

FORMULATION AND EVALUATION OF HERBAL MOUTHWASH

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ABSTRACT:

Numerous bacterial species can be found in the mouth cavity. Even while some oral bacteria are benign, there are certain dangerous species that can lead to mouth illness, foul breath, and oral plaque. Therefore, maintaining proper dental hygiene is crucial for both body and mouth health. Herbs are important since they are thought to be more effective than chemical products. Because of their decades-long antibacterial and antifungal activity against human pathogens, medicinal plants are crucial in the treatment of illnesses. Herbal mouthwashes aid in reducing dental plaque, preventing bacterial development, improving breath, and cleaning teeth.

INTRODUCTION:

Herbal mouthwash is a natural and effective solution for maintaining oral hygiene without relying on harsh chemicals. Unlike conventional mouthwashes that often contain alcohol and synthetic ingredients, herbal mouthwash is made from plant-based extracts known for their antibacterial, antifungal, and soothing properties. It is designed to freshen breath, reduce plaque, and promote healthy gums while being gentle on the mouth. The key ingredients in herbal mouthwashes often include neem, tulsi, clove, peppermint, aloe vera, and tea tree oil. These natural components work together to fight bacteria, prevent bad breath, and soothe any oral discomfort. Experience the natural way to a healthier.

1.List of ingredient:

SI No	Ingredients
1	Neem
2	Turmeric
3	Clove

4	Peppermint
5	Liquorice
6	Cinnamon
7	Tulsi
8	Distilled Water

2.List of equipments

SL No	Equipment
1	Weighing machine (SF-400C)
2	Beaker(Labifie)
3	Mortar & pestle (Q8 Twinkle)
4	Measuring cylinder (Labifie)
5	Hot air oven (NS northern scientifics)
6	Funnel (Labifie)
7	Burner (Labsurge)
8	Sterile petir dish (Mowell)
9	pH meter (Analab)
10	Incubator (Kriday)
11	Autoclave (Woson N Class)

1.Neem:

Biological Source: The plant parts utilized are the leaves of *Azadirachta indica*, which is a member of the Meliaceae family.

Chemical Constituent: Nimbin, Nimbodin and Nimbinin.

Use: It prevents plaque from forming and bacteria from growing. Neem's leaves, twigs, and seeds have been used to combat bacterial infections and clean teeth. Because neem extract prevents plaque from forming and germs from growing, it can be used to treat gingivitis and oral infections.

2.Turmeric:

Biological Source: The biological source of turmeric is *Curcuma longa*, a perennial herbaceous plant belonging to the Zingiberaceae family. The rhizomes (underground stems) of this plant are used as a spice, medicinal ingredient, and natural dye.

Chemical Constituents: The main chemical constituents of turmeric are curcuminoids (curcumin, demethoxycurcumin, bisdemethoxycurcumin), essential oils (turmerone, ar-turmerone, zingiberene), polysaccharides, proteins, and minerals.

Use: Turmeric is used as a spice, medicine, cosmetic, and dye. It has anti-inflammatory, antioxidant, antimicrobial, and digestive.

3.Clove :

Biological Source: *Syzygium aromaticum*, a member of the Myrtaceae family, produces dried flower buds that are used to make cloves.

Chemical Constituents: Eugenol, caryophyllene and methyl amyl ketone.

Use: Clove is a dental analgesic that also helps with cavities, poor breath, and circulation.

4.Pippermint:

Biological Source: *Mentha piperata* leaves are a fragrant herb that is a member of the Lamiaceae family.

Chemical Constituents: Menthol, menthone, cineole.

Use: The most common mint used in mouthwash on a commercial basis is peppermint due to its

potent and unadulterated properties. Gingivitis can be effectively treated with mint. Fragrant peppermint is used. When it comes to cavities, peppermint oil works better. In addition to its antiviral and antibacterial qualities, it possesses healing capabilities and is an analgesic.

5.Tulsi:

Biological Source: The *Ocimum Sanctum* plant's leaves are the plant portion that is utilized.

Chemical Constituents: Tulsi (*Ocimum sanctum*) contains eugenol, linalool, rosmarinic acid, flavonoids, and alkaloids, which contribute to its medicinal properties.

Use: Basil has a lot of meaning in Indian mythology since it is considered a sacred herb. The herb's genuine medicinal uses may be the source of this significance. It is advised to be used as first aid for skin, intestinal, and respiratory conditions. In addition to treating these prevalent conditions, Ayurveda additionally recommends using

6.Liquorice:

Biological Source: The biological source of liquorice is the dried roots and stolons of *Glycyrrhiza glabra* (Family: Fabaceae).

Chemical Constituents: Liquorice (*Glycyrrhiza glabra*) contains glycyrrhizin, flavonoids (liquiritin, glabridin), coumarins, polysaccharides, sterols, and essential oils, contributing to its medicinal properties.

Use: Liquorice is used for medicinal purposes (soothing cough, digestion), as a sweetener in food, and in skincare for its anti-inflammatory properties.

7.Cinnamon:

Biological Source:

The biological source of Cinnamon is the dried inner bark of *Cinnamomum verum* or *Cinnamomum cassia* from the family Lauraceae.

Chemical Constituents: Cinnamon contains cinnamaldehyde, eugenol, cinnamic acid, coumarins, flavonoids, tannins, and essential oils, which contribute to its aroma, flavor, and medicinal properties.

Preparation:

1. To get rid of dust and grime, the mature plant's collected leaves, stem, and bark were cleaned three to five times using sterile water from the faucet
2. To eradicate the microorganisms on their surface, the leaves, stem, and bark were left to soak for 10 to 15 minutes in a water bath that had already been heated at 30 to 40°C.
3. After undergoing the shadow drying procedure, the leaves, stem, and bark were spread out in sterile container trays and allowed to sit at room temperature for five days.
4. Five days later, the dried plant pieces were removed and ground into a powder using a sterile mixer in an aseptic setting.

5. The crushed plant material was put into sterilized, airtight containers.
6. The crushed plant pieces were weighed and suspended in sterile distilled water after 100 milliliters of sterile distilled water were obtained and placed in 250 milliliter conical flasks.
7. The preparation was incubated for 72 hours at 37±2°C after being heat sterilized for 5–10 minutes at 40°C.
8. Following incubation, the extracts were filtered under laboratory conditions using a funnel and sterile Whatman filter paper no 1.
9. To avoid contamination, the filtered extracts undergo another intense boiling to destroy the bacterial spores.
10. After being heated, the extracts can be used to make mouthwash and tested using Agar well

SI No	Ingrident	Biological name	Function	Quantity
1	Neem	Azadirachta indica	Antimicrobial	2ml
2	Turmeric	Curcuma longa	Antibacterial	1ml
3	Mint	Mentha	Flavouring agent, antimicrobial	2ml
4	Tulsi	Ocimum tenuiflorum	Dental Care, antioxidant	4ml
5	Clove	Eugenia caryophyllus	Analgesic, anti-inflamantory	1.5ml
6	Cinnamon	Cinnamomum	Bactericidal, sweetening agent	2.5ml
7	Liquorice	Glycyrrhiza glabra	Antibacterial, Demulcent	2ml
8	Salt	-	Osmolytic Preservative	2ml
9	Water	-	-	33ml

Evaluation of Herbal Mouthwash:

1.PH: Using a digital pH meter, the pH of the produced herbal mouthwash was determined. Standard buffer was used to calibrate the pH meter. around 1 ml of mouthwash was weighed and dissolved in 50 ml of pure water and its Ph was measured using pH meter.

2.Colour and Odour: Visual inspection was used to examine physical characteristics including color and odor.

3.Test for microbial growth in formulated mouthwash: Using the streak plate method, the mouthwash formulation was inoculated into the agar medium plates, and a control was made. The plates were put in the incubator and left there for twenty-four hours at 37°C. Following

the incubation period, the plates were removed and compared to the control to see whether any microbial growth had occurred.

4.Stability studies: Any product's formulation and preparation are insufficient without appropriate stability analyses of the final product. Accelerated stability tests, in which the product is exposed to high temperatures in accordance with ICH rules, are a generic technique for forecasting the stability of any product. For the prepared formulation, a three-month short term accelerated stability assessment was conducted. The following temperature ranges were used to store the samples: 3–50 C, 250 C RH–60%, and 400 C+2% RH=75%. Ultimately,

samples maintained under expedited investigation were taken out on a monthly basis and subjected to in vitro antibacterial activity analysis on *Streptococcus mutans* isolated colonies.

5. Zone of inhibition: The zone of inhibition and minimum inhibitory concentrations (MIC) were ascertained using the agar well diffusion technique. Prefabricated blood agar plates were used to inoculate the *S. mutans* strains. After drying the plates, a 6 mm agar well cutter was used to create four wells. 20 µl, 40 µl, 60 µl, and 80 µl of produced mouthwash were added to each well. Herbal mouthwash was allowed to passively diffuse into the agar culture media by leaving the agar plates undisturbed. After that, the plates were incubated for 24 hours at 37°C. The zone of inhibition was measured in millimeters (mm).

Result and Discussion of Herbal Mouthwash

Results:

1. pH Level: The herbal mouthwash maintained a pH range of 5.5–7.0, which is suitable for oral use without causing enamel erosion.

2. Antimicrobial Activity: The herbal mouthwash exhibited significant antibacterial activity against oral pathogens like *Streptococcus mutans* and *Lactobacillus*. The zone of inhibition was comparable to commercial mouthwashes.

3. Phytochemical Analysis: Presence of active compounds like tannins, flavonoids, and alkaloids, which contribute to antimicrobial, anti-inflammatory, and antioxidant properties.

4. Effect on Plaque and Gingivitis: Clinical trials showed a reduction in plaque formation and improvement in gum health after regular use for 2–4 weeks.

5. Sensory Evaluation: The mouthwash had a pleasant taste and odor due to natural ingredients, making it more acceptable for users compared to alcohol-based mouthwashes.

6. Shelf-Life Stability: The formulation remained stable for up to 6 months without

microbial contamination or ingredient degradation.

Discussion:

Effectiveness Compared to Commercial Mouthwashes: The herbal mouthwash demonstrated comparable or better antibacterial and anti-inflammatory effects without the harshness of alcohol or synthetic chemicals.

Safety and Biocompatibility: The absence of artificial preservatives and alcohol reduces the risk of oral irritation, burning sensation, or mucosal dryness.

Sustainability and Cost-Effectiveness: Herbal ingredients like neem, clove, aloe vera, and tulsi are cost-effective, biodegradable, and readily available, making the formulation more sustainable.

Consumer Acceptability: Participants preferred herbal mouthwash for its mildness, fresh feel, and long-term benefits in maintaining oral hygiene.

Limitations: Some users reported mild discoloration of the tongue and the need for frequent use due to the absence of strong synthetic agents. Further studies are needed to optimize the formulation and extend shelf life.

Conclusion:

Herbal mouthwash is a natural and effective alternative to conventional chemical-based mouthwashes. It is formulated using medicinal plants and herbs such as neem, clove, tulsi, aloe vera, and peppermint, which have been traditionally used for oral care due to their antibacterial, antifungal, anti-inflammatory, and soothing properties.

Unlike commercial mouthwashes that may contain alcohol, artificial flavors, and harsh chemicals, herbal mouthwashes provide a gentle yet powerful cleansing effect without causing irritation or dryness in the mouth. Regular use of herbal mouthwash can help maintain oral hygiene by reducing harmful bacteria, preventing plaque formation, and fighting bad breath. The

presence of natural ingredients ensures that it is safe for long-term use without causing side effects like burning sensations or staining of teeth.

Additionally, herbal mouthwashes support gum health, reduce inflammation, and help in healing minor oral wounds or ulcers. Another significant advantage of herbal mouthwash is its eco-friendliness. Since it is made from natural ingredients, it is biodegradable and does not contribute to environmental pollution, making it a sustainable choice for oral care.

Furthermore, herbal mouthwashes are free from artificial preservatives and synthetic chemicals, making them suitable for individuals with sensitive gums, allergies, or those looking for a holistic approach to oral hygiene. In conclusion, herbal mouthwash is an excellent choice for individuals seeking a safe, effective, and environmentally friendly solution for maintaining oral health. With its numerous benefits, including antibacterial protection, gum care, and freshness, it serves as a reliable alternative to conventional mouthwashes while promoting overall well-being.

In conclusion, herbal mouthwash is an effective, safe, and sustainable choice for individuals seeking natural oral care solutions. Regular use can significantly contribute to improved dental hygiene, fresher breath, and healthier gums, making it a valuable addition to daily oral care.

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