



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Formulation and Evaluation of Herbal Toothpaste

Jagtap Komal Umesh¹, Jagtap Komal Umesh², Dr. Shinde Asha S.³

^{1,2}Department Of Cosmetic Science, Late. Narayandas Bhavandas Chhabada Institute Of Pharmacy Raigaon, Satara. Dist: Satara, Maharashtra. 415020
Email Id : komaljagtap4545@gmail.com

³Assistant Professor, Late Narayandas Bhavandas Chhabada Institute of Pharmacy Raigaon, Tal:Jaoli, Satara. Dist: Satara, Maharashtra. 415020. Email
Id : komaljagtap4545@gmail.com

ABSTRACT

This study outlines the formulation and preparation of a natural toothpaste using a combination of abrasives, humectants, foaming agents, preservatives, and essential oils. The key ingredients include calcium carbonate for cleaning, glycerine for moisture retention, sodium lauryl sulfate for foaming, and acacia gum as a thickening agent. Additionally, neem, clove, and peppermint oils provide antibacterial properties and freshness. The ingredients are systematically mixed to achieve a smooth, effective toothpaste. This formulation ensures oral hygiene with natural and beneficial components

1. INTRODUCTION

India is one of the most important country to be known for the ancient script number system invention of zero and Vedas. In india, medicine are used 60% world's population. These are not used for only primery health care and not just in rural areas in developing countries, but they have also developed countries as well as were modern medicines are predominantly used. While traditional medicines are obtained medicinal plant, minerals, and show on herbal medicines of organic matters are prepared medicinal plant only. Drugs have been used as the source of the plant and important component healthcare system of in India. The Indian system of medicine, most practitioners should make and share their own recipes, so it requires proper documentation and ayurvedic system, as associated towards around 7,00,000 of the new drug system depending on the 70% of population in rural India there is a traditional medicine type ayurveda. In India many forms of alternative medicines are available, those do not want to do traditional medicines or what cannot be helped traditional medicine, ayurveda and kabiraji herbal medicine are two important forms that are alternative medicine available in India. Ayurvedic medicine can be considered as the form of equivalent to in thousand years in India. It provides various techniques and things for implament to ill patient or patient for relief. One of the things that ayurveda uses medicine of plant origin. In traditional systems, different indigenous plant are used physical, mental or imbalance of diagnosis, prevention and eradication. The drugs are obtained with whole plant of organs like leaves, stems, bark, root, flower, seeds etc. the source of medicinal plant because synthetic drugs and antibiotics associated with health hazards and toxicity increase of human diseases in order to eliminate important therapeutic help, the indiscriminate use of synthetic drugs and antibiotics.

2. AIM AND OBJECTIVES:-

- To formulation and evaluation of *herbal toothpaste* for the treatment of *oral disease*.
- To identification of physical examination and evaluation test of herbal toothpaste
- To investigate the evaluation parameters
- From the research; it is clear that no pharmacognostic work is carried out.

The present study was therefore undertaken to investigate the formulation and evaluation of the herbal toothpaste was carried out.

3. PLAN OF WORK:-

- ❖ Collection and preparation
- ❖ Drying
- ❖ size reduction
- ❖ Extraction

- ❖ Physical parameters Color, odor, taste, smoothness, relative density and pH.
- ❖ Spreadability determination Moisture content determination

4. DRUG PROFILE:-

1] **Neem:-** (*anti-inflammatory agent*)



Figure : 1.



Figure :2.

- Neem oil is used for preparing cosmetic (soap and shampoo, ointment as well as lotion and others), and is useful for skin care such as [acne](#) treatment.

Neem oil has been used effectively as a [mosquito repellent](#).

a) Synonym: - Azadirachta indica

b) Family: - [Meliaceae](#).

c) Biological source :- Neem consists of the **fresh** or dried **leaves** and seed oil of Azadirachta indica J. Juss (**Melia Indica** or **M. azadirachta** Linn)

d) Uses: - Products made from neem have been used in India for over two millennia for their medicinal properties. They are said to be

- ❖ Antifungal
- ❖ Antidiabetic
- ❖ Antibacterial
- ❖ Antiviral

- ❖ Contraceptive
- ❖ Sedative

Neem products are also used in selectively controlling pests in plants. Neem is considered a part of Ayurvedic medicine.

2) Clove:- (antibacterial agent)



Figure :3

- The clove tree is an evergreen that grows to a height ranging from 8–12 m, has large leaves and sanguine flowers in numerous groups of terminal clusters.
- The flower buds are at first of a pale colour and gradually become green, after which they develop into a bright red, when they are ready for collection.
- Cloves are harvested when 1.5–2 cm long, and consist of a long calyx terminating in four spreading sepals and four unopened petals that form a small ball in the center.

a) Synonym: - Syzygium aromaticum

b) Family: - Myrtaceae

c) Biological source :- Clove oil is obtained from the **dried flower buds of *Eugenia caryophyllus***

d) Uses: - Cloves are full of antioxidants. These compounds help your body to fight free radicals, which damage your cells and can lead to disease. By removing free radicals from your system, the antioxidants found in cloves can help reduce your risk of developing

- ❖ **Heart disease**
- ❖ **Diabetes**
- ❖ **Certain cancers**

3) Peppermint oil:- (flavouring agent)



Figure :4.



Figure :5.

- **Peppermint** (*Mentha × piperita*, also known as *Mentha balsamea* Wild) is a hybrid mint a cross between watermint and spearmint. Indigenous to Europe and the Middle East the plant is now widely spread and cultivated in many regions of the world.
- It is occasionally found in the wild with its parent species

a) Synonym: - *Mentha balsamea*

b) Family: - Lamiaceae

c) Biological source: - Peppermint oil (*Menthae piperitae aetheroleum*), which contains cineol, limonene, menthofuran, menthol, and menthone, is obtained from the fresh leaves of peppermint, *Mentha piperita* by steam distillation.

d) Uses: - Peppermint oil is promoted for topical use (applied to the skin) for problems like

- ❖ Headache
- ❖ Muscle aches
- ❖ Joint pain
- ❖ Itching

In aromatherapy, peppermint oil is promoted for treating coughs and colds, reducing pain, improving mental function, and reducing stress.

4) Turmeric:-(antimicrobial agent)



Figure :6.

- Turmeric is a common spice that comes from the root of *Curcuma longa*. It contains a chemical called curcumin, which might reduce swelling.

- Turmeric has a warm, bitter taste and is frequently used to flavor or color curry powders, mustards, butters, and cheeses. Because curcumin and other chemicals in turmeric might decrease swelling, it is often used to treat conditions that involve pain and inflammation.
- People commonly use turmeric for osteoarthritis. It is also used for hay fever, depression, high cholesterol, a type of liver disease, and itching, but there is no good scientific evidence to support most of these uses. There is also no good evidence to support using turmeric for COVID-19.
- Don't confuse turmeric with Javanese turmeric root or tree turmeric. Also, don't confuse it with zedoary or goldenseal, which are unrelated plants that are sometimes called turmeric.

a) Synonym: - *Curcuma longa*

b) Family: - Zingiberaceae

c) Biological source: - Turmeric is a flowering plant *Curcuma longa*, of the ginger family, Zingiberaceae the rhizomes of which are used in cooking.

d) Uses: - In India, it was traditionally used for

- ❖ **Disorders of the skin**
- ❖ **Upper respiratory tract**
- ❖ **Joints**
- ❖ **Digestive system.**

Turmeric is promoted as a dietary supplement for a variety of conditions, including arthritis, digestive disorders, respiratory infections, allergies, liver disease, depression, and many others.

5) Funnel fruit:- (*antipyretic agent*)



Figure :7.

- Fennel is a perennial, pleasant-smelling herb with yellow flowers. It is native to the Mediterranean, but is now found throughout the world.
- Dried fennel seeds are often used in cooking as an anise-flavored spice. But don't confuse fennel with anise; though they look and taste similar, they are not the same.
- Fennel's dried ripe seeds and oil are used to make medicine. Fennel is used for various digestive problems

a) Synonym: - *Foeniculum vulgare*

b) Family: - Apiaceae

c) Biological source: - Fennel is a flowering plant species in the carrot family. It is a hardy, perennial herb with yellow flowers and feathery leaves.

d) Uses: - Fennel is used for various digestive problems including,

- ❖ **Heartburn**
- ❖ **Intestinal gas**
- ❖ **Bloating**
- ❖ **Loss of appetite**

❖ **Colic in infants**

It is also used for upper respiratory tract infections, coughs, bronchitis, cholera, backache, bedwetting, and visual problems.

5. EXPERIMENTAL STUDIES :

A) Procedure for Making Toothpaste:

1. Preparation of Dry Ingredients

Take calcium carbonate (acts as an abrasive) and turmeric powder (for antibacterial properties).

Sieve the powders to remove any lumps and ensure a smooth texture.

Mix them well in a dry container.

2. Preparation of Liquid Ingredients

In a separate container, mix glycerine (for smooth texture and moisture retention) with distilled water to form a gel-like consistency.

Add acacia gum (as a thickening agent) and stir continuously until it dissolves completely.

Gradually mix sodium lauryl sulfate

(foaming agent) with the liquid mixture and stir to ensure even distribution.

Add sodium chloride (salt, for oral cleansing) and benzoic acid (preservative) and stir well.

Introduce sodium saccharine (sweetening agent) and mix thoroughly.

4. Incorporating Essential Oils

Add neem oil, clove oil, funnel oil, and peppermint oil to the mixture.

These provide antibacterial properties, freshness, and flavor.

Mix thoroughly to evenly distribute the oils.

5. Final Mixing & Adjustment

Slowly add the dry ingredient mixture (calcium carbonate and turmeric) to the liquid mixture while stirring continuously to avoid lumps.

Blend until you get a smooth, consistent paste-like texture.

6. Packaging

Transfer the toothpaste into a sterilized tube or container.

Store in a cool, dry place.

B) FORMULATION OF PREPARATION :

Sr. No.	Ingredient	Function	Quantity	Percent
1	Calcium Carbonate	Mild Abrasive	8.0	40.0%
2	Glycerine	Humectant (Prevents drying)	4.0	20.0%
3	Sodium Lauryl Sulfate	Foaming Agent	0.4	2.0%
4	Acacia Gum	Thickening Agent	0.6	3.0%
5	Sodium Chloride	Antiseptic & Flavor Enhancer	0.2	1.0%
6	Sodium Saccharine	Sweetener	0.1	0.5%
7	Benzoic Acid	Preservative	0.2	0.1%
8	Neem Oil	Antibacterial Agent	1.0	5.0%
9	Clove Oil	Antiseptic & Flavor	0.5	1.5%
10	Peppermint Oil	Flavoring Agent	0.3	1.5%

11	Fennel Oil	Flavor & Antimicrobial	0.3	1.5%
12	Turmeric Powder	Antibacterial & Whitening	0.5	2.5%
13	Distilled water	Solvent	q.s	q.s
	Total		20 g	100%

C) Evaluation test of Toothpaste

1] Physical Examination:-

- **Color-** Mud green
- **Odour-** Pleasant
- **Taste-** Better
- **Smoothness-** smooth
- **Relative density-** 10.2
- **pH** -8.2

2] Evaluation Parameters:-

A) Determination of spreadability

In this method slip and drag characteristic of paste involve. Formulated paste (2g) placed on the ground slide under study. The formulated paste placed like sandwich between this slide and another glass slides for 5min to expel air and to provide a uniform film of the paste between slides. Excess of the paste was scrapped off from the edges. The top plate was then subjected to pull of 80g with the help of string attached to the hook and time (sec) required by the top slide to cover a distance of 7.5cm was noted. A short interval indicated better spread.



Figure :8.

Formula was used to calculate spreadability:

$S = M \times L / T$ Where,

\ S= Spreadability

M= Weight in the pan (tied to the upper slide)

L= Length moved by the glass slide

T=Time (sec) taken to separate the upper slide from the ground slide.

$S = M \times L / T$

$S = 10 \times 3 / 5$

$S = 6$

B) pH determination:-

pH of formulated herbal toothpaste was determined by using pH meter. 10g of toothpaste placed in 150ml of beaker. Allow the 10ml of boiled and then cooled water. Stir vigorously to make a suspension.

C) Foaming:-

The foamability of formulated toothpaste evaluated by taking small amount of formulation with water in measuring cylinder initial volume was noted and then shaken for 10 times. Final volume of foam was noted



Figure :9.

Determination of froth power

Foaming power = $V_1 - V_2$

V_1 - Volume in ml of foam with water.

V_2 - Volume in ml of water only.

Initial volume :- 10 ml

Final volume :- 9 ml

Foaming volume :- 1 ml

D) Moisture contents:-

Weight the sample of 10 gm, add small quantity of water to make slurry, dry it on hot air oven for 10min, then weight the and calculate the moisture contents by using given formula:

Moisture content = $\frac{w-d}{w} \times 100$

Moisture content = $\frac{1-0.26}{1} \times 100$

Moisture content = 74%

3] Phytochemical test :-**a. SAPONIN**

• 2 ml sample was dissolved in 6ml distilled water. • Shaked well. Froth formation took place. • Stability of the froth confirms the presence of saponin in the samples.



Figure :10.

b. TANNIN

• 1 ml sample was dissolved in 1 ml 5% FeCl_3 . • Appearance of dark blue or greenish black color confirms presence of tannin the sample. • If no color changes then heating mantle is used for changing the color.

c. FLAVANOIDS

• 2 µl samples was drop wise added into 20 ml NaOH. • Again Conc. HCL was added drop wise, appearance of yellow color • Confirms the presence of flavonoids in the sample.



Figure :11.

d. PROTEIN

• 500µl of 1% CuSO₄ was prepared and 500µl of 5% NaOH was prepared. • Mixed together. • Sample was added in the solution, occurrence of purple color confirms protein in the sample.



Figure :12.

e. STARCH SOLUTION

• Add the sample • Add 2-3 drops of yellow iodine solution • Stir with glass rod • The iodine solution will turn blue/black colour then starch is Present.



Figure :13.

f. FAT TEST.

• Press the small quantity of extracts between two filter • Paper the strain on one filter indicated the presence of fixed oils.

g. PHENOL TEST

• 500µl extract was dissolved in distill water. 2 drops of aq. • FeCl₃ was added. • Appearance of blue color or green color indicates presence of phenols.

2) Phytochemical test: -

SR NO.	TESTS	OBSERVATION
1.	SAPONIN	Present
2.	TANNIN	Absent
3.	FLAVANOIDS	Present
4.	PROTEIN	Absent
5.	STARCH	Present

6.	FAT TEST.	Absent
7.	PHENOL TEST	present

6. RESULT AND DISCUSSION:-

1)Physical examination:-

SR NO.	CONTENT	OBSERVATION
1.	Color	Uniform
2.	Odor	Pleasant
3.	Taste	Pleasant
4.	Smoothness	Smooth
5.	Relative density	10.2
6.	Ph	7.76

2) EVALUATION RESULT: -

SR NO.	PARAMETERS	OBSERVATION
1.	spreadability	3cm/sec
2.	pH	7.76
3.	Foaming	1ml
4.	Moiture contents	74%

• FORMULATION OF HERBAL TOOTHPASTE :



Figure :: 14.

7. CONCLUSION:-

The research concluded that Herbal toothpaste an emphasizing and more acceptable in dental research and they are safer with minimum side effect than synthetic preparation. The formulated toothpaste capable to the toothpaste and oral hygiene show the antimicrobial activity against pathogen. The formulation compared with market preparation. Therefore it shows the equal patronizing and engrossing passion over the marketed formulations (Colgate, Dabour Red, and Dantkanti). The formulated herbal toothpaste has been good scope in future in nature remedies research and Dental health of public.

8. REFERENCE

- 1 **Adejumo OE, et al.**, Assessment of in-vitro and in-vivo antimicrobial activities of selected Nigerian toothpastes and mouth washes on some oral pathogens. *Adv. in Med. Dent. Sci.* 2008; 2(3):61-5.
- 2 **Anna T, et al.**, Remineralization potential of a new toothpaste formulation: An In-vitro Study. *The J. of Cont. Dent. Practice* 2004; 5(1):1-12.
- 3 **Collins L et al.**, Instant tooth whitening from a silica toothpaste containing blue covarine. *J. of Dentistry* 2006; 36(8):21-5.
- 4 **D. Mamatha** IOSR Journal of pharmacy and biological Sciences (IOSR- JPBS) Volume 12, Issue 6 Ver. V (Nov.-Dec.2017)
- 5 **Golpar R, et al.**, study to assess the plaque inhibitory action of herbal-based toothpaste: A double blind controlled clinical trial. *J. of Medicinal Plants Research* Vol. 4(12), pp. 1182-1186, 18 June, 2010.
- 6 **Kandarp Dave** International Journal of chemistry and Pharmaceutical Sciences, 2014, vol.2 (3): 666-673.
- 7 **Kolpo AL, et al.**, Phytochemical composition and antimicrobial activity of *propos* is Africana against some selected oral pathogens. *World J. Agric. Sci.* 2009; 5(1): 90-93.
- 8 **Man S, Gao W, Zhang Y, Huang L, Liu C.** Chemical study and medical application of saponins as anti-cancer agents. *Fitoterapia*. 2010 Oct; 81(7):703-14. Doi 10.1016/j.fitote.2010.06.004. Epub 2010 Jun.
- 9 **Mahendra sekar et al** International journal of pharmaceutical and clinical research 2016; (8):1155-1158.
- 10 **Meyers AI, et al.**, The surface effect of dentifrices .*Australian Dent J.* 2000; 45 :(2):118-124.
- 11 **Mridul Haque** Journal of chemical and Pharmaceutical Research, 2014, 6(3): 1279-1285.
- 12 **Nitin CM, et al.**, Chitosan-based toothpaste: As novel oral hygiene product. *Indian J. Dent Research*.21(3), 2010.
- 13 **Okpalugo J, et al.**, Toothpaste formulation efficacy in reducing oral flora. *Trop. J. of Pharm. Research* 2009;8(1):71-7.
- 14 **Ozdemir A, et al.**, The determination of salivary zinc level following delivery from zinc containing toothpaste. *J. of Med. Sciences* 1998; 28(11):281-3.