IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, October 2024

Review on Formulation and Evaluation of Herbal Toothpaste

Rohit P. Jagtap, Mohini D. Desale, Ashok A. Chopane, Dr Sanjay Ingale
Dharmaraj Shaikshik Pratishan College of Pharmacy, Walki, Ahmednagar, India

Abstract: *The majority of people use toothpaste regularly. Typically, toothpaste is used to clean the mouth and teeth. It is also used to treat a variety of dental conditions. A lot of dentists advise using toothpaste to cure conditions including sensitivity and chronic gingivitis, among others. Herbal extracts of numerous crude medications with antibacterial and antimicrobial properties can be used to make herbal toothpaste. Herbs like ginger, indica extracts, babul leaves extract, ginger extract, lemon oil extract, neem stem & bark, babul leaves, gauva leaves, kalmi bark, etc. are used in the preparation of herbal toothpaste formulations. [1] Preparing, assessing, and contrasting lab-made herbal toothpaste with commercial herbal toothpastes is the major goal of the current effort. Commercial herbal toothpastes including Himalaya, Meswak, and Dent County have all had their quality assessed in the current study. All of the examined commercially available herbal toothpastes and lab-made herbal toothpaste met the requirements outlined by the Bureau of Indian Standards. [2] The goal of the ongoing research is to create herbal toothpaste using chemicals like camphor, honey, and plant extracts including neem, tulshi leaves, and guava leaves. In formulating herbal toothpaste, characteristics like colour, spreadability, foamability, and particle identification of shard and edge abrasives were assessed. [3] Neem, Clove, Betel, Peppermint, Turmeric, and Guava are six plant samples included in this experiment that are typically used as traditional medicines. The created toothpastes were assessed in accordance with Bureau of Indian Standards requirements. The effectiveness of the tested toothpastes' antibacterial properties was found. [4] One of the most important needs for humans is oral hygiene. Oral hygiene is the first step in a human being's daily life. Therefore, toothpaste is crucial to this process. To counteract some drawbacks of synthetic cleaning agents, many natural herbs might be used*

Keywords: Herbal toothpaste, Ginger, Neem, Kalmi Bark, Guava Leaves

I. INTRODUCTION

Herbal and Herbal based toothpaste has been used since many years ago in ancient life[1] and is one of the main important components of oral health care[2]. 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 cleaning[3]. 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 agent In the modern era, the focus has shifted towards the release of active ingredients during formulation developments to prevent and/or treat oral illness[13].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 (eg. Gingivitis).

Benefits of Toothpaste

- Remove plaque.
- Resist decay.
- Help strengthen the enamel that has been attacked by acids.
- Clean and polish teeth.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, October 2024

- Remove teeth stains.
- Freshen breath.
- Whitens teeth.
- Fights gum problems.
- Reduces plaque.
- Strengthens enamel.
- Prevents cavities.
- Fights germs.
- Prevents tartar

Our unique formula fights bacteria, prevents cavities and gingivitis, provides tartar control and strong enamel, whitens teeth, keeps breath fresh, and provides long-lasting sensitivity relief with continued use.
If playback doesn't begin shortly, try restarting your device

II. DRUG PROFILE

Plant name:
1. Guava leaves:

Synonyms
yellow cattley guava.
Psidium
strawberry guava.
fruit tree.

Chemical constituents: Chlorogenic acid, Galic acid, Quercetin hyperin Caffeic acid Ethancl, Calcium carbonate, Sodium lauryl sulphate, Sodium saccharine, Calcium hydrogen Phosphate. Dicalcium phosphate, Glycerin Gum tragacanth Seccharin, Methyl cellulose, Methyl paraben

Biological name: Psidium guajava

Biology source –
The leaves of the guava plant have been studied for their health benefits which are attributed to their plethora of phytochemicals, such as quercetin, avicularin, apigenin, guajaverin, kaempferal, hyperin, myricetin, gallic acid, catechin, epicatechin, chlorogenic acid, epigallocatechin gallate, and caffeic acid. **Pharmacological activity:** Anti rumatic, anti ulcer, anti tumer, anti bacterial, hepato protective, etc.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, October 2024

Uses of gauva leaves -

- Guava leaves are good for diabetes
- Guava leaves are effective for hair
- Guava leaves help lower cholesterol levels
- Guava leaves are use to antibacterial

III. MATERIAL AND METHODS

Material:

Drug: Guava leaves The guava leaves will we collected from the Iccal farm Apparatus-Soxhlet apparatus, Heating mentles, Beaker, Motar and Pestle Test tube. Measuring cylinder

Neem

Synonyms: margosa, nimtree or Indian lilac.

Biological Source

Neem, (Azedarach indica), also called nim or margosa, fast-growing tree of the mahogany family (Meliaceae), valued as a medicinal plant, as a source of organic pesticides, and for its timber. Neem is likely native to the Indian subcontinent and to dry areas throughout South Asia.

The chemical compounds present in neem have anti-inflammatory, antiarthritic ,antipyretic ,hypoglycaemic , Antifungal, spermicidal, antimalarial, antibacterial and Diuretic properties. Flower, leaves, bark and seeds of neem are used in home remedies and in preparation of medicines.

Chemical constituents :

The active ingredients are Azadirachtin, Salannin and Meliantriol
Neem leaves contain Nimbosterol and Quercetin
Seeds contain Azadirachtin, Salanin, Mediator and Meliacin.
The trunk bark contains Nimbin, Nimbinin, Nimbidin, Nimbosterol and a bitter principle called Margosine.
Neem oil contains chiefly glycerides of Oleic (50%) and Stearic (20%) acids.

Uses of Neem leaves -

Treats Acne. Neem has an anti-inflammatory property which helps reduce acne.

- Nourishes Skin. ...
- Treats Fungal Infections. ...
- Useful in Detoxification. ...
- Increases Immunity. ...
- Insect & Mosquito Repellent. ...

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, October 2024

- Prevents Gastrointestinal Diseases. ...
- Treats Wounds.

GINGER

Synonym: Zingiber, Zingiberis
Biological Source: Fresh or dried peeled or unpeeled Or coated rhizomes of Zingibar officinale
Family: Zingiberene

Chemical constituents:
Ginger contains 1-4% of volatile oil, Ginger oil contains monoterpene hydrocarbons, sesquiterpene hydrocarbons, oxygenated mono and sesquiterpenes, and phenylpropanoids.Sesquiterpenes-Zingiberene, Beta-bisabolene, alpha-farnesene, Beta-sesquiphellandrene, and alpha- curcumene.
The main characters of ginger are aroma and flavour. Its aroma is because of the fragrant principles of volatile oils, whereas the flavour, pungency and pharmacological actions are produced by the phenolic ketones of oleo-resin.
Asafoetida contains resin (40-65%), gum (20-25%), and volatile oil (4-20%).
The chief resin of asafoetida is asaresinotannol present either in free form or is combined with ferulic acid. Asafoetida does not contain free umbelliferone.
Ferulic acid when treated with hydrochloric acid, converts into umbellic acid, which forms umbelliferone by losing water (Principle in chemical test).
Asafoetida oil is obtained by steam distillation of the oleo-gum resin. The oil contains secondary butyl propenyl disulphide as its chief constituent.
The sulphur compounds imparts odour to asafoetida,

Uses of ginger:

- Fights Germs.
- Certain chemical compounds in fresh ginger help your body ward off germs.
- Keeps Your Mouth Healthy.
- Calms Nausea.
- Soothes Sore Muscles.
- Eases Arthritis Symptoms.
- Curbs Cancer Growth.
- Lowers Blood Sugar.
- Eases Period Pains.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, October 2024

Clove:

Synonym: Clove bud, Clove flower, Caryophyllum, Laung
Biological Source: Dried flower buds of Eugenia caryophyllus
Family: Myrtaceae

Chemical Constituents:
Nutmeg consists of 5 to 15% volatile oil, lignin, stearin, starch, gum, colouring matter, and 0.08% of an acid substance. The volatile oil contains clemicine, myristicin, geraniol, borneol, pinene, camphene, and dipentene. Myristicin is a poisonous compound. It mainly contains myristic, palmitic, oleic lauric and other acids. It also contains eugenol, safrol, p-cymene and is-oeugenol in small quantity.

Uses of Clove:

- Cough and cold
- Infections
- Toothaches
- Labor pain
- Muscle spasms
- Nausea
- Bloating
- Indigestion
- Colic
- Diarrhea
- High cholesterol
- Ulcer

Honey:

Synonym:
madhu ,honey purified
Family :- Apidae

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, October 2024

Scientific Name :- Apis mellifera **Biological Source :**
Honey is a viscid and sweet secretion stored in the honey comb by various species of bees, such as Apis mellifera, Apis dorsata, Apis florea, Apis indica and other species of Apis, belonging to family Apideae (Order: Hymenotera).

Chemical Constituents:
Honey is aqueous solution of glucose 35%, fructose 45%, and sucrose about 2%.The proportion of sugar may vary depending upon the source of nectar and enzymatic activity responsible for converting nectar into thehoney.
The other constituents of honey are maltose, gum, traces of succinic acid, acetic acid, dextrin, formic acid, colouring matters, enzymes (invertase, insulase) and traces of vitamins.Proteins and pollen grains from various flowers are also found in honey.
Since, honey is a saturated solution of sugar, on keeping, it starts crystallising.
A product which contains crystallised dextrose is called as Granulated honey.

Uses of honey:

- Demulcent and sweetening agent
- Good nutrient to infants and patients.
- Antiseptic and applied to burns and wounds.
- It is a common ingredient of several cough mixture, cough drops and vehicle for ayurvedic formulations.
- It is used in preparation of creams, lotions, soft drinks and candies.

Cinnamon Bark

Synonyms: Cinnamon bark; Kalmi-Dalchini
Family:- Lauraceae
Biological Source: Cinnamon consists of dried inner bark of shoots of coppiced trees of Cinnamomum zeylanicum Nees, belonging to family Lauraceae. It should not contain less than 1.0 % of volatile oil.
Chemical Constituents:
Volatile oil contains 60-70% cinnamaldehyde, 5 to 10% eugenol, benzaldehyde, cuminaldehyde, terpene hydrocarbons such as phellandrene, cymene, caryophyllene, pinene and small quantities of ketones and alcohols.
Uses of calmi bark:Brk is used as a carminative, stomachic.and mild astringent. It is also used as a flavouring agent, stimulant, an aromatic and antiseptic. Commercially, it is used as a spice and condiment, and also in the preparation of candy, dentifrices and perfumes

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, October 2024

Turmeric:

Synonyms:
curcuma.
Curcuma aromatica.
Curcuma domestica.
curcumae longa.
curcumae longae rhizoma.
curcumin.
curcumine.
Curcuminoid.

Biological Source: urmeric is the dried rhizome of *Curcuma longa* Linn. (syn. *C.domestica* Valeton)., belonging to family Zingiberaceae. urcuma (Turmeric)

Chemical Constituents:
5% volatile oil
Resin
Abundant Zingiberaceous starch grains
Yellow colouring substances known as Curcuminoids.

Uses of Turmeric

- Inflammation.
- Degenerative eye conditions.
- Metabolic syndrome.
- Arthritis.
- Hyperlipidemia (cholesterol in the blood) • Anxiety.
- Muscle soreness after exercise.

Peppermint leaves:

Synonyms: Mentha piperita

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, October 2024

Biological Source: It is the oil obtained by the distillation of Mentha piperita, belonging to family Labiatae. It is mainly found in Europe, United States, and also in damp places of England. Peppermint thrives best in a fairly warm, preferably moist climate, with well-drained, deep soils rich in humus. **Chemical Constituents**: Peppermint oil mainly contains menthol (about 70%). It also contains menthone, menthyl acetate, and other terpene derivatives like cineole, pinene, isopulegone, camphene, limonene, Zasmone, menthofurone, menthyl isovalerate.

Uses of Peppermint leaves:

- Soothes
- Indigestion
- Irritable Bowel
- Syndrome
- Gas & Indigestion
- Colic
- Tuberculosis
- Shingles

Memory Problems
Prostate Cancer
Radiation Damage

Composition of Herbal Toothpaste:

Sr no	Ingredients	Quantity	Role
1	Guava leaf extract	10 g	Anti c
2	Calcium carbonate	2.8 g	Abras
3	Calcium hydrogen phosphate	6 g	Buffe
4	Sodium lauryl sulphate	2 g	Foam
5	Methyl Paraben	0.5 g	Prese
6	Glycerin	3.35 g	Hume
7	Methyl cellulose	0.1 g	Thick
8	Gum tragacanth	0.24 g	Bindi
9	Saccharin	0.01g	Sweet
	Total	25 g	

Equipments:
Chemicals:
Calcium carbonate,
Glycerin
Para hydroxyl benzoic acid
Sodium lauryl sulfate
Sodium chloride
distilled water

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, October 2024

Plant collection: -

Guava
Neem
Ginger
Clove
Honey
Cinnamon bark
Turmeric
Peppermint leaves

Preparation of extract –

Alcoholic extract of guava leaf was made by soxhlation Guava leaves were collected and washed with distilled water. Further these leaves are shade dried for a week and powdered in a mixer. This powder is passed through sieve number 44to get desired sized powder. 200ml ethanol (70%) taken for 20 gm of guava leaf powder. Soxhlation was carried out for 6 hours. Obtained extract was dried to get powder.

Preparation of toothpaste –

Take all required ingredients in a mortar and pestle in desired quantity. Add ingredients in increasing order of weight and triturate. Add desired amount of glycerine to form a paste of desired thickness. Fill in a container and store.

Evaluation of toothpaste Physical Exam:

The colour of toothpaste with a colour formulation was assessed.

The colour was examined visually.

Odor Smelling the substance revealed an odour

Taste: The formulation was manually tasted to assess the flavour.

Relative density: Weight in grammes was measured using an RD bottle with 10 ml of formulation and 10 ml of distilled water. Evaluation criterion.

Abrasiveness Extrude the material onto the butter paper until it is 15 to 20 cm long. Repeat the process to create at least ten collapsible tubes. Fingertip pressure along the length of the object should reveal any sharp or hard-edged abrasive particles. Such particles are not permitted in toothpaste.

Calculating Spreadability

This technique uses the paste's slip and drag properties. (2g) of prepared paste was applied to the ground slide. In research To remove air and create a homogenous paste film between slides, the prepared paste was sandwiched between this glass slide and another for five minutes. The edges of the paste were scraped clean of excess. The top plate was then pulled 80g with the aid of a line tied to a hook, and the amount of time (in sec) needed for the top slide to travel 7.5cm was recorded. Better Spreadability was indicated by a brief interval. Spreadability was determined using the following formula: Where

S=Spreadability, M=M-L-T Weight in the pan is M. (tied to the upper slide) L = The length that the glass slide moved. T is the amount of time (in seconds) needed to separate the top slide from the bottom slide.

pH Calculation Using a pH metre, the pH of a herbal toothpaste formulation was determined. 150ml of beaker were filled with 10g of toothpaste. Allow 10 cc of water that has been heated and then cooled. In order to create a suspension, stir briskly.

Homogeneity By applying normal force at 27°C, the toothpaste must extrude a homogenous mass from the collapsible tube or any other suitable container. Additionally, the bulk of the contents must protrude from the container's crimp before being gradually rolled.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, October 2024

Foaming By mixing a tiny amount of the formulation with water, the foamability of toothpaste formulations is assessed. I

nitial cylinder capacity measurement was recorded, followed by a 10-time shake. Foam's final volume was noted.

Calculating froth power

Power of foaming = V1 – V2

V1: Water and foam volume in millilitres.

Only in ml of water, V2 is the volume.

Stability:

He stability study was conducted in accordance with ICH guidelines. The prepared paste was placed within a collapsible tube and stored for three months at various temperatures and humidity levels, including 25°C, 2°C, and 60%, 65%, and 5%, respectively. Moreover, spreadability, pH, and appearance were examined.

Moisture and volatile matter determination

A porcelain dish about 6 to 8 cm in diameter and 2-4 cm deep was filled with 5 g of the formulation. Dry the Sample in a 105°C oven. Calculation Mass = 100Mi/M by M-Mass (g) of the material used for the test MI-Loss of mass (g) on drying 9

Content of moisture:

Weighted toothpaste (10 gm) was placed in a porcelain plate and dried at 105 o C in the oven. It was desiccated to chill it. The supplied formula is used to compute the weight loss and record it as a percentage of moisture content. Dry sample weight divided by the original sample weight gives the percentage of moisture.

Character that foams

In a test tube with a stopper (height 16 cm, diameter 6 mm), 1 g of tooth paste was added. The liquid's volume was then increased by 10 ml with water. The tube was stopped and shaken for the desired length of time at a rate of two shakes per second. 15 minutes of standing time was given, and the height of the foam created was measured. A 10% tooth paste solution was made. 146 ml of water were mixed with 4 ml of this solution at 30 o C. For ten seconds, the Solution was agitated. A 100 ml graduated cylinder was filled to the brim with foam. The foam was gently filled with a rubber stopper. It took between 40 and 80 milliseconds for the rubber stopper to move between the two spots. The foam is denser and more stable when it falls for a longer period of time

Organoleptic assessment

By using sensory and visual inspection, organoleptic evaluation (colour, taste) was carried out. **pH**

One gramme of the product was dissolved in nine millilitres of water, shaken vigorously, and the pH of the resulting aqueous solution was measured using a pH metre.

Smell test

It was evaluated for acceptability based on personal observation. It was decided whether the aroma was acceptable after asking five persons for their opinions. The following criteria were used to evaluate fragrance: A) The scent was commensurate with that of a toothpaste of reference. B) The aroma wasn't great, but it was equivalent to the toothpaste used as a reference. C) The toothpaste's aroma was inferior to that of the standard toothpaste.

REFERENCES

[1]. Mangilal T.,Ravikumar M. Preparation and Evaluation of Herbal Toothpaste and Compared with Commercial Herbal Toothpaste: An invitro Study. International Journal of Ayurvedic and Herbal Medicine.2016;6(3):2266-2273.

[2]. Parwal V. Singh P, Gurjar D. A Comprehensive Study on Different Methods of Extraction from Guajava Leaves for Curing various Health Problems. International journal of Engineering Research and Applications.2012;490-496.

[3]. Deshmukh P.,Shende V.,Gunde M. Formulation and Evaluation of Herbal Toothpaste . International journal of Pharmaceutics & Drug Analysis 2017

[4]. Davies R, Scully C and Preston AJ. Dentifrices- an update.

[5]. Medicina Oral Patologia Oral y Cirugia Bucal. 2010; 15: 976-982. 5.Ersoy M, Tanalp J, Ozel E, Cengizlier R and Soyman M. The allergy of toothpaste: a case report. Allergol Immunopathol. 2008; 36: 368-370.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, October 2024

[6]. Jardim J, Alves L, and Maltz. M. The history and global market of oral home-care products. Brazilian Oral Research. 2009; 23: 17- 22.

[7]. Mithal BM and Saha RN. A handbook of cosmetics. Vallabh Prakashan. 2000; 1st Ed. pp. 204-212.

[8]. Kokate CK, Purohit AP and Gokhale SB. A Textbook of

[9]. Pharmacognosy. Nirali Prakashan. 2002; 13th Ed: pp. 9.9-19.4.

[10]. Nema RK, Rathore KS and Dubey BK. A Textbook of Cosmetics. CBS Publisher and distributor. 2009; 1st Ed: pp.

[11]. 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. 2016; 6: 2266 –2251.