider. (7)

ANATOMY OF HUMAN TEETH



Human mouth consists of totally 32 teeth, that are fixed embedded in the alveolar edge of theupper jaw called as maxilla and the lower jaw called as mandible.

Human teeth are classified into for types,

- Incisors
- Canines
- Pre-molar
- Molar

The tooth is divided into three major parts,

- Crown
- Neck
- Root

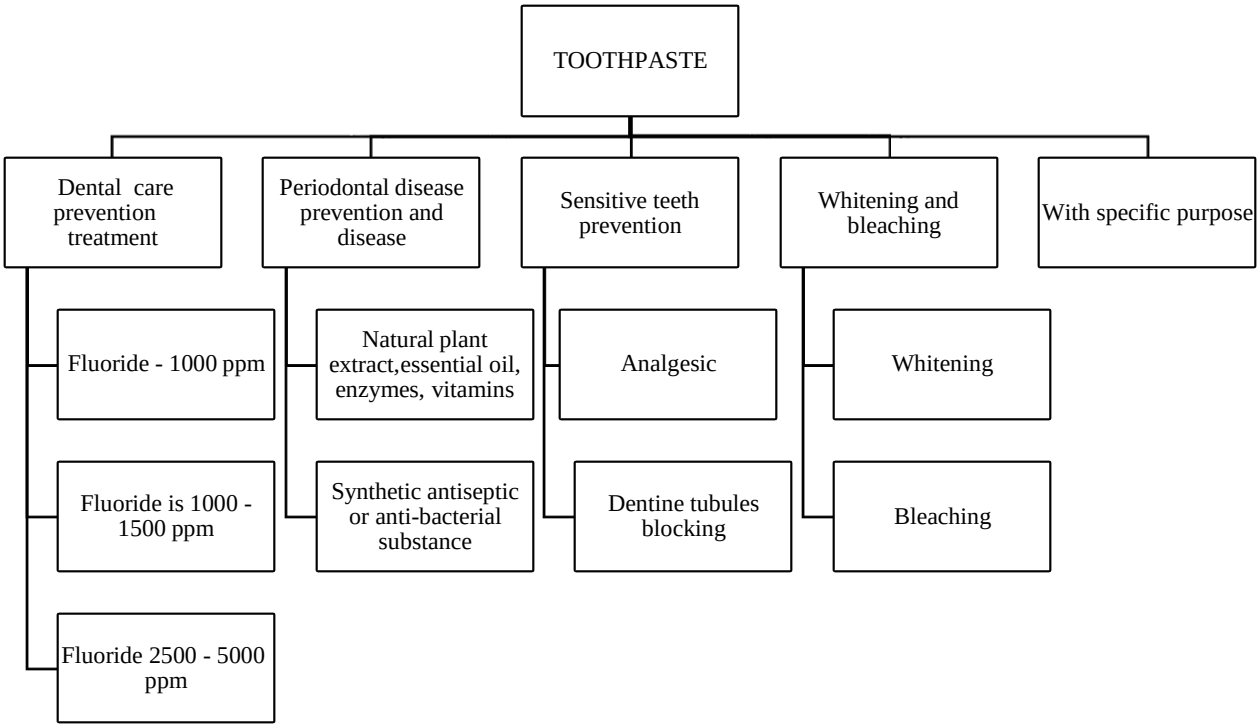
The tooth is made up of three components,

- Dentine
- Enamel
- Cementum [8,9]

IDEAL PROPERTIES

- Non-toxic
- Non-irritant
- Good abrasive action
- Inexpensive
- Pleasant flavor
- Readily available
- Less side effects
- No stain on teeth
- Long lasing freshness [11]

CLASSIFICATION OF TOOTHPASTE (12)



PHARMACEUTICAL EXCIPIENTS USED IN TOOTHPASTE (13-15)

Listing of Pharmaceutical excipients used in formulation of toothpaste are,

- Abrasive agent
- Humecting agent
- Binding agent
- Preservatives
- Foaming agents
- Flavoring agent
- Coloring agent
- Sweeteners

❖ A**brasive agent**

- Abrasive agents are the substance used to grinding, polishing and rubbing of the teeth.It cleans the teeth surface by adhering as well as without scratching the teeth.
- The range of abrasive agent is 9 – 13%. The example abrasive agent such as dicalcium phosphate, alumina, calcium carbonate. It is used as remover for the food debris, stainand also polish the tooth surface.

❖ **Humecting agent**

- Humectants are the substance used to prevent the water loss and helps to hardening the toothpaste in the collapsible tube, when exposure to air.
- The ranges from 37 to 45 % of humectants are added to the toothpaste. The examples are glycerol, xylitol, water, PEG 8 (polyethylene glycol esters). It is used to provide moisture content and also it prevents the plug-in nozzle tube.

❖ **Binding agent**

- Binders are the substance which is used to provide the visco-elasticity properties to the toothpaste. It prevents the preparation from dryness
- It is range from 0.8 % to 2.5 %. The examples are agar, carrageenan, gum tragacanth, isapgol mucilage. Binding agents are further used to maintain the consistency of the toothpaste.

❖ **Preservatives**

- Preservatives are the substance that prevents the growth of micro-organisms in the toothpaste. It also helps to improve the shelf life of the tooth paste
- It ranges from 0.05 -0.5 %. Examples are formaldehyde, benzoic acid, parabens, phenolics and citric acid. It is used to inhibit the growth of microorganism.

❖ **Foaming agents**

- Foaming agents are otherwise called as surfactants which are used to enhance the cleaning effects and lowers the surface tensions of tooth paste in oral cavity. Dissolve plaque by penetrating tooth.
- The foaming agent are range from 1 – 2 %. Various examples are sodium lauryl sulphate, sodium stearyl lactate, amine fluorides, dioctyl sodium sulfosuccinate. It is used to enables dispersion.

❖ **Flavoring agent**

- Flavor ants of the substance are used to mask the unpleasant taste or smell of other ingredients and it also provide refreshing taste.
- It ranges from 1 -6 %. The examples are clove oil, peppermint oil, eucalyptus, spearmint, aniseed, fennel. Flavors are used to enhance the fragrances of herbalpreparation.

❖ **Coloring agent**

- Coloring agents are substance which is used to often the coloring of the tooth paste. Itis providing homogenous color throughout the shelf life.
- Colorants are often added to the ranges from 1 – 2 %. The various examples are titanium chlorophyll dioxide. It is used to color the herbal preparation.

❖ **Sweeteners**

- Sweetening agents are the substance are used to enhance the taste of tooth paste by giving sweet taste and mask the bitter taste of other ingredients it promotes palatabilityof the product.
- It ranges from 18 to 24 %. The examples such as saccharine, aspartame, sorbitol and xylitol. It is used to mask the bitter taste of the herbal toothpaste.

HERBS USED IN FORMULATION OF HERBAL TOOTHPASTE (16-24)

S.no.	Herb	Biological source and family	Part of plant used	Chemical constituents	Uses
1.	Neem	*Azadirachta indica* **Family** *Meliaceae*	Tenderstem	Azadirachtin M & N, terpenoids, rutin, nimbin, alkaloids, steroids.	Anti-diabetic, anti-viral, anti-microbial, anti-bacterial and anti-pyretic.
2.	Guava	*Psidium guajava* **Family** *Myrtaceae*	Leaves	Isoflavonoids, gallic acid, catechin, epicatechin, rutin, naringenin.	Treat inflammation, ulcer, lung illness, diarrhoea and fever. Controls blood pressure
3.	Mango	*Mangifera indica* **Family** *Anacardiaceae*	Leaves	Mangiferin, alpha and beta carotin, catechin.	Reducing the plaque, cleaning teeth,
4.	Mussularia acuminata	It is also called as chewing sticks. **Family** *Rubiaceae*	Twig	Angraquinones, saponins, flavonoids and alkaloid.	Treating diarrhea, dysentery, muscular pain and venereal disease.
5.	Ginger	*Zingiber officinale var roscoe* **Family** *Zingiberaceae.*	Giant ginger extract	Gingerol, shogoals, paradol and zingerone.	Treats constipation, bloating and intestinal gas. As antioxidants.
6.	Acmella ciliate	It is commonly known as fringed pod, toothacheplant. **Family** *Asteraceae*	Leaves and flowers	Alkaloids, flavonoids and amino acids	Treats anemia, scurvy, toothache, cough and gum infection. As anaesthetic, antiseptic and antimicrobial agent.
7.	Celery	*Apium graveolens linn* **Family** *Apiaceae*	Leaves	Flavonoid, saponins, tannins, essential oil, apigenin and choline.	Maintain oral hygiene, dental health and treats bacterial and fungal infections.
8.	Clove	*Eugenia caryophyllus, Szygium aromaticum* **Family** *Myrtaceae*	Dried flower	Eugenol, eugenyl acetate, gallic acid, ellagic acid.	Dental analgesic, treat gingivitis, halitosis, plaque. As antiseptic.
9.	Turmeric	*Curcuma longa* **Family** *Zingiberaceae*	Dried rhizome	Curcumin, curcuminoids, demethxycurcumin.	Antiseptic, antibacterial, analgesic, antioxidant and carminative.

ANTI BACTERIAL STUDIES OF ABOVE-MENTIONED PLANTS

The antibacterial activity was done by the Cup plate method by using the test microorganism such as Streptococcus viridians and Streptococcus mutans in the agar nutrient media. There were totally nine formulations are prepared by using various concentration of neem tender extract. Among the nine formulations, batch 'C' which contains percolation method of tender stem extract of neem with containing 0.75 % was most effective antibacterial activity against test microorganism. Also, the formulation containing fine twig powder of neem was equally effective. (16) Gurav evaluated the antibacterial activity of ethanolic leaves extract of guavatoothpaste by Agar well diffusion method with the bacterial strain such as Escherichia coli and Staphylococcus aureus in the nutrient agar media. The outcome shown that the formulation passed all evaluation parameters such as physical examinations and antimicrobial studies. (17) The study evaluated the antibacterial activity of the Mango leaves extract against the Staphylococcus aureuson the Mueller Hinton agar was used. The leaves extract has greater zone of inhibition was measured against the bacterial strain at higher concentration. And it also has good physicochemical properties was evaluated. (18) The antibacterial activity of the ethanolic extract of *Mussularia acuminata* twig was evaluated by the Agar well diffusion method against Streptococcus mutans and Staphylococcus aureus. the *Mussularia acuminata* twig extract toothpaste has significant inhibition on the growth of Staphylococcus aureus than Streptococcus mutans. It is also must to be mentioned that the positive control i.e., Gentamicin has the potential inhibition activity on the both test microorganism. (19) There are three formulations are prepared by various concentration of extract, that was comparing the antibacterial activity by the Well diffusion method. From the three formulations, the formulation 1 & 3 shows greater inhibition zone against the gram-negativebacteria. It is must to be meant that formulation 1 has effective against both gram positive and negative bacteria. (21) Using Streptococcus mutans, the Well diffusion method was used to evaluatethe antibacterial studies of various concentration of celery leaves extract. As the concentration increases the zone of inhibition against the bacterial strain was significantly higher.[22] It is study ofcomparing the antibacterial effectiveness of infusion, decoction and essential oil of clove were evaluated by using the 10 different species of the gram-negative bacilli such that Escherichia coli,Proteus mirabilis, Serratia marcescens, Enterobacter aerogenes, Salmonella typhi, Vibrio choleraeand Klebsiella pneumoniae was isolated as 100 colonies. From the three-clove extract, the aqueous decoction and infusion extract of clove gives major inhibition against the P. aeruginosa, S. marcescens and other bacilli. The oil extract of clove has much higher inhibitory factor against alltaken tested bacilli. (23)

CONCLUSION

The teeth are the hardest part of the human body that is must to be maintain hygiene to prevent the various dental issues. On that way, toothpastes play the major part to maintain the oral hygiene. The natural ingredients add more therapeutic activity to the toothpaste that effectively enhance the oral hygiene when regular use of it. The above given herbs are some examples which is added to the toothpaste formulation to maintain dental health. Herbal toothpastes are the formulation which is safer, lesser side effect, readily available and more therapeutic activity than

compared to the synthetic preparation. Herbal based toothpastes are used to treat various dental issues such as gingivitis, dental caries and dental plaque. Therefore, the use of herbal toothpaste had the widest scope in the further studies by the researchers to maintain the dental health.

REFERENCE

1. Gautam, D., Palkar, P., Maule, K., Singh, S., Sawant, G., Kuvalekar, C., ... & Jagtap, V. A. (2020). Preparation, Evaluation and Comparison of Herbal toothpaste with marketed Herbal toothpaste. *Asian Journal of Pharmacy and technology*, *10*(3), 165-169.
2. Yigit, N., Aktas, E., & Ayyildiz, A. (2008). Antifungal activity of toothpastes against oral Candida isolates. *Journal de mycologie medicale*, *18*(3), 141-146.
3. Abhay, S., Dinnimath, B. M., & Hullatti, K. K. (2014). Formulation and spectral analysis of new polyherbal toothpaste. *Journal of Drug Delivery and Therapeutics*, *4*(6), 68-74.
4. Mamatha, D., & Kumar, G. N. (2017). Preparation, Evaluation and Comparison of Herbal Toothpaste with Markedly Available Tooth Pastes. *IOSR Journal of Pharmacy and Biological Sciences*, *12*(6), 1-6.
5. Sharma, S., Agarwal, S. S., Prakash, J., Pandey, M., & Singh, A. (2014). Formulation Development and Quality Evaluation of Polyherbal Toothpaste" Oral S". *International Journal of Pharmaceutical Research & Allied Sciences*, *3*(2).
6. Ozaki, F., Pannuti, C. M., Imbronito, A. V., Pessotti, W., Saraiva, L., Freitas, N. M. D., ...& Cabral, V. N. (2006). Efficacy of a herbal toothpaste on patients with established gingivitis: a randomized controlled trial. *Brazilian oral research*, *20*, 172-177.
7. Jenner, F., Jaleel, V. A., Kulshrestha, R., Maheswar, G., Rao, P. K., & Kranthi, J. (2013). Evaluating the antimicrobial activity of commercially available herbal toothpastes on microorganisms associated with diabetes mellitus. *J Contemp Dent Pract*, *14*(05), 924- 929.
8. Dr. Ramesh, K. Goyal, Dr. Anita A. Mehta, Dr. Gaurang B. Shah, Derasari and Gandhi's, Elements Of Human Anatomy and Physiology And Health Education, B.S. Shah Prakashan. Pg No. 158
9. Donald C. Rizzo, Fundamentals of Anatomy and Physiology, Second Edition, Thomson Indian Edition, Pg No. 371
10. Peyron, M. A., Santé-Lhoutellier, V., François, O., & Hennequin, M. (2018). Oral declinesand mastication deficiencies cause alteration of food bolus properties. *Food &function*, *9*(2), 1112-1122.
11. Shahidulla, N. B., & Sultana, N. (2022). HERBAL TOOTHPASTE: AN OVERVIEW.
12. Maldupa, I., Brinkmane, A., Rendeniece, I., & Mihailova, A. (2012). Evidence based toothpaste classification, according to certain characteristics of their chemical composition. *Stomatologija/issued by public institution" Odontologijos studija"...[et al.]*.
13. Chaudhari, S. P., & Patil, P. S. (2012). Pharmaceutical excipients: a review. *Int J Adv PharmBiol Chem*, *1*(1), 21-34.
14. Saluja, V., & Sekhon, B. S. (2016). The regulation of pharmaceutical excipients. *Journal of Excipients and Food Chemicals*, *4*(3).

15. Srivastava, S., Biswal, P. K., Alam, F., Anand, A., & Pal, A. (2023). A REVIEW ON TOOTHPASTE TO TREAT SENSITIVE TEETH.
16. Jadge, D. R., Patil, S. V., & Purohit, R. (2008). Formulation of toothpaste from various forms and extracts of tender twigs of neem. *J Pharm Res*, *1*(2), 148-152.
17. Gurav P., *et al*., (2022). Formulation and Evaluation of Herbal Toothpaste. *Journal of Emerging Technology and Innovative Research*, 9(8), 368-380.
18. Apeksha, S., & Charishma, K. (2021). DEVELOPMENT OF HERBAL TOOTHPASTE CONTAINING MANGO LEAVES EXTRACT. *studies*, *1*, 3.
19. Adeleye, O. A., Bamiro, O., Akpotu, M., Adebowale, M., Daodu, J., & Sodeinde, M. A. (2021). Physicochemical evaluation and antibacterial activity of Massularia acuminata herbal toothpaste. *Turkish Journal of Pharmaceutical Sciences*, *18*(4), 476.
20. Jumain, M. A. S., Sunarjo, L., Suwondo, A., Widyawati, M. N., & Fatmasari, D. Effect ofGiant Ginger Extract (Zingiber officinale. var. Roscoe) As Toothpaste Ingredients on Saliva pH..
21. Devi, N. N., Rasmi, R., Aparna, K., Gokul, K. V., Kavya, K., & Lanina, T. (2023). Formulation, Evaluation and Antibacterial Effect of Herbal Toothpaste using leaves and flowers Acmella ciliata. *Journal of Drug Delivery and Therapeutics*, *13*(5), 35-40.
22. Hayati, M., Mailiza, F., & Savitri, S. K. (2023). Antibacterial potential of celery leaf extract toothpaste on the growth of Streptococcus mutans ATCC 25175. *Padjadjaran Journal of Dentistry*, *35*(1), 1-4.
23. Saeed, S., & Tariq, P. (2008). In vitro antibacterial activity of clove against gram negative bacteria. *Pak. J. Bot*, *40*(5), 2157-2160.
24. Nurdiana, N., & Krishnasamy, S. (2016). Effect of two percent turmeric extract gel on minor recurrent aphthous stomatitis. *Padjadjaran Journal of Dentistry*, *28*(1).