



An Overview of Formulation and Evaluation of Herbal Toothpaste

Abhishek Kotkar^{1} and Santosh Kudnar^{2*}, Tandale³ (M. Pharm)*

^{1,2}Final Year B. Pharmacy, Shri Swami Samarth Institute of Pharmacy, Malwadi (Bota), 422602, (MH), India.

³Guide, Department of Pharmaceutical chemistry, Shri Swami Samarth Institute of Pharmacy, Malwadi (Bota), 422602, (MH), India.

E-mail address: abhishekkotkar2002@gmail.com, Tel: 9422658931

ABSTRACT:

The main objective of the research is the formulation and evaluation of herbal tooth paste. Its usually toothpaste used product used by all people. Toothpaste is usually used to clean tooth enamel and mouth It is also used to solve many email problems. Many dentists recommend applying toothpaste to treat diseases such as sensitivity, chronic gingivitis, etc. Herbs like neem leaves, black pepper, and babul are used in the preparation of herbal formulations of toothpastes. leaves, fire oil, turmeric. These herbal toothpastes are evaluated by various tests such as physical examination, pH determination, Homogeneity, sharp and abrasive particles, determination of humidity and volatile substances, Dispersibility, stability study, extrudability, etc. The aim of this study is to formulate herbal toothpaste that is good for oral hygiene and bleeding gums.

Keyword: Tooth paste, antimicrobial activity, GAVA

INTRODUCTION:

Toothpastes are the best preventative approach to oral health. Many where commercially stupid Toothpastes are said to have antimicrobial properties, but little research has been done to analyse this these arguments. It is quite understandable that more than 2000 years ago we participated use toothpaste to clean the enamel and toothpicks and brushes still need to be done like the older exercise. Today's toothpastes follow many of the same concepts that have been developed over the centuries then. The use of natural or Ayurveda medicines for the primary and oral condition of the normal condition is an integral part of Indian tradition. There are many Ayurveda toothpastes available in the market claims to have excellent antimicrobial properties.[1]

Herbal-based toothpaste has been used since ancient times in ancient life and is one of the most important parts of oral health care. The production and development of toothpaste production began in China and India, from 300-500 BC. At that time, crushed bones, crushed eggs, and mussel shells were used as abrasives as part of tooth cleaning. Modern toothbrushes were developed in the 19th century. After advances in medicine, chalk and soap were added to these forms. Soon after independence, several developments in the formulation of various solvents had begun, sodium lauryl sulphate was used as an emulsifying agent. At present, the focus has shifted to the release of active ingredients during the development of the formulation to prevent and / or treat oral disease.

Ayurvedic Concept of teeth: Dentistry was not a specific branch of Ayurveda within the Shalaky Tantra (surgical program). In Ayurveda, dental health (dantaswasthya in Sanskrit) is considered an individual choice. In the structure of the individual (prakriti) and in climatic changes caused by the influence of the sun, moon and planets (kala- Mating). The structure of the body is divided based on the composition of one or more of the Tridosha vata, pitta and Kapha Dosha predominance in the individual and the environment determine Ayurvedic health care, which includes Dental health

In developed countries, toothpastes are used almost universally, but in certain groups and cultures people still practice traditional tooth brushing without cleaning their teeth with, for example, mistake or salt. Toothpastes (toothpastes) have been used since ancient times, but recently preparations that provide activity compounds have been developed for the prevention and/or treatment of oral diseases. Someone's story toothpastes have been reviewed elsewhere

In herbal medicinal treatments, it has been found that part of the flora is used for healing and treatment of diseases. Herbal remedies have been widely used throughout human history and stages According to the World Health Organization (WHO), about 80% of people used natural the number one medicine in healthcare. In addition, more than 35,000 plant species have been proposed use in various human cultures around the arena for scientific purposes. Some of them are great antimicrobial, anti-diabetic, anti-viral, anti-cancer and anti-fungal. Every other word has oral hygiene exercise preserves the mouth and teeth to save dental problems, most often teeth cavities, gingivitis, periodontal (gum) disease and terrible breath. One of the functions of speech hygiene is protection against oral cavity infections. Oral infections are caused by plaque-forming microorganisms and yeast.

Neem has antibacterial and anti-inflammatory properties. Neem is also anti-caries Functions. Antimicrobial activity of neem has been reported against *S. mutants* and *S. faecalis*. dried neem chewing shows the most antibacterial interest against *S. mutants*. It is limited studies on the effectiveness of natural toothpastes that current looks at their effect on oral hygiene and gingival bleeding was assessed.[4]

Toothpaste protects, cleans and polishes tooth enamel. This makes oral hygiene more effective. It is clean taste and smell and freshens the breath. Brushing with toothpaste twice in the afternoon is crucial keeping the mouth healthy.

The main objective of the research is the formulation and evaluation of herbal toothpaste. It's usually toothpaste used product used by all people. Toothpaste is usually used to clean tooth enamel and mouth It is also used to solve many email problems. Many dentists recommend applying toothpaste to treat diseases such as sensitivity, chronic gingivitis, etc. [5]

Ideal Properties of Toothpaste

1. Strong abrasive action
2. Non-toxic and non-irritating
3. Leave no stains on the teeth.
4. Maintain a healthy and clean mouth
5. Long-lasting impact
6. Accessible and affordable
7. It should not be harmful to the oral tissue & fluid. It should not stain teeth.
8. It should not be scratching to the enamel surface of tooth. If it is ingested, it should not be harmful to the G.I.T.
9. It should have pleasant odour & taste. Shouldn't hurt the oral fluid and tissue.

Benefits of Applying Herbal Toothpastes

1. It helps to prevent any dental disease.
2. It cleans teeth.
3. It stimulates the air.
4. Prevents gum disease.
5. Herbal Toothpaste is made from natural ingredients of Ayurvedic, natural oils, minerals, and herbal extracts.
6. Regular use of Herbal Toothpaste helps with dental problems.
7. No side effects of herbal toothpaste.

INGREDIENT USED IN HERBAL TOOTHPASTE:

1 GAVA LEAVES:

Synonyms: Guava Bush and Strawberry Guava

Biological Source: The little medicinal tree Psidium Guajava L. is a South American native.

Family: Myrtaceae



Figure 1: GAVA

Chemical Constituent:

The primary phenolic chemicals found in guava leaves include is flavonoid, Gallic acid, catching, epicatechin, rutin, and antigenic.

Uses:

1. It treats inflammation.
2. It is used to treat ulcers, lung diseases, diarrhoea and fever.
3. Helps to lose weight. helps control blood sugar helps improve the texture of your skin

Helps to lose weight. Helps control blood sugar helps improve the texture of your skin

2 CLOVE:

Synonyms: Lavang, clove buds, clove flower, and caryophyllum

Biological Source: Eugenia caryophyllus dried flower buds

Family: Myrtaceae



Figure 2: CLOVE

Chemical constituents:

1. Volatile oil (Clove oil) : 15%-20% a- Eugenol 70%-90%, B-Vanillin, c- Caryophyllene, d-Acetyl Eugenol 4%
2. Tannin: 10-13% (Gallo tannic acid)
3. Resin
4. Chromone
5. Eugenin
6. Small quantities of esters, ketones, alcohols

Uses:

1. Because casks are known to have antibacterial properties, they are often found in mouthwash, toothpaste and other dental care products.
2. Eugenol is a compound in clove oil that is used to make vanillin for commercial use.
3. Carminative
4. Antiseptic

3 Honey

Synonym: Madhu

Biological Source: The hive bee *Apis mellifera* and other species of ApIS from the family Apidae deposit a sweet material or secretion called honey in the honey comb.

Chemical Composition: Honey contains minor amounts of sucrose, dextrin, formic acid, fructose (40–50%), Glucose (30–40%), and fructose (40–50%). contain colouring material vitamins, enzymes, proteins, etc.



Figure 3: Honey

Uses:

1. Honey is used as a sweetening and soothing ingredient.
2. It is used as an antiseptic.
3. It is used for wounds and burns.
4. Is used in cream, custard, soft drink and candy recipes.

4 Gum Acacia

Synonym: Acacia gum, gum Arabic, and acacia

Biological Source: Acacia Arabica, a member of the Leguminaseae family, produces dried sticky exudate that is used to make Indian gum.

Chemical Components: The main chemical component is arabin, which is a combination of Arabic acid's calcium, magnesium, and potassium salts. The sole four chemical components of acacia were first believed to be (-) arabinose; (+) galactose.



Figure 4: Gum Acacia

Uses:

1. Acacia plant glue is used as an emollient.
2. It is widely used as an important pharmaceutical thickener and emulsifying excipient.
3. As a tablet binder, it has a wide range of uses.

❖ **MATERIALS AND METHODS**

1. Fenugreek Powder (*TrigonellaFoenum-graecum*)
2. Clove oil (*SyzygiumAromaticum*)
3. Neem Powder (*Azadirachtaindica*)
4. Aloe Vera gel (*Aloe barbadensismiller*)
5. Taritatu Powder
6. Pomegranate peel(*Punicagranatum*)
7. Calcium Carbonate (CaCO_3)
8. Sodium Fluoride (NaF)
9. Sorbitol ($\text{C}_6\text{H}_{14}\text{O}_6$)
10. Sodium lauryl Sulphate ($\text{CH}_3(\text{CH}_2)_{10}\text{CH}_2(\text{OCH}_2\text{CH}_2)_n\text{OSO}_3\text{Na}$)
11. Sodium CMC ($\text{C}_8\text{H}_{15}\text{NaO}_8$)
12. Methyl paraben ($\text{C}_8\text{H}_8\text{O}_3$)
13. Sodium benzoate ($\text{C}_7\text{H}_5\text{NaO}_2$)
14. Sodium saccharine ($\text{C}_7\text{H}_5\text{NO}_3\text{S}$)
15. Peppermint oil ($\text{C}_6\text{H}_{10}\text{O}_7$)

1 Fenugreek Powder (*TrigonellaFoenum-graecum*):

Fenugreek lowers blood sugar, increases testosterone levels, and fenugreek can also lower cholesterol levels. Levels, lowers inflammation and helps control appetite, reduces inflammation and relieves pain

2 Clove oil (*SyzygiumAromaticum*) :

Clove oil, also known as cassava oil, is an essential oil extracted from the *syzygium aromaticum* plant. Fire oil often used in aromatherapy and to flavour foods and some medicines. Especially in South Korea and India Eugenol, a phytochemical extracted from clove oil, is used to relieve toothache. Applied to a decayed tooth Eugenol or clove oil can temporarily relieve toothache. States, The FDA considers Eugenol to be ineffective in treating toothache and has downgraded clove oil as a pain reliever because there is insufficient evidence to rate its effectiveness.

3 Neem Powder (*Azadirachtaindica*):

The nose is perfect for the teeth. This herb with a bitter taste is considered very important. Because it is antibacterial and anti-inflammatory, it can actually help clean your teeth better and reduce plaque build-up in the long turn

4. Aloe Vera gel (*Aloe barbadensismiller*):

Aloe Vera is a succulent plant known as a rich source of antioxidants and vitamins. Treats burns and thin cuts, improves digestion and reduces arthritis pain due to its anti-inflammatory and soothing properties. Aloe gel the plant is an ingredient in cosmetics, nutritional supplements, and even oral care products.

5. Trikatu Powder

It is a mixture of equal amounts of pipe or long pepper (*Piper Longum L*), black pepper (*Piper nigrum L*) and dried ginger or saunthi (rhizomes of *Zingiber officinalis*). All three herbs work together to stimulate Agni or digestion. Knitwear works mainly by stimulating "Agni" or digestive fire, improves the absorption of nutrients in the body and reduces Kapha. It is also renowned as a rejuvenator and tonic that helps calm aggravated Kapha in the respiratory system. And digestive tract and also regulates the Vata pathway, which reduces bloating and flatulence.

6. Pomegranatepeel (*Punicagranatum*):

Lots of vitamin C and powerful antioxidants. Pomegranate shell Sweet powder contains almost twice as much amount of antioxidants than pulp or juice, improves digestion. It can also be used as a natural moisturizer; help with pimples or acne. Pomegranate peel extracts have been used against hair loss. Good For Teeth Pomegranate is one the main ingredients of various tooth powders and toothpastes.

7. Calcium Carbonate (CaCO_3)

Calcium carbonate is a dietary supplement that is used when the amount of calcium in the diet is insufficient. Calcium is which the body needs for healthy bones, muscles, nervous system and heart. Calcium carbonate is also used as an antacid relieves acid, acid indigestion and stomach irritations Carbonate (CaCO_3)

8. **Sodium Fluoride (NaF):**

Sodium fluoride is another type of fluoride that you may see in oral care products, such as some toothpaste. It might help fight cavities while strengthening enamel. However, it cannot fight gingivitis, prevent tooth decay or refresh respiratory system

9. **Sorbitol (C₆H₁₄O₆):**

Sorbitol is an example of a humectant, an ingredient that prevents water loss in toothpaste. Hydration traps of water to the toothpaste so you get a nice smooth substance when you squeeze the tube. Besides sorbitol, others Examples of humectants are glycol and glycerol

10. **Sodium lauryl Sulphate (CH₃ (CH₂)₁₀CH₂ (OCH₂CH₂)_nOSO₃Na):**

Sodium lauryl sulphate is one of the most commonly used synthetic detergents in toothpastes. Usually surfactants lowers surface tension, penetrates and removes residues on the surface, and emulsifies or suspends the toothpaste remove from the tooth.

11. **Sodium CMC (C₈H₁₅NaO₈):**

Sodium carboxymethyl cellulose (CMC) is an anionic polymer whose clarified solution is dissolved in cold or hot water. It acts as a thickener, rheology modifier, humectant, structure/body builder, suspending agent, and a binder in personal products and toothpaste.

12. **Methyl paraben (C₈H₈O₃):**

They preserve products to extend their shelf life, which proponents say is vital to consumer health and safety. Methyl paraben in its water-soluble form is therefore an ideal paraben for use in, for example, mouthwash or toothpaste

13. **Sodium benzoate (C₇H₅NaO₂):**

Sodium benzoate is often used as a preservative in cosmetics and personal care products such as hair products, baby products. Towels, toothpaste and mouth wash. It also has industrial uses.

14. **Sodium saccharine (C₇H₅NO₃S):**

Sodium saccharin is very sweet, so small amounts make the toothpaste tasty and delicious. Still sodium Saccharin has no oral health benefits, so its only function is to improve the taste of toothpaste.

15. **. Peppermint oil (C₆₂H₁₀₈O₇):**

Mixing peppermint oil into your toothpaste while brushing helps clean your teeth and gums better, making your mouth feel better. health Using peppermint oil can help mask bad breath, relieve the

❖ **METHOD OF PREPARATION**

There are two types of methods for formulation of toothpastes:

1. Dry gum method
2. Wet gum method

Dry Gum Method-

a) Preparation of Base

Δ Solid ingredients calcium carbonate, sodium fluoride, SLS, sodium CMC, methyl paraben, sodium Benzoate, and sodium saccharin was accurately weighed.

Δ Sieve with No. 80 sieve.

Δ Mix with a mortar and pestle.

Δ Triturated with accurately weighed sorbitol until a semi-solid mass was formed.

(b) Addition of Herbal ingredient

Δ precisely weighed herbal extract in the form of powders.

Δ Sieve with No. 80 sieve.

Δ Add to the bottom with Aloe Vera gel and fine oil.

Δ Peppermint oil was added as a flavouring agent at the end.

PREPARATION OF TOOTH PASTE

The binder was mixed with a solid abrasive and other powders and then pour into the appropriate mixture with aqueous solution a mixture of preservatives, surfactants and sweeteners was done How homogeneous was the dough happened, flavour was A added

❖ FORMULATION OF TOOTHPASTE

Sr.no	Ingredient	Quantity
1	Tragacanth	1.2 gm
2	Tulsi leaf powder	1 gm
3	Bay leaf powder	0.5 gm
4	Mango leaf powder	1 gm
5	Guava leaf powder	1 gm
6	Calcium Carbonate	46.5 gm
7	Sodium Saccharin	0.05 gm
8	Methyl Paraben	0.15 gm
9	Sodium Lauryl Sulphate	1.3 gm
10	Sorbitol	30 gm
11	Water	Q.S
12	Peppermint Oil	1 ml

❖ EVALUATION

- ✓ **pH:** The net amount of the sample is 5 g accurately weighed and placed a 150 ml beak to this 45 ml fresh 27°C boiled and cooled water was added Move well to pass it pH was determined with the suspension 5 minutes with a pH meter.
- ✓ **Organoleptic Properties:** Formula was characterized based on organoleptic characteristics such as appearance, colour and texture after the test and extrudability
- ✓ **Volatile matter & moisture content:** Amount of sample required Dishing and drying must be done equally Weight loss shows % Loss of moisture and volatile matter.
- ✓ **Foaming power:** 5 grams. Was from the sample Taken in 100 ml. glass beak 10 here Incl. water was added. Next was the decanter Shake with a glass rod and let stand 30 minutes. The contents of the beak were Mixed and transferred to a 250 ml container. By measurement Cylinder the residue left in the beak finished with an additional dose of 5-6 ml. Water into the cylinder. Content the cylinder is adjusted to 50 ml. in an adequate manner Water the mixed contents of the cylinder Glass rod as soon as the temperature is the content reached 30 minutes. Cylinder was stopped mixing and 12 full shakes given to it. A top hat was allowed Stand for 5 min. and then foaming Power was calculated
- ✓ **Microbial Assay:** Antibacterial the activities had a different composition was determined using a modified agar well diffusion method. In this method, the food agar plates were inoculated with 0.2 ml on 24 Broth cultures of *S. aureus*. Aggressive the plates were allowed to solidify. Sterile 8 for example, a drill was used to cut wells equal distance in each plate. 0.5 ml preparations or plant extract were brought to the well. There were plates incubated at 37°C for 24 hours. The antibacterial activity was evaluated by measuring inhibition zones.
- ✓ **Spread ability test:** About 1 g of tooth the dough is weighed into the centre of the glass plate (10x10 cm) and another glass plate is carefully placed on it. In the middle a weight of 2 kg is placed on the plate. After 30 minutes, the diameter of the dough is measured in cm. The experiment is repeated three times and the average diameter is decided
- ✓ **Particle size:** 2 grams of the sample are separated in 25 ml. water and then passed through 150 °C and 50 mesh screens. Up to 0.5% Particles must pass a sieve no. 150 and no more than 2% of the practical must pass sieve No. 50 [6-7]

RESULT:

pH- 7

Colour- light green

Volatile matter- 3gm

Foaming power- 100%

Microbial assay- zone of inhibition (diameter in mm.): - toothpaste-13 mm., standard drug (ofloxacin)-24 mm., control-0 mm.

Spread ability - 8 mm.

Particle size - % of particles passing sieve no. 150- 0.41% of particles passing sieve no. 50- 1.6%

CONCLUSION:

The current design is good organoleptic, spreading, foaming, abrasive properties and in vitro antimicrobial properties. It also has the advantage of not having harmful substances chemicals and the presence of herbal powders a wide range of natural compounds good for teeth and oral cavity ordinary toothpastes. Because design has future prospects of such design and widespread use.

REFERENCE:

1. Priyal G. 1, Maji Jose 2, Shruti Nayak 3, Vidya Pai 4, Sudeendra Prabhu, Evaluation of efficacy of different tooth paste formulations in reducing the oral microbial load - An in vivo study, *Biomedicine*: 2021; 41(2) Supplementary issues: 465-4771
2. <http://dentistry.about.com/od/toothmouthconditions/tp/10-Common-Dental-Problems.htm>
3. <http://www.webmd.com/oral-health/guide/change-your-breath-from-bad-to-good>.
4. Singh K., Singh P. and Oberai G. Comparative studies between herbal toothpaste (dant kanti) and nonherbal toothpaste. *IJDR* (2016); 4(2):53-56.
5. Dr. Gaud RS, Dr. Gupta GD. *Practical Microbiology*. NiraliPrakashan, Pune. 2016; 10th Ed. pp.63-78
6. Bureau of Indian Standards Manak Bhavan, 9 Bahadur Shah Zafar Marg New Delhi. <https://archive.org/details/gov.in.is.6356.2001>.
7. Knowlton J and Rearse S. *Handbook of cosmetic science and technology*, 1st edition; Elsevier science publisher; oxford, UK, 1993.
8. Wilkinson JB and Moore RJ. *Harry's Cosmetology* 7th edition; Longman science and technical, London 1982:551.
9. George J, Hegde S, KS R, Kumar A. The efficacy of herbal-based toothpaste in the control of plaque and gingivitis: A clinico-biochemical study. *Indian J Dent Res*. 2009; 20(4): 480-482.
10. Siswomihardjon W, Badawi S Nishimura M. The difference of antibacterial effect of neem leaves and stick extracts. *Into Chin J Dent*. 2007; 7: 27-29.
11. Prashant GM, Chandu GN, Murulikrishna KS, Shafiulla MD. The effect of mango and neem extract on four organisms causing dental caries: Streptococcus mutant, streptococcus salivavivus, streptococcus mitis, and streptococcus sanguis: An in vitro study. *Indian J Dent Res*. 2007; 18(4): 148-151.
12. Shah S, Venkataraghavan K, Chaudhary P, Mohammad S, Trivedi K, and Shah S G. Evaluation of antimicrobial effect of Azadirachta indica plant extract (Soluneem™) on commonly found root canal pathogenic microorganisms (viz. Enterococcus faecalis) in primary teeth: A microbiological study. *J Indian SocPedoPrev Dent*. 2016; 34(3): 210-216.
13. [24]. Dr. Gaud RS, Dr. Gupta GD. *Practical Microbiology*. NiraliPrakashan, Pune. 2016; 10th Ed. pp.63-78.
14. [25]. Singh K, Singh P, Oberoi G. Comparative studies between herbal toothpaste (dantkanti) and non-herbal tooth paste. *Into J Dent Res*. 2016;4(2): 53-56.
15. [26] Kokate C K, Purohit A P, *Pharmacognosy*, 4th edn, NiraliPrakashan; 11: 81-94.
16. [27]. Shende V, Telrandhe R. Formulation and evaluation of Tooth Gel from Aloe vera leaves extract. *Int J Pharm Drug Analysis*. 2017;5(10): 394-398.
17. Telrandhe R, Mahapatra D K, Kamble M A. Bombax ceiba thorn extract mediated synthesis of silver nanoparticles: *Int J Pharm Drug Analysis*. 2017;5(9): 376-379.
18. T Mangilal, M Ravikumar. Preparation and Evaluation of Herbal Toothpaste and Compared with Commercial Herbal Toothpastes: An Invitro Study. *Int J Ayu Herb Med*. 2016; 3(6): 2266-2273.
19. Mithal BM and Saha RN. *A handbook of cosmetics*. VallabhPrakashan. 2000; 1st Ed. pp. 204-212.
20. 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*. 2008; 1(2): 148-152.
21. Sherikar AS and Patil RA. Standardization of polyherbal formulations: containing Cassia angustifolia. *International Journal of Pharmacy and Life Sciences*. 2010; 1: 213-216.
22. Clark-Perry D, Levin L (December 2020). "Comparison of new formulas of stannous fluoride toothpastes with other commercially available fluoridated toothpastes: A systematic review and meta-analysis of randomised controlled trials". *International Dental Journal*. 70 (6): 418-426.

-
23. Soeteman GD, Valkenburg C, Van der Weijden GA, Van Loveren C, Bakker E, Slot DE (February 2018). Whitening dentifrice and tooth surface discoloration-a systematic review and meta-analysis". *International Journal of Dental Hygiene*. 16 (1): 24–35.
 24. Dhingra K (April 2014). "Aloe vera herbal dentifrices for plaque and gingivitis control: a systematic review". *Oral Diseases*. 20 (3): 254–67.
 25. introduction to cosmetics) <https://en.wikipedia.org/wiki/Cosmetics>
 26. advantages of herbal formulation : <https://www.slideshare.net/SudheerKandibanda/herbal-cosmetics-59780830>
 27. [38] types of oral cosmetics: <https://www.slideshare.net/prashantpingale/dental-products-toothpaste-amp-Mouthwash>
 28. Introduction of clove: shan B, Cai YZ, Sun M, Corke H. Antioxidant capacity of 26 spice extracts and Characterization of their phenolic constituents. *J Agric Food Chem*. 2005; 53(20):7749–7759. [PubMed] [Google Scholar]