

FORMULATION OF HERBAL TOOTHPASTE USING PEEPLE TREE (FICUS RELIGIOSA) AND MARIGOLD (TAGETES SPP)

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ABSTRACT

The current study's objective is to create and assess herbal tooth paste made of natural ingredients, with a focus on efficacy and safety. It has anti-cavity, anti-caries, and teeth-cleaning benefits. In India, dental items are in high demand. Paste is a crucial item in the dental product line. Nowadays, toothpaste is a staple in the annual food shopping lists of the majority of rural and urban households. Herbal toothpaste is more in demand than synthetic toothpaste since it is primarily used by consumers. The purpose of these is to treat and cure oral cancer, tooth decay, gum disease, tooth erosion, gum infection, and antibacterial and anti-carries. Several herbs, including red pepper flakes, marigold, and peppermint, are used in this toothpaste. The toothpaste was made by varying the amounts of rose water, marigold oil, and folks leaf powder. the recipe with less ingredients. The following parameters were examined severely: spreadability, stability study, extrudability, shape retention, total flavonoid content, moisture content, spreadability, pH, physical examination, homogeneity, foamability, and sharp and edge abrasive particles. Herbal toothpaste, which is created from herbal oil and powder, is used to clean teeth, shield them from calcium loss, and aid in the prevention of dental decay. The herbal toothpaste has no negative effects and is comprised entirely of organic materials. make the teeth healthy.

Keywords: Large, Supermarket, Dispersal Capacity, Antimicrobial, And Anti-Carrie.

I. INTRODUCTION

Our oral health care system is sustained by our teeth. Before you swallow, they chop or smash the food to break it down. Although some have more or less, humans typically have 32 teeth. Teeth are ectodermal organs that resemble bones and are vital for digesting.

Each of the various tooth kinds that we have has a distinct function. Humans have four different types of permanent teeth.

• Incisor; • molars • premolars

Incisor: The teeth in your mouth that are most noticeable are your incisors. The majority of people have four upper and four lower incisors in their jaws. Your two front teeth as well as the teeth on either side of them are included in this. When you bite into food, the single, narrow edge on each incisor helps cut it.

Canines: Canine teeth take their name from the fact that they resemble the fangs of a dog. Compared to other tooth varieties, they are more pointed. Canine teeth are typically found in four quadrants: upper right, upper left, lower right, and lower left. Your canines aid in breaking down tough foods like meat and crisp veggies. Canines are sometimes referred to as "eye teeth" due to their placement right behind your eyes.

Premolars: Premolars, also known as bicuspid, are the teeth that are located in between your canines and molars, or the back teeth of your mouth. Premolar teeth combine characteristics of molars and canines. They assist you in tearing, crushing, and grinding food into tiny fragments.

Molars: The teeth in the back of your mouth are called molars. About 90% of your chewing occurs in this area. Most

Conditions and problems: -

A number of the maximum common sicknesses that effect our oral fitness consist of cavities (tooth decay), gum (periodontal) disease, and oral cancer. greater than forty% of adults file having felt ache of their mouth in the final year, and extra than 80% of people can have had at the least one cavity by way of age 34.

enamel decay is one of the most commonplace dental problems. In truth, over 90% of adults inside the U.S. over 40 have had as a minimum one cavity. Cavities can shape while micro organism consume through the difficult, outer layer of your enamel. as soon as the dentin below loses this protective layer, the micro organism hold to erode your enamel. (3)

Gum disease :

Despite the fact that gum ailment begins in your gum. among the sicknesses of gums are (4)

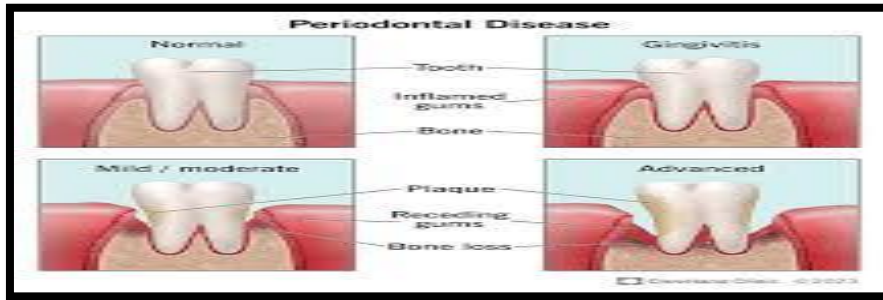


Fig.1

Toothache:- Sensitivity to warmth, cold or sweets: A toothache refers to pain in or around your enamel. Minor toothaches can arise from a temporary gum irritation that you can deal with at home.



Fig.2

Sore, bleeding gums:- bleeding of the gums on gentle probing, or gingival bleeding tendency, and also bleeding in the attention, or retinal hemorrhaging, had been associated with low nutrition C ranges in the bloodstream ..

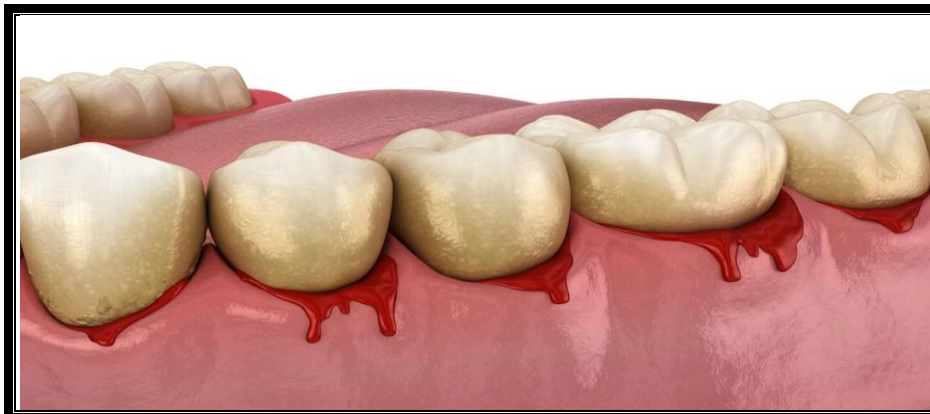


Fig.3

Some of the most not unusual dental remedies consist of: -

- Dental fillings.
- Dental crowns.
- Dental bridges.
- Dental bonding.
- tooth whitening.

- Porcelain veneers.
- teeth braces.
- Dental implants.
- Dentures.(7)

Main ingredients of herbal toothpaste:-

Peepal Tree: - The peepal tree is taken into consideration the mythical ‘Tree of lifestyles’ or ‘global Tree’ of the Indian subcontinent. The peepal tree, also known as *Ficus religiosa*, belonging to the family Moraceae, is a variant of the fig tree known as the bodhi tree. The word ‘Ficus’ in Latin refers to ‘fig’, the fruit of the tree and the word ‘Religiosa’ refers to ‘faith’, as it is sacred in each Buddhism and Hinduism. also, for this reason, it is named ‘Sacred fig’. it’s far a massive tree frequently planted near holy places and temples.(8)



Fig.4

The vernacular names of peepal trees are Pipal, Pipala in Hindi; Jari, Piplo, Pipalo, Piparo in Gujarati; Pimpal, Pipal, Pippal in Marathi; Ashud, Ashvattha, Asvattha in Bengali; Aswatha in Oriya; Ahant in Assamese; Pippal, Pipal in Punjabi; Ravichettu in Telugu; Arara, Arasu, Arasan, Ashwarthan, Arasamaram in Tamil; Ranji, Arlo, Basri, Ashwatha, Ashvatthanara, Aralegida, Aralimara, Basari, Ashvathamara, Ashvattha in Kannada; Arayal in Malayalam; horrific in Kashmiri. (10)

Scientific Classification:-

Domain	Eukaryota
Kingdom	Plantae
Subkingdom	Vridaeplantae
Phylum	Tracheophyta
Subphylum	Euphyllopsida
Class	Magnoliopsida
Subclass	Dilleniidae
Subclass	Dilleniidae
Order	Urticales
Family	Moraceae
Tribe	Ficeae
Genus	Ficus
Specific epithet	Religiosa Linnaeus
Botanical name	Ficus religiosa.

Peepal tree might have the subsequent residences:-

- it may have antidiabetic assets
- it could have an antibacterial potential

- it would act as an antioxidant.
- Anticaries.

Botanical plant description of peepul tree:-

Tree as much as 30 metres (98 toes) tall and with a trunk diameter of up to three metres (9.eight ft). The leaves are cordate in form with a specific prolonged drip tip; they may be 10–17 cm long and eight–12 cm wide, with a 6– 10 cm petiole. The fruits are small figs 1–1.5 cm in diameter, inexperienced ripening to crimson. *Ficus religiosa*, commonly referred to as Bodhi tree, peepul and sacred fig, is local to Southeast Asia, southwest China, India and the Himalayan foothills. it's far a large broadleaf evergreen tree with extensive-spreading branching that grows to 60-100' tall. over time, the trunk may additionally grow to as much as 9' in diameter.(12)

Chemical constituents:-

S. No	Activity	Parts Used	Compounds Isolated
1	Anti-diabetic action and Insulin raising effect	Sem bark	3',5-dimethylether of leucocyanidin-3 -O-P-D ¹⁴
2	Insulin sparing action	Sem bark	3',5-dimethylether of leucocyanidin-3-O-P-D-galactosylcellobioside ²¹
3	Hypolipidemic effect	Sem bark	5,7-dimethylether of leucopelargonidin-3-O-a- L-rhamnoside ¹³
4	Antioxidant effect	Sem bark	5,7-dimethylether of leucopelargonidin-3-O-a- L-rhamnoside ²⁶
5	Effects on glucosesphosphate, Hexose Kinase and HMGCo A reductase enzyme activity	Sem bark	3', 5 -dimethylether of leucocyanidin-3-O-P-D-galactosylcellobioside ¹⁴
6	Anti-tumour	fruits	Not isolated
7	Anti-microbial	fruits	Not isolated
8	Anti-diarrhoeal	Hanging roots	Not isolated

Fig.5

Marigold

Marigold,(rubric Tagetes), rubric of about 50 species of periodic sauces of the aster family(Asteraceae), native to southwestern North America, tropical America, and South America. The name marigold also refers to the pot marigold(rubric Calendula). It's unconnected shops of several families. Physical Description- Members of the rubric Tagetes have seductive unheroic, orange, or red compound flowers that are solitary on the stems or clustered. The leaves are arranged opposite each other on the stem and are generally finely cut. Characteristic bracts(leaflike structures) form a mug- shaped base below each flower head (14).



Fig.6

Scientific Classification

Kingdom	Plantae
Subkingdom	Tracheobionta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Asteridae
Order	Asterales

Family	Asteraceae
Tribe	Calenduleae
Genus	Calendula
Species	Calendula officinalis

Botanical factory description of marigold tree- Marigold is a hardy periodic condiment native to Southern Europe and is also cultivated considerably in Asia, India, China and other countries with a tropical climate. Marigold flowers have different spices and colors, in which the unheroic color is most common. The marigold is an standing periodic condiment that grows up to a height of 180 cm. Marigold(*Tagetes erecta* Linn.) also belongs to Asteraceae family. It's an cosmetic flower, generally known as marigold. still, other names with the common name “ marigold ” are African marigold, American marigold, Aztec marigold, big marigold, Mexican marigold, saffron marigold, among others.(15) Chemical ingredients- They're essential canvases , carotenoids, flavonoids, terpenoids, thiophenes and phenolic composites. the important phytochemical ingredients present in the different part of the shops are lutein, quercetin, quercetagenin, a glucoside of quercetagenin, syringic acid, thienyl, terpinenes and phenolic composites. (16)

Types of Toothpaste

Anti-carries /cavity Protection toothpaste.	Protection toothpaste Sodium chloride and sodium monofluoride phosphate.	protect teeth from tooth decay Contain fluoride to stop tooth enamel decalcification and Cavities.	Ex. Colgate cavity protection.
Plaque and Ginger it is prevention tooth.	Sodium Laurel sulphate triclosan zinc and stands iron	Antibacterial and prevent the formation of dental plaque.	Ex. Crest pro health clinical gum protection
Tooth whitening toothpaste.	Papain, Dimethicone	Have either higher abrasion value than normal toothpaste to Mechanically remove food, smoking and other stain from Teeth.	Colgate optical white and Colgate pro clinical White.
Tartar control toothpaste	Pyrophosphates.	Reduce the new tartar build up (But they can't remove the existing tartar.)	Ex. Colgate Tartar protection with whitening.
Fresh breath Toothpaste.	Peppermint, spearmint, menthol.	Enhance flavoring agents along with antibacterial to fight halitosis.	Ex. Colgate Max fresh.(15)

Ingredients Of Herbal Toothpaste

Peepal Tree leaves: -

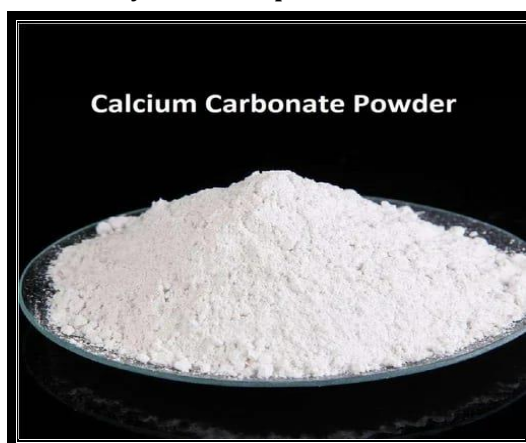
Help to strengthen the epoxies and might help withtoothache.it also helps to treat throat diease when pustule with banyantree.it also used for eye and hair problems.

**Fig.8****Marigold oil: -**

Help to strengthen the bonds and might help with toothache. It also helps to treat throat disease when papule with Banyan tree. It is also used for eye and hair problems.

**Fig.9****Calcium carbonate: -**

Help to strengthen the bonds and might help with toothache. It also helps to treat throat disease when pustule with Banyan tree. It is also used for eye and hair problems.

**Fig.10****Camphor: -**

Camphor helps in managing toothache and gum diseases due to its anti-inflammatory property.



Fig.11

Sodium lauryl sulphate:-

SLS lowers surface tension of aqueous solutions and is used as fat emulsifier, wetting agent, and detergent in cosmetics, pharmaceuticals and toothpastes.



Fig.12

Methyl paraben: - Methyl paraben are a type of chemical that manufacturers often use as a preservative.



Fig.13

Sodium chloride:- sodium chloride, or table salt, as an active ingredient, salt toothpaste acts as a gentle abrasive, capable of removing stains from teeth.



Fig.14

Distilled water: - Used as vehicle in many pharmaceutical formulations.



Fig.15

Sample Formula

Sr.no	Ingredients	Quantity in gm	Quantity in gm	Quantity in gm
1	Peepal leaves	0.5 gm	1.1 gm	1.5 gm
2	Camphor	0.5 gm	0.5 gm	0.5 gm
3	Honey	0.5 gm	1.1 gm	1.5 gm
4	Calcium carbonate	3.5 gm	3.5 gm	3.5 gm
5	Glycerin	2.0 gm	2.0 gm	2.0 gm
6	Sodium lauryl sulphate	0.5 gm	1.1 gm	1.5 gm
7	Methyl paraben	0.6 gm	0.6 gm	0.6 gm
8	Sodium chloride	0.2 gm	0.2 gm	0.2 gm
9	Marigold oil	0.5 gm	0.5 gm	0.5 gm
10	Distilled water	Qs	Qs	Qs

FORMULA

SR.NO	Ingredients	Properties
1	Peepal leaves powder	Antibacterial
2	Camphor	Anti inflammatory
3	Honey	Sweetening agent
4	Calcium carbonate	Whitening agent
5	Glycerin	Lubricant and humectants
6	Sodium lauryl sulphate	Foaming agent
7	Methyl paraben	Preservative

8	Marigold oil	Anticavity
9	Sodium chloride	Abrasive
10	Distilled water	Vehicle

Final Formula (50gm)

Sr. no	Ingredients	quantity
1	People leaves powder	5.5 gm
2	Camphor	2.5 gm
3	Honey	5.5 gm
4	Calcium carbonate	17.5 gm
5	Sodium lauryl sulphate	10 gm
6	Methyl paraben	5.5 gm
7	Glycerin	3 gm
8	Marigold oil	1 gm
9	Sodium chloride	2.5 gm
10	Distilled water	Q.S

Procedure for formulation

The people leaves powder are home made by shed drying.

All other materials are purchase from market and some are available in our laboratories. we had prepared three formulations in different quantities (sample formula) from those three formulations we selected one for final formulation.

Step 1:- The people leaves powder were passed through sieve shaker to obtain uniform size.

Step 2:- All required ingredients and powders for the preparation were accurately weight individually by using digital balance.

Step 3:- people leaves powder and other ingredients were triturated in a mortar and pastle to form uniform mixture except methyl paraben which is used as preservatives.

Step 4:- mix well to form a paste with optimum thickness as like other marketed tooth pastes.

Step 5:- methyl paraben add at last and prepared herbal toothpaste was packed into into the toothpaste tube, labeled and used for further studies.

From all three formulations we selected second formula from sample formula for final formulation..

Performed various evaluation tests for toothpaste

Evaluation tests

1) Physical Examination: -



Fig.16

Color:- Formulated toothpaste was evaluated for its color.

The visually color was checked and it found to be faint green.

Odour:-Odour was found by smelling the product, smell slightly camphor smell

Taste:-Taste was checked manually by tasting the formulation and it was found to be sweet.

Both taste are done for physical examination.

2. Abrasiveness: -



Fig.17

Extrude the content 15-20 cm long on the butter paper, repeat the same process for at least ten collapsible tubes. Press with the contents of the entire length with fingertip for the presence of sharp- and hard-edged abrasive particles. Toothpaste shall not contain such particles.

3. Determination of spread ability: - 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 ability.

4. Homogeneity: - The toothpaste shall extrude a homogenous mass from the collapsible tube or any suitable container by applying of normal force at $27 \pm 20^\circ\text{C}$. in addition bulk of contents shall extrude from the crimp of container and then rolled it gradually

5. Stability: - The stability study was performed as per ICH guideline. The formulated paste was filled in collapsible tube and stored at different temperature and humidity conditions, $25^\circ\text{C} \pm 2^\circ\text{C} / 60\% \pm 5\% \text{RH}$, $30^\circ\text{C} \pm 2^\circ\text{C} / 65\% \pm 5\% \text{RH}$, $40^\circ\text{C} \pm 2^\circ\text{C} / 75\% \pm 5\% \text{RH}$ for the period of three months and studied for appearance, pH and spread ability

6. Moisture content Toothpaste:- (10 gm) weighted in a Porcelain dish and dried it in the oven at 105°C . It was cooled in a desiccator. The loss of weight is recorded as percentage moisture content and calculated by the given formula. % Moisture = $\frac{\text{Original sample weight} - \text{dry sample weight}}{\text{Original sample weight}}$.

7) Foaming character: - 1 gm of tooth paste was poured into stoppered test tube (height 16 cm. diameter 6 mm) and volume of the liquid was adjusted with the water up to 10 ml. Tube was stoppered and Shaked length wish, motion for 16 second, two shake/second. Allowed to stand for 15 minutes and height of the foam produced was measured.2) 10% solution of tooth paste was prepared. 4ml of this solution was added to 146 ml of water at 30°C . The solution was agitated for 10 seconds. The foam was poured in to a 100 ml graduated cylinder to overflowing. A rubber stopper was gently dropped in to the foam. The time for the rubber stopper to pass two points (40ml/80ml) was measured. Longer time of fall indicates the denser and more stable foam.

**Fig.17****8) Organoleptic evaluation: -**

Organoleptic evaluation (color, taste) was done by sensory and visual inspection.

9) Fragrance test: -

It was based on individual observation for its acceptability. 5 people were asked for acceptability of fragrance and their opinion was taken. And fragrance was evaluated based on the below-described criteria;

- A) The fragrance was good, as good as the fragrance of reference toothpaste
- B) The fragrance was not so good but comparable to the reference toothpaste
- C) The fragrance of the toothpaste was poor than the reference toothpaste.

10) pH test: -

pH was tested by dissolving 1 gm product in to 9 ml of water and Shaked vigorously then aqueous solution and pH is observed by pH meter.

**Fig.18**

The standard method of toothpaste pH measurement is either to directly measure the tooth paste or to make tooth paste slurry by diluting it with water and performing pH measurement by a pH electrode



II. RESULT AND DISCUSSION

Sr.no	Parameters	Observations
1	Color	Faint green
2	Odor	Characteristic
3	Taste	Characteristic
4	Smoothness	Smooth
5	PH	7.2
6	Homogeneity	Good
7	Abrasiveness	Good
8	Foam ability	10 ml
9	Moisture content	15%
10	Extrudability	Extrudable
11	Readability	Easily spread
12	Stability	Stable

The toothpaste was prepared and labeled.

III. CONCLUSION

Herbal toothpaste shows the good action to maintaining the dental caries and oral hygiene. The herbal toothpaste shows the safer minimum side effects. They are low cost and available easily. They have less side effects. The formulated herbal toothpastes are evaluated by different tests like Physical Examination, pH determination, Homogeneity, Sharp and edge abrasive particles, Determination of moisture and volatile matter, Spread ability, Stability study, Extrudability etc. We prepare it with less ingredients.

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