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"Herbal Mouthwashes: A Green Alternative to Oral Hygiene"

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ABSTRACT
Herbal mouthwash is becoming a popular alternative to traditional oral rinses, providing a natural and often safer way to ensure oral hygiene. This study explores the formulation, effectiveness, and benefits of herbal mouthwashes derived from plant-based ingredients such as Guava (Psidium Guajava), clove (Syzygium aromaticum), peppermint oil (Mentha Piperita). Unlike chemical mouthwashes containing chlorhexidine or alcohol, herbal formulations are known for their antimicrobial, anti-inflammatory, and antioxidant properties with minimal side effects. The objective of this study is to evaluate the antimicrobial efficacy of herbal mouthwash against common oral pathogens, assess its impact on plaque formation and gingival health, and compare its performance with standard commercial products. Preliminary findings suggest that herbal mouthwashes can significantly reduce oral microbial load and improve overall dental health. With increasing consumer preference for natural products, herbal mouthwash presents a promising, eco-friendly, and effective solution in oral care.

Keywords: Herbal Mouthwash, Natural Mouthwash, Anti bacterial Mouthwash, cavity Protection, Oral hygiene.

I. INTRODUCTION:

Mouthwashes and mouth rinses are antiseptic liquids that patients use as an efficient at-home oral hygiene system. Mouthwashes are aqueous solutions that clean and deodorize the buccal cavity. They usually contain alcohol, glycerin, sweetening components, flavoring agents, coloring agents, and antibacterial agents. They have a pleasant taste and scent.Even though these medications have been demonstrated to be successful in lowering the oral bacterial load and penetrating oral microbial biofilms in vitro, it would be prudent to limit their use to temporary therapeutic scenarios if necessary.Moreover, some widely used mouthwashes can lead to negative effects, including dental erosion and accidental poisoning in children.

Mouthwash is a clear, most of the times, colored solution that is aimed to refresh the breath by swishing the product around the mouth, followed by spitting it out.(1)

Guava, also known as Psidium guajava, is a nutrient-rich fruit. The Portuguese introduced it to India from South Africa. Because of its therapeutic properties, leaves are valued in Western nations and utilized extensively in Asian nations.

Guava trees are not very large. The Myrtaceae family includes guavas, which grow best in tropical or subtropical regions. China ranks as the second-largest producer of guavas, following India.

The guava plant is well-liked in the Philippines and recognized as a medicinal plant by the Department of Health since practically every component of it has therapeutic properties.

The guava tree is a tiny tree that can grow up to three meters tall. Herbal medicine uses its leaves, bark, and fruit. Guava leaf decoction is renowned fortreating gastroenteritis and persistent diarrhea. In addition, it is used to treat uterine and vaginal problems and to clean wounds.

The decoction of guava leaves can also be used as a mouthwash.

In parts of Northeast India, young leaves and tender shoots of guava have been used to alleviate toothaches.(3)

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Figure 1: Common Name : Guava Leaves Scientific Name : Psidium Guajava Family Name: Myrtaceae

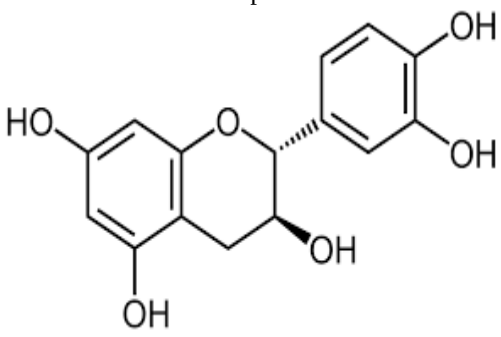
Botanical Name : Psidium guajava
Family : Myrtaceae

Description :

Guava leaves are rich source of various health promoting micro and macro nutrients and phytochemicals such as quercetin catechin epicatchin apigenin and caffeic acid.

Guava leaves can be a great cost effective traditional drug if you are having a hard to managing with dental infections. Its anti-bacterial conditioning against oral pathogens , dental caries, and dental pealers are remarkable.

It has been documented in the Indian state of Andhra Pradesh to be used to treat mouth ulcers. Enquiries explain that the presence of Flavonoids significantly decreases the size of mouth ulcers. In places of Northeast India, youth full eaves and tender shoots of guava have been utilized to treat toothaches.Traditional healers of Cameroonal so used Guava leaves for treating dental infections. Additionally, guava roots can serve as 'chewing sticks' for flavor and therapeutic benefits.



Catechin

Taxonomical Classification:
Kingdom: Plantae (Plants)
Phylum: Tracheophyta (Vascular plants)
Class: Magnoliopsida (Dicotyledons)
Order: Myrtales (Myrtle order)
Family: Myrtaceae (Myrtle family)
Genus: Psidium (Guava genus)
Species: Psidium guajava (Guava)
Uses :
1. Help in reducing inflammation of swollen gums and minimize the plaque.
2. They have antibacterial property.

2. Clove:

Figure 2: Common Name: Clove Bud Scientific Name: Syzygium aromaticum Family: Myrtaceae.

Botanical Name : Syzygium aromaticum
Family : Myrtaceae

Description :

Clove bud contains essential oil, flavonoids ,hydroxybenzoic acid ,eugenol ,phenolic acid , gallic acid , salicyclic acid etc. Clove buds contain around 18% essential oils and around 89%

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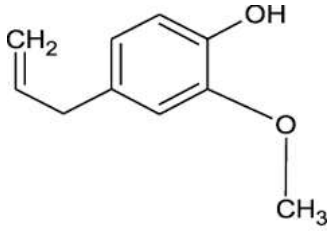
of essential oils is eugenol and 5% to 15% is ergenol acetate and beta cariofileno.



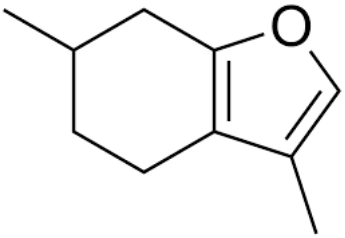
Eugenol

Taxonomical Classification:
Scientific name: Syzygium aromaticum
Family: Myrtaceae
Order: Myrtales
Genus: Syzygium
Kingdom: Plantae
Uses :
1 Clove oil relieve toothpain and bad breath, as well as reduce gum disease.
2 They also have the natural capacity to inhibit the growth of bacteria and can aid in the treatment of mouth and throat infections.

3. Peppermint Oil

Figure 3:Common Name: Peppermint Leaves Scientific Name: Mentha Piperita Family: Lamiaceae

Botanical Name : Mentha piperita
Family : Lamiaceae
Description :
It contains cineol, limonene, menthofuran, menthol, and menthol. It has several pharmacological effects, including anesthetic, antibacterial, antifungal, antihelmintic, and antioxidant activity.
Uses :
1 Pippermint oil reduce plaque and help to clean the teeth and gums and also give cooling effect.
2 To quickly eliminate bad breath or eradicate a bad taste in your mouth.(3)



Menthofuran

FUTURE POTENTIAL

The use of various soils and plant development aids can be investigated further to improve this technique. It is crucial to contrast it with alternative methods ofcultivating plants as well. It will bebeneficial to try it out in actual fields us determine whether it is beneficial for producing numerous high-quality plants for sale (4).

Species:-
The amplexicaule Psidium
Psidium araao
Psidium araca
Psidium austral
Cattleianum Psidium
"Arazá" and Cattley Guava are Peruvian guavas.
"Chinese Guava" (as intrusive) in Colombia

The health advantages of guava leaves have been utilized for a very long time. Individuals employ them in many ways:
1) Herbal Treatments: Guava leaves are utilized in natural treatments since they could aid in the fight against microorganisms, lessen inflammatory responses, and serve as antioxidants.
2) Dental and Oral Health: A few mouthwashes and Guava leaf extracts are used in products because they could aid in maintaining oral hygiene.
3) Skincare: Occasionally, skincare products include extracts from guava leaves since they may improve the health of your skin, particularly for treating wounds and acne.
4)Benefits of Antioxidants: Flavonoids and carotenoids, which are found in guava leaves, are effective at scavenging your body's damaging chemicals.
5) Digestive Health: Infusions made from guava leaves are occasionally taken to aid with digestion and ease gastrointestinal problems (5).

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Methodology (Materials and methods)

1. Guava leaves Powder

Guava leaves powder can be used to make a mouthwash that possesses antibacterial and anti-inflammatory characteristics, which are advantageous for maintaining oral hygiene. It can assist with problems such as gum swelling, pain alleviation, and breath freshening.

Figure 4: Guava Leaves Powder

Benefits:

Antibacterial and Antimicrobial: Guava leaves contain elements that help combat bacteria and decrease plaque accumulation.

Reduces Gum Inflammation: A mouthwash made from guava leaves can help calm irritated and swollen gums.

Relieves Pain: It may offer temporary relief from toothaches and other oral discomforts.

Freshens Breath: The antibacterial nature helps combat foul breath caused by bacterial proliferation.

Treats Minor Oral Wounds: Guava leaf mouthwash can support the healing of small cuts or lesions in the mouth.

Reduces Gingivitis: By managing plaque and bacteria, it can help prevent or control gingivitis (inflammation of the gums).(5)

2. Clove Oil

Cloves are the aromatic flower buds of the Syzgiumaromaticum tree, which belongs to the Myrtaceae Family. They are from Indonesia's Maluku Islands and are commonly used as a spice, flavoring, or scent in consumer products such as toothpaste, soaps, and cosmetics. Ayurvedic and Chinese medicine both use them as spices.Dried cloves and clove oils The tree (Syzygiumaromaticum) is indigenous to Indonesia.

Leaves and stems are used to create medicine, and its dried blossom buds are a favorite flower. Antioxidants are abundant in cloves. These substances aid in the body's defense against free radicals, which harm cells and can cause illness.

Cloves' antioxidants can reduce your risk of heart disease, diabetes, and other illnesses by removing free radicals from your body.

Figure 5: Clove Oil

Benefits of Clove

cloves can reduce gum swelling and irritation, stimulate circulation, enhancing gum tissue health, help soothe, toothache pain, fight bad breath and kill bacteria in the mouth.(6)

3. Peppermint Oil

Peppermint is a hybrid mint, combining spearmint and watermint. The plant, which is native to Europe and the Middle East, is now grown and distributed over much of the world. It is occasionally discovered in the wild alongside its parent species. Peppermint (Mentha × piperita), sometimes known as Mentha balsamea wild, is a hybrid between spear mint and water mint.The plant, which is native to Europe and the Middle East, is now grown and distributed over much of the world. It is sometimes encountered in the wild with its parent species.

Peppermint is the most widely used of the more than 25 species in the genus Mentha. Chinese peppermint (bohe) is prepared from fresh Mentha × piperita leaves, while Western peppermint is made from the same plant.

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Figure 6: Peppermint Oil

Benefits of Peppermint Oil

Peppermint oil is recommended for topical application (on the skin) to treat headaches, muscle aches, joint discomfort, and itching. Peppermint oil is used in aromatherapy to heal coughs and colds, relieve pain, improve brain performance, and reduce stress.(7)

4. Sodium Benzoate

Sodium benzoate is used in herbal mouthwash primarily as a preservative. It helps to prevent the growth of bacteria, mold, and other microorganisms, extending the shelf life and keeping the mouthwash fresh.

5. Glycerine

Glycerine is commonly used in herbal mouthwashes as a sweetening agent, a humectant to provide moisture and body, and to enhance the overall texture and taste. It also helps stabilize the formulation and prevent separation of ingredients.

6. Sodium Lauryl Sulphate

Sodium lauryl sulfate (SLS) is a surfactant and foaming agent commonly used in herbal mouthwashes to enhance cleaning and provide a foaming action. It helps to remove food debris and particles from the mouth and contributes to plaque solubility during brushing, making it easier to clean.

Methods of Extraction Of Guava Leaves

The leaf samples are washed in tap water.

↓

The leaves are then dried in a hot air furnace at 121 degrees Celsius.

↓

Make a powder of leaves in mortar and pestle.

↓

Wash all the glasswares and dry it on hot air oven

↓

Next, pour 100 ml of distilled water and 10 g of powder into a conical flask.

↓

Heat it into water bath for 15 min.

↓

Filter a solution using filter paper

↓

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Then take a filter solution of guava leaves.

Table 1: Ingredients (8,9)

Ingredients	Qunatity	Properties
Guava powder	10 Gm	Anti Bacterial
Clove oil	2-3 Drops	Anti Inflammatory
Peppermint oil	2-3 Drops	Anti Oxidant
Sodium Benzoate	0.4 Gm	Preservative
Glycerine	2-3 ml	Emulsifying Agent
Sodium Lauryl Sulphate (SLS)	1 Gm	Foaming Agent

Formulation of Herbal Mouthwash

All glasswares are washed and sterilized in Autoclave at 121^{o}c for 15 min

↓

Take a beaker add guava extract of required quantity

↓

Add clove oil and peppermint oil of 2-3 drops in guava extract

↓

Then add 0.4 gm Sodium benzoate, 2-3 ml glycerine, and 1 gm Sodium Lauryl Sulphate (SLS)

↓

Mixed it well then add coloring agent

↓

Prepared Mouthwash was packed in suitable Container and labelled and used for further Studies(8,9)

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Figure 7: Formulation of Herbal Mouthwash

Evaluation test

a) Color:

The color change observed here is the original color of the mouthwash sample. The color is light Orange on the 0th day and degrades faster at the ambient temperature.

b) Taste:

The taste is strong and remains almost same over the week except for the ambient temperature sample.

c) Flavor :

The flavor is practically unchanged, with a great smell of clove and peppermint. Only a week later, when kept at room temperature, the aroma fades slightly.

d) Texture :

Sample remain clear liquid over a week except the one kept at the ambient temperature which develops turbidity after the 3rd day.

Chemical tests:

Sr. No	Phytochemical Tests	Observation	Result
1.	Determination of Alkaloids:- About 2ml of 10% aqueous hydrochloric acid was stirred with2ml of guava extract. 1ml was treated with a few drops of Wagners reagent and second 1ml portion was then treated similal with Mayers reagent	Precipitate were observed	Positive
2.	Test for Tannins:- In this determination, a Ferric chloride solution plus5% ferric chloride solution will be added drop by drop, 2-3mls in the solution of leave of guava extract in order to observed the appearance of Tannins	Dark green colour solution were appeared	Positive
3.	Determination of Saponin:- In this test 5ml of the extract was poured in to a test tube + 5ml of water and its then shaken strongly to determine the present saponin	Honey tomb froth in the solution	Positive

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	content in the sample		
4.	Test for Flavonoid:- 3ml aliquot of the filtratedand 1ml of the 10% NaOH sodium hydroxide was mixed together, to find the possibility of flavonoid	Appearance yellow colour	Positive
5.	Test for Anthraquinones:- 2ml of each plant extract was shaken with 10ml benzene, and 5ml of 10% ammonia solution was added.	No pink colour formed	Positive
6.	Alkaline Reagent Test: Extract is treated with 10% NaOH solution	Formation of Intense yellow colour	Presence of Flavonoids
7.	NH4OH Test: 3ml of extract is treated with 10% NH4OH solution	Development of yellow fluorescence	Presence of Flavonoids
8.	Zn Test: 2ml Extract is treated with Zinc dust and Conc. HCL	Development of red colour	Presence of Flavonoids
9.	Confirmatory Test: Shinoda test: dissolve the plant extract in ethanol. Add few drops of Conc. HCL. Add a zinc dust. Reaction for few min at room temperature	Development of Red Colour	Positive

Table 2: Chemical Tests

Figure 7: Chemical Tests

Sensory Characteristics:

Sample	Temperature	Texture
0 day	Ambient	Clear
0 day	Refrigerated	Clear
7^{th} day	Ambient	A little turbid
7^{th} day	Refrigerated	Clear

Table 3

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Physical Characteristics:

Day of measurement	PH of the smaple
0^{th} day	6.5
7^{th} day	6.5

Table 4

Thus ,no change was found in the acidity of the sample over a week and the sample was observed to be quite stable chemically.

Microbial Analysis

Storage Life (7 days)

Storage temperature of sample	Storage Life (log cfu/ml) 0^{th} day	Storage Life (log cfu/ml) 7^{th} day
Ambient	No Growth	4.9
Refrigerated	No Growth	4.4

Table 5

Stability Studies:

The formulation and preparation of any product is incomplete without thorough stability studies of the finished product. Accelerated stability tests are a general method for estimating the stability of any product by subjecting it to elevated temperatures in accordance with ICH recommendations.The samples were stored at under the following conditions of temperature as 3-50 C, 250 C RH=60%, 400 C ±2% RH= 75%. Finally, the samples retained under expedited research were collected and analyzed at monthly intervals.

II. DISCUSSION

By using herbal mouthwash showed a multipurpose effect and all these herbal ingredients showed significant different activities. Based on results and discussion , the formulation were stable at room temperature or low temperature and can be safely used in oral cavity.

III. CONCLUSION

A global trend toward natural and holistic approaches to healthcare is reflected in the growing popularity of herbal mouthwash. Numerous plant-based extracts used in herbal mouthwashes, including guava leaves, clove, and peppermint oil, have been shown in scientific research to have strong antibacterial, antifungal, and anti-inflammatory qualities. Because of these advantages, herbal formulations are especially useful for treating common oral conditions like plaque build up, halitosis, and gingivitis.

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