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#### **Review Article**

# **Formulation And Evaluation of Herbal Mouth Wash**

# Vishwasrao Niraj\*, Monali Hon

Rashtrsant Janardhan Swami College of Pharmacy Kokamthan Kopargaon.

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#### ABSTRACT

The present study focuses on the formulation and evaluation of a herbal mouthwash using natural plant extracts known for their antimicrobial and oral health-promoting properties. Synthetic mouthwashes, though effective, often come with side effects such as staining of teeth, altered taste sensation, and mucosal irritation. To address these concerns, a herbal alternative was developed using extracts of Azadirachta indica (Neem), Osmium sanctum (Tulsi), and Salvadora persica (Miswak), which possess proven. Antibacterial, anti-inflammatory, and antioxidant properties. The formulated mouthwash was evaluated for organoleptic properties, pH, microbial efficacy, stability, and safety. The results demonstrated that the herbal mouthwash exhibited significant antibacterial activity against oral pathogens such as Streptococcus mutans and Lactobacillus species, maintained an acceptable pH, and showed good stability over time. Sensory evaluation confirmed its palatability and acceptability. Thus, the herbal mouthwash offers a natural, effective, and safe alternative to conventional chemicalbased oral rinses.

# **INTRODUCTION**

#### **History:**

The first koos rences to mauth raming is in Ayurved of ging L the Greek and Roman periods, mouth riting falleg meaning among the upper classes and Hippocrates recommended a mixture of serving The Jewish Talmud, dating hack, about 1,500 years, sugpots & care for menning dough water and olive oil. The ancient Chinese had ato garglind saltwater. Before Europeans came to the Americas, Native North American and Mescomerican cultures ged mouthwashes, often made from plants such as Coptis trifolia Indeed, Autoc dentatry wa mere advanced than European dentistry of the age. Peoples of the Americas used sell water mouthwashes for sore throats, and other mouthwashes for problems such as teething and mouth. Anton van Leeuwenhock, the famous 17th century microscopist, discovered living organises (living, because they were mobile) in deposits on

\*Corresponding Author: Vishwasrao Niraj

Address: Rashtrsant Janardhan Swami College of Pharmacy Kokamthan Kopargaon.

Email : aashutoshvi588@gmail.com

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the teeth (what we now call dental plaque). He also found organisms in water from the canal next to his home in Delft. He experimented with samples by adding vinegar or brandy and found that this resulted in the immediate immobilization or killing of the organisms suspended in water. Next he tried rinsing the mouthof himself and somebody else with a mouthwash containing vinegar or brandy and found that living organisms remained in the dental plaque. He concluded correctly that the mouthwash either did not reach, or was not present long enough, to kill the plaque organisms. In 1892, German Richard Seifert invented mouthwash product Odol, which was produced by company founder Karl August Lingner (1861-1916) in Dresden.

## Mouthwash:

Mouthwash is an aqueous solution most commonly used for plaque control and is a bealing liquid that is retained by mouth and flicking by perioral musculature action to remove oral pathogens.

# Herbal Mouthwash :

Herbal mouthwashes are mouthwashes that are prepared from natural plant extracts. A natural extract present in the herb mouthwashes are obtained from various plant leaves, fruits, seeds and various tree oils. Herbal mouthwashes are high in demand, because they act on oral pathogens and relieve the pain instantly and are also less sideeffect. Chemical mouthwashes have hydrogen peroxide and chlorhexidine as an immediate whitener, sterilizer and pain reliever of teeth, but they tend o produce discoloration of teeth and may produce side effect, meanwhile they are cost effective mouthwashes for sore throats, and other mouthwashes for problems such as teething and mouth ulcers. Anton van Leeuwenhoek, the famous 17th century microscopist, discovered living organisms (living, because they were mobile) in deposits on the teeth (what we now call dental plaque). He also found organisms in water from the canal next to his home in Delft. He experimented with samples by adding vinegar or brandy and found that this resulted in the immediate immobilization or killing of the organisms suspended in water. Next he tried rinsing the mouthof himself and somebody else with a mouthwash containing vinegar or brandy and found that living organisms remained in the dental plaque. He concluded correctly that the mouthwash either did not reach, or was not present long enough, to kill the plaque organisms. In 1892, German Richard Seifert invented mouthwash product Odol, which was produced by company founder Karl August Lingner in Dresden.

# Herbal Mouthwash: A Natural Approach to Oral Care:

Herbal mouthwash is a plant-based oral hygiene product designed to maintain oral health through natural ingredients known for their medicinal properties. It serves as a gentle and effective alternative to chemical-based commercial mouthwashes. offering benefits such as antimicrobial action, anti-inflammatory effects, and soothing relief for oral tissues. Commonly used herbs in such formulations include neem, clove, cinnamon, and licorice, each contributing unique therapeutic actions. Neem possesses strong antibacterial and antifungal properties that help reduce dental plaque and gingivitis. Clove, rich in eugenol, offers antiseptic and analgesic benefits, making it effective against toothache and oral infections. Cinnamon exhibits broad- spectrum antimicrobial activity and helps combat bad breath, while licorice soothes irritated mucous membranes and promotes healing. Unlike zalcohol-based mouthwashes, herbal formulations are mild and non-irritating, making them suitable



for individuals with sensitive gums, children, and those who prefer chemical-free products. Salt is often added to enhance cleansing action and reduce inflammation, while natural preservatives like sodium benzoate are used to extend shelf life without compromising safety. Herbal mouthwash can be used regularly to prevent oral conditions such as halitosis, gingivitis, and mouth ulcers. It is also beneficial as a supportive therapy in periodontal treatment and post-surgical oral care. The preparation of herbal mouthwash is simple and cost-effective, often involving the decoction or infusion of dried herbs in water followed by filtration and preservation. It aligns with the principles of traditional medicine and is increasingly supported by modern research, which recognizes the efficacy of phytochemicals in oral health management. In conclusion, herbal mouthwash represents a sustainable, safe, and effective solution for daily oral hygiene, combining nature's healing properties with ease of use and minimal side effects.

#### Herbal Mouthwash:

Herbal mouthwashes are mouthwashes that are prepared from natural plant extracts. A natural extract present in the herb mouthwashes are obtained from various plant leaves, fruits, seeds and various tree oils.

# Why Should We Prefer Herbal Mouthwash?

Herbal mouthwashes are high in demand, because they act on oral pathogens and relieve the pain instantly and are also less side-effect. Chemical mouthwashes have hydrogen peroxide and chlorhexidine as an immediate whitener, sterilizer and pain reliever of teeth, but they tend to produce discoloration of teeth and may produce side effect, meanwhile they are cost effective.

# Advantage Of Herbal Mouthwash:

The use of herbal mouthwashes has increased over chemical mouthwashes due to their non-irritating and non- staining properties and does not contain alcohol.

- They have very minimal or no side effects and are less harmful.
- All herbal mouthwashes are alcohol and/or sugar free.
- Herbal mouthwashes are gentle on even the most sensitive mouths
- Herbal mouthwashes have natural antibacterial properties.
- Does not contain any harsh ingredients.
- She is in high demand.
- Keeps your mouth healthy.

## Herbal Mouthwash Do Not Contain:

- 1. Alcohol
- 2. Sugar
- 3. Artificial colours
- 4. Stannous fluoride
- 5. Artificial sweeteners
- 6. Cetylpyridinium chloride (CPC)
- 7. Sodium Lauryl Sulphate (SLS)
- 8. Harsh chemical preservative

Herbal mouthwash has gained significant popularity in recent years as people become more aware of the potential side effects associated with chemical-based oral hygiene products. Unlike synthetic formulations that often contain alcohol, chlorhexidine, or artificial flavors and colors, herbal mouthwashes rely on the pharmacological actions of natural plant extracts. These herbal constituents provide a wide range of therapeutic effects, including antibacterial, antifungal, antiviral, antioxidant, anti-inflammatory, and analgesic activities, which help in maintaining overall oral hygiene and preventing various oral infections. The use of medicinal plants in oral care is rooted in traditional systems of medicine such as



Ayurveda and Unani, where herbs like neem, clove, tulsi (holy basil), triphala, and turmeric have been used for centuries to treat gum diseases, dental caries, and bad breath. Scientific studies have supported these traditional claims by showing that many herbal extracts can effectively inhibit the growth of oral pathogens such as Streptococcus mutans, Prohormones gingival is, and Candida albicans. For instance, neem has been shown to prevent plaque formation and reduce bacterial colonization, while clove extract is known for its strong analgesic and antimicrobial actions that help relieve dental pain and infections. In addition to antimicrobial protection, herbal mouthwashes also promote gum healing and tissue regeneration. Herbs like licorice and aloe vera contain flavonoids and glycosides that help reduce inflammation, soothe oral ulcers, and support the repair of damaged mucosa. This makes herbal mouthwash especially useful for patients suffering from periodontitis, gingivitis, or those recovering from dental surgeries. Some herbal ingredients also act as natural breath fresheners, offering a pleasant aroma without the use of synthetic perfumes. Another advantage of herbal mouthwashes is their biodegradability and ecofriendliness. Since they are composed of natural substances, they pose no harm to the environment upon disposal. Moreover, they are generally non-toxic, with minimal to no adverse effects, even when used over long durations. This makes them ideal for daily use and for people who are allergic or sensitive to strong chemical agents. Preparation of herbal mouthwash can be done on a small scale at home or on a larger commercial scale. At home, users can boil selected herbs in water to make a decoction, filter the solution, and store it with a natural preservative like sodium benzoate. On an industrial scale, advanced techniques such solvent extraction. as lyophilization, and quality control testing are employed to standardize the herbal content and

ensure consistency in efficacy. In summary, herbal mouthwash is a holistic, safe, and effective option for maintaining oral hygiene. It offers a balanced combination of therapeutic and preventive effects, making it suitable for routine oral care as well as in the management of specific dental conditions. With growing consumer interest in natural and organic products, herbal mouthwashes are becoming an essential component of modern oral health regimens, providing a gentle yet powerful way to promote a healthy mouth and fresh breath without the drawbacks of synthetic chemicals. Mouthwash is a liquid preparation used in the oral cavity for its antiseptic, cleansing, and refreshing Among properties. various types, herbal mouthwashes have gained significant attention for being natural alternatives with fewer side effects compared to chemical-based ones like chlorhexidine. Herbal mouthwashes contain plant extracts and essential oils known for their antimicrobial, anti-inflammatory, and healing properties. The growing global trend towards natural and chemical-free healthcare products has popularity of herbal further fueled the mouthwashes. Historically, the use of herbs for oral hygiene dates back thousands of years. Ancient Egyptians, Greeks, Chinese, and Indians practiced herbal oral care as part of their daily routines. Ayurveda, the traditional Indian system of medicine, extensively describes various plants beneficial for oral health. Similarly, Traditional Chinese Medicine (TCM) and Unani medicine emphasize herbal formulations for maintaining oral hygiene. With advances in modern science, many traditional herbal practices have been validated, leading to the development of commercially available herbal mouthwashes today. The composition of herbal mouthwashes involves various typically plant-derived ingredients known for their therapeutic properties. Commonly used herbs include neem (Azadirachta indica), which offers antibacterial and antifungal

effects, and tea tree oil (Melaleuca alternifolia), valued for its potent antiseptic action. Clove (Syzygium aromaticum) provides analgesic and antimicrobial benefits, while peppermint (Mentha piperita) is widely appreciated for its cooling, antibacterial effects and refreshing taste. Tulsi (Osmium sanctum), also called holy basil, exhibits strong anti-inflammatory and antimicrobial properties. Other ingredients often used are chamomile (Matricaria chamomilla) for its soothing effects, licorice (Glycyrrhiza glabra) for anti-plaque activity, and myrrh (Commiphora myrrha) for its antimicrobial and wound-healing properties. Besides herbal extracts, natural preservatives like grapefruit seed extract, flavoring agents, and humectants such as glycerin are often incorporated into formulations to improve stability and user acceptability. The mechanism of action of herbal mouthwashes primarily revolves around the antimicrobial activities of their active compounds. Herbal extracts inhibit the growth and adherence of pathogenic oral bacteria responsible for plaque formation, gingivitis, and bad breath. Additionally, their anti-inflammatory properties help reduce gum swelling and irritation, while antioxidant effects protect the oral tissues from oxidative damage. Some herbs also possess astringent action, promoting gum tightening and reducing bleeding, and a few provide mild aesthetic effects, offering relief from oral discomforts like sore gums and ulcers. Herbal mouthwashes offer several benefits over their synthetic counterparts. One of the key advantages is safety; they are less likely to cause adverse effects like tooth staining, taste disturbances, or mucosal irritation, which are common with chemical mouthwashes like chlorhexidine. Their natural composition promotes gentle healing and tissue regeneration. Some herbal mouthwashes have shown anti-cavity effects by preventing bacterial adhesion and acid production. Their typically pleasant, natural taste also makes them

more acceptable for long-term use. Furthermore, since they lack alcohol and strong chemicals, they are suitable for sensitive users, including children and the elderly. However, herbal mouthwashes are not without limitations. The potency of herbal extracts can vary based on plant source, harvesting conditions, and extraction techniques, leading to inconsistency in product effectiveness. Herbal formulations generally have a shorter shelf life than chemical-based ones unless adequately preserved. Standardization remains a major challenge; maintaining consistency in concentration and quality across batches is difficult. Additionally, though rare, some individuals may experience allergic reactions to specific plant components. Another concern is the relatively limited number of large-scale clinical trials supporting the efficacy of herbal mouthwashes compared to the robust evidence available for synthetic products. Recent research has strengthened the case for herbal mouthwashes. Studies comparing neem-based mouthwashes to chlorhexidine found that neem mouthwash is nearly as effective in reducing plaque and gingivitis. Green tea extracts, rich in catechins, have been shown to inhibit key oral pathogens like Streptococcus mutans and Porphyromonas gingivalis, major contributors to dental caries and periodontitis. Aloe vera mouthwash has demonstrated similar efficacy to chlorhexidine in plaque control, with the added benefit of healing minor oral wounds. Furthermore, turmericbased mouthwashes have shown promising antiinflammatory and antimicrobial effects, making them effective in managing gingivitis. Several herbal mouthwashes are commercially available, each boasting different herbal formulations. Himalaya Hiora-K mouthwash contains clove, pilu, and other plant extracts to reduce sensitivity and plaque. Dabur Herbal Mouthwash combines neem, mint, and tulsi for a refreshing and protective effect. TheraNeem Mouthwash is

enriched with neem leaf extract and essential oils to offer a potent natural antimicrobial action. Aloedent Aloe Vera Mouthwash includes aloe vera, tea tree oil, and peppermint to provide soothing, antibacterial protection. Herbodent is another popular Ayurvedic formulation designed for comprehensive oral care. Simple herbal mouthwash formulations can be prepared at home or in small-scale setups. A basic recipe might include neem leaf extract (5%), tulsi leaf extract (3%), clove oil (0.5%), peppermint oil (1%), glycerin (10%), and water to make up 100%. The procedure involves mixing glycerin with water, adding the herbal extracts and oils, filtering the solution, and storing it in a cool, dark place. Natural preservatives like sodium benzoate derived from fruits can be used to prolong shelf life. Such formulations offer flexibility and customization according to personal needs and preferences. Looking into the future, herbal mouthwashes hold immense promise. Advancements in nanotechnology are being explored to enhance the bioavailability and effectiveness of herbal extracts through nano formulations. Increasing clinical trials and evidence-based research will strengthen the credibility of herbal mouthwashes among healthcare professionals and consumers alike. Personalized oral care products based on individual oral microbiota profiles may soon become a reality. The global market for organic and eco-friendly oral care products continues to expand, driven by rising consumer awareness of the adverse effects of synthetic chemicals. In conclusion, herbal mouthwashes represent a safe, effective, and sustainable approach to oral hygiene, and with greater scientific backing and standardization, they are poised to become an integral part of mainstream dental care.

#### **Uses Of Herbal Mouthwash:**

Many conditions within the oral cavity require the use of a mouthwash:

- This can vary from breath freshener to treatment of life threatening secondary infectious such as oral mucositis in patient undergoing bone marrow tratoplant therapy.
- Use of herbal mouthwash is to improve oral hygiene.
- It help to control dental plaque.
- It can be use in gum diseases.
- Used for killing germs in oral cavity.
- It freshens breath and covers bad breath.
- Using a mouthwash for gum disease prevention is very important.
- It is use to clean septic sockets.
- It relieves pain and inflammation.
- In treatment of Mucositis and Halitosis. Used in Periodontal diseases.

#### **Functions Of Herbal Mouth Wash:**

- Herbal mouthwash uses time tested ingredients.
- Herbal mouthwash is gentle for even the most sensitive mouths
- Herbal mouthwash has naturally antibacterial properties.
- Herbal mouthwash contains no harsh additives.
- Herbal mouthwash is effective
- Herbal mouthwash doesn't cause dry mouth.
- Herbal mouthwash helps keep your mouth (and body) healthy.
- Herbal mouthwash contains no "mystery" ingredients

# Disadvantages Of Herbal Mouth Wash Overusing:

Using mouthwash too much or inappropriately may lead to serious issues. For example, mouthwashes with a high level of alcohol can burn



delicate mucous membranes in your mouth. While chlorthexidineghiconate, an Ingredion present in some merutinwashes, stains and darkens teeth when in contact with leftover food in your mouth.

#### **Benefits Of Polyhedral Mouthwash:**

- Natural mouthwash uses time-tested ingredients.
- Natural mouthwash is gentle for even the foremost sensitive mouths
- Natural mouthwash feels great.
- Natural mouthwash has naturally antibacterial properties.
- Natural mouthwash contains no harsh additives.
- Natural mouthwash is effective.
- Natural mouthwash doesn't cause waterlessness.
- Natural mouthwash is in high demand.
- Natural mouthwash contains no "mystery" ingredients

## Aim: Formulation and Evaluation of Herbal Mouthwash Objectives:

- 1. To clean and refresh the oral cavity.
- 2. Reduce the plaque growth in your mouth, decrease your chances of developing gum disease.
- 3. prevent tooth decay.
- 4. Kills germs that cause bad breath
- 5. Relieve infection.
- 6. Prevent dental caries.
- 7. Prevent bleeding gums.

# **MATERIAL AND METHOD:**

#### **MATERIAL:**

#### 1. Clove

Clove (Syzygium aromaticum), a highly aromatic flower bud native to the Maluku Islands in

Indonesia, has been extensively used in traditional medicine for centuries. It belongs to the family Myrtaceae and is known for its strong, pungent aroma and flavor, which is primarily due to its high content of eugenol, a phenolic compound that constitutes up to 70–90% of clove essential oil. In oral healthcare, clove has been widely recognized for its antiseptic, analgesic, antimicrobial, antifungal, and anti-inflammatory properties. These properties make it an ideal candidate for inclusion in herbal mouthwash formulations aimed at improving oral hygiene and preventing common oral conditions such as dental plaque, gingivitis, halitosis (bad breath), toothache, and oral ulcers.

Clove exhibits broad-spectrum antimicrobial activity, particularly against oral pathogens such as:

- Streptococcus mutans (responsible for dental caries),
- Porphyromonas gingival is (linked to periodontal disease),
- Candida albicans (a fungal pathogen in oral thrush).

The eugenol in clove acts by disrupting microbial cell membranes and inhibiting the growth of microorganisms. It also has anesthetic effects, providing temporary relief from toothache and gum pain, which explains its traditional use in dentistry as a painrelieving agent. In fact, clove oil is still used today in modern dental practices for temporary fillings and dry socket treatments. Moreover, clove possesses antioxidant properties, which help in reducing oxidative stress in the oral cavity and contribute to the overall health of oral tissues. Herbal mouthwashes formulated with clove extract or essential oil offer a natural and safer alternative to commercial chemical-based mouthwashes, many of which may cause side effects such as burning sensations, tooth staining, or alteration of taste. The incorporation of clove in



mouthwash not only helps in maintaining oral cleanliness but also promotes healing and provides a refreshing effect due to its distinct flavor and aroma. As consumer preference shifts toward herbal and chemical-free products, clovebased mouthwash formulations align well with the demand for natural, effective, and safe oral hygiene solutions.

Table Ivo. 1			
Taxonomic	Classification		
Rank			
Kingdom	Plantae		
Subkingdom	Tracheobionta (Vascular plants)		
Division	Magnoliophyta (Flowering plants)		
Class	Magnoliopsida (Dicotyledons)		
Order	Myrtales		
Family	Myrtaceae		
Genus	Syzygium		
Species	Syzygium aromaticum (L.) Merr. &		
	L.M.Perry		





Fig 1: Clove

#### 2. Neem

Neem (Azadirachta indica) is a versatile and highly valued medicinal plant belonging to the family Meliaceae and is native to the Indian subcontinent. Traditionally revered as a "village pharmacy" in Ayurveda, Unani, and Siddha systems of medicine, neem has been used for over 2,000 years due to its broad-spectrum therapeutic effects. The neem tree is medium to large in size, with bitter leaves, fragrant white flowers, and olive-like fruits. Almost every part of the neem plant-including the bark, leaves, flowers, seeds, medicinal and oil—has significance. Phytochemically, neem is rich in a variety of bioactive compounds such as azadirachtin, nimbin, nimbidin, salannin, quercetin, limonoids, and various flavonoids. These contribute to its antibacterial, antifungal, antiviral, antiinflammatory, antimalarial. antioxidant, hepatoprotective, anticancer, and antidiabetic properties, making it one of most the pharmacologically potent herbal remedies available. Neem's role in oral and dental care is especially significant. Its antimicrobial action against common oral pathogens like Streptococcus mutans and Candida albicans makes it an effective agent in reducing dental plaque, preventing gingivitis, soothing inflamed gums, and treating halitosis. Traditionally, neem twigs were used as natural toothbrushes ("datun") due to their mechanical cleaning action and the therapeutic release of active compounds during chewing. In modern formulations, neem extract and oil are widely incorporated into herbal toothpastes, powders, and mouthwashes as natural alternatives to chemical antiseptics. Beyond dental care, neem is also recognized for its dermatological uses-it is frequently used in treating acne, eczema, psoriasis, and other inflammatory skin conditions. In agriculture, neem oil and neem cake are popular organic insecticides and soil enhancers, respectively, due to neem's eco-friendly insectrepelling qualities. Scientific research continues to validate neem's traditional uses, with studies confirming its efficacy in managing blood glucose, enhancing liver function, and inhibiting cancer cell growth in vitro. Despite its extensive benefits, caution is advised, particularly with neem oil, which can be toxic in large doses- especially for young children, pregnant women, and immunocompromised individuals. Nevertheless,



neem remains a cornerstone of holistic medicine and sustainable healthcare, embodying the principles of natural healing with minimal side effects. As global interest in herbal medicine grows, neem's importance in therapeutic, cosmetic, and agricultural sectors is only expected to increase.

<b>Taxonomic Rank</b>	Classification	
Kingdom	Plantae	
Subkingdom	Tracheobionta (Vascular plants)	
Division	Magnoliophyta (Flowering	
	plants)	
Class	Magnoliopsida (Dicotyledons)	
Order	Sapindales	
Family	Meliaceae	
Genus	Azadirachta	
Species	Azadirachta indica A. Juss.	
Family Genus Species	Meliaceae Azadirachta Azadirachta indica A. Juss.	

Table	No	2
Table	110.	4



Fig 2. Neem

#### 3. Cinnamon

Cinnamon is a fragrant spice that has been used for thousands of years across cultures, both as a flavoring agent and a traditional remedy. It is harvested by cutting the stems of cinnamon trees, stripping off the outer bark, and allowing the inner bark to curl into rolls as it dries—forming what we know as cinnamon sticks or quills. Ground cinnamon is simply these sticks finely milled. Among its types, Ceylon cinnamon (Cinnamomum verum) is considered superior in quality, with a delicate flavor and low coumarin content, making it a preferred choice for healthconsumers. Cassia conscious cinnamon (Cinnamomum cassia), on the other hand, is darker, more bitter, and more widely used due to its lower cost and availability, especially in North America and Asia. Nutritionally, cinnamon contains small amounts of fiber, calcium, iron, and vitamin K, but its real power lies in its active compounds like cinnamaldehyde, which gives cinnamon its distinctive smell and many of its health properties. Studies suggest cinnamon may improve insulin sensitivity, reduce cholesterol levels, and even protect brain function due to its antioxidant content. It has also shown promise as a natural preservative, owing to its antimicrobial properties. However, because Cassia cinnamon contains significantly more coumarin, which in large doses can damage the liver or interact with medications such as blood thinners, it's important to use it judiciously. In aromatherapy, cinnamon essential oil is also valued for its warming, stimulating effect. Whether used in food, drinks, or natural health remedies, cinnamon remains one of the most versatile and beneficial spices in the world. Medicinally, cinnamon is the focus of ongoing scientific research. Some studies suggest that regular consumption of small amounts of cinnamon may help manage type 2 diabetes by improving insulin sensitivity and lowering fasting blood glucose levels. Other research points to its potential neuroprotective effects, with studies exploring its ability to slow the progression of neurological disorders like Alzheimer's and Parkinson's disease. Additionally, cinnamon has shown antibacterial and antifungal properties against common pathogens such as Candida albicans and E. coli, which supports its traditional use in treating infections. In modern wellness culture, cinnamon is frequently used in teas, tinctures, essential oils, and even skincare



products. Its warming properties make it a favorite in cold weather and traditional medicine systems like Ayurveda and Traditional Chinese Medicine (TCM), where it's believed to stimulate circulation, aid digestion, and reduce inflammation. In cosmetics and aromatherapy, cinnamon oil is used sparingly due to its potency but is valued for its invigorating and antimicrobial qualities.

Table	No.	3
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Taxonomic Rank	Classification
Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Magnoliids
Order	Laurales
Family	Lauraceae
Genus	Cinnamomum
Species	Cinnamomum verum J.
	Presl



Fig 3. Cinnamon

#### 4. Liquorice

Licorice (Glycyrrhiza glabra) has a rich history of use in both traditional medicine and the culinary world. The plant's roots, which can grow up to 6 feet long, are the most valuable part, containing the compound glycyrrhizin that gives licorice its characteristic sweet flavor—approximately 50 times sweeter than sucrose (table sugar). The root is harvested after about 3-4 years of growth, typically from deep, well- drained soils in warm

climates, such as those found in parts of Europe, the Mediterranean, and Central Asia. Historically, licorice was used by the ancient Egyptians, Greeks, and Romans for both medicinal and ceremonial purposes. In addition to its digestive and respiratory benefits, it was prized for its purported ability to enhance longevity, strengthen the immune system, and treat ailments like coughs and colds. Today, licorice is still widely used in herbal remedies and supplements. It's known for its ability to soothe the stomach and intestines, reduce inflammation, and help alleviate symptoms of indigestion, such as heartburn. It is often included in herbal formulas designed to promote gastrointestinal health, and many people use it to relieve the discomfort caused by ulcers or gastritis. Licorice also has a mild diuretic effect, which helps to flush excess fluids from the body, potentially benefiting conditions like fluid retention. In the realm of respiratory health, licorice is used as an expectorant to help break up mucus in the lungs, making it beneficial for treating coughs, colds, and bronchitis. It is commonly found in many over-the- counter cough syrups and lozenges due to its ability to calm the throat and reduce irritation. Despite its many benefits, licorice can cause side effects, particularly when consumed in large amounts. Glycyrrhizin, when consumed excessively, can lead to serious health issues such as high blood pressure, low potassium levels, and even kidney or heart problems. It can also interact with certain medications, especially diuretics, corticosteroids, and blood pressure medication. For this reason, it is important to use licorice products in moderation and avoid long-term use. Pregnant women, those with hypertension, and individuals with kidney or heart disease should avoid using licorice root or containing glycyrrhizin products without consulting a healthcare professional. In addition to its medicinal uses, licorice is also a popular flavoring agent in sweets, particularly in



European, Middle Eastern, and Asian countries. Licorice candy is often made with a blend of sugar, flour, and licorice extract, and it is often combined with aniseed to balance its intense sweetness. In Scandinavian countries, for instance, salty licorice-flavored with ammonium chloride-is a beloved treat. The plant's versatility extends to its use in modern skincare, where licorice extracts are included in creams, lotions, and serums due to their anti- inflammatory, skin-brightening, and soothing properties. Studies suggest that licorice extract can help reduce hyperpigmentation, making it a common ingredient in products aimed at evening out skin tone.

Table No. 4		
Taxonomic Rank	Classification	
Kingdom	Plantae	
Clade	Angiosperms	
Clade	Eudicots	
Order	Fabales	
Family	Fabaceae (Legume family)	
Genus	Glycyrrhiza	
Species	Glycyrrhiza glabra	





**Fig 4. Liquorice** 

#### **METHOD:**

#### **Composition Of Ingredients:**

Material	Quantity for 100 mL
Fresh or dried neem	2 g
leaves	

Clove buds	1 g
Cinnamon bark	1 g
Licorice root	1 g
Salt	0.4 g
Sodium benzoate	0.2 g
Distilled water	100 mL
Beaker	1 (for preparation)
Heating setup	1 (e.g., stove or heating
	plate)
Strainer	1 (fine mesh or muslin
	cloth)
Glass bottle for storage	1 (sterile for storage)

#### **Procedure:**

#### 1. Preparation Of Decoction

- Take 100 mL of distilled water in a beaker.
- Add 2 g of neem leaves, 1 g of clove buds, 1 g of cinnamon bark, and 1 g of licorice root to the water.
- Heat the mixture to 80°C and simmer for 15– 20 minutes.
- Allow it to cool to room temperature.

# 1. Filtration

Once cooled, strain the decoction using a fine mesh or muslin cloth to remove any plant residues.

# 2. Addition Of Salt & Preservative

- Dissolve 0.4 g of salt into the strained decoction.
- Add 0.2 g of sodium benzoate to the decoction as a preservative (to ensure it stays fresh).

# 3. Final Mixing & Storage

- Mix the ingredients well to ensure even distribution of the salt and preservative.
- Transfer the mouthwash into a sterile glass bottle.
- Store in a cool, dark place, or refrigerate for an • extended shelf life.





Fig 5. Decoction Of Herbal Material



Fig 6. Formulation Of Herbal Mouthwash

#### **Phytochemical Testing:**

Phytochemical	Test Name	<b>Reagents Used</b>	Observation	Inference
Alkaloids	Dragendorff's	Dragendorff's:	Reddish-brown or	Presence of alkaloids
	/ Wagner's test	Potassium bismuth	brown precipitate	
		iodide Wagner's:		
		Iodine in KI solution		
Flavonoids	Shinoda test	Magnesium turnings	Pink to red	Presence of
		+ Conc.	coloration	flavonoids
		HCl		
Tannins	Ferric chloride	5% Ferric chloride	Blue-black or	Presence of tannins
	test	solution	greenish black color	
Saponins	Froth test	Distilled water,	Stable persistent	Presence of saponins
		shaken vigorously	froth	
Terpenoids	Salkowski test	Chloroform +	Reddish-brown	Presence of terpenoids
		Conc. H <sub>2</sub> SO <sub>4</sub>	coloration at	
			interface	
Phenols	Ferric chloride	5% Ferric chloride	Blue-green	Presence of phenolic
	test	solution	coloration	compounds
Glycosides	Keller- Killiani	Glacial acetic acid +	Reddish-brown ring	Presence of cardiac
	test	FeCl <sub>3</sub> + Conc. H <sub>2</sub> SO <sub>4</sub>	at the interface	glycosides
Steroids	Liebermann-	Acetic anhydride	Blue-green color	Presence of steroids
	Burchard test	+ Conc. H <sub>2</sub> SO <sub>4</sub>		
Carbohydrates	Molisch's test	$\alpha$ -Naphthol +	Violet ring at	Presence of
		Conc. H <sub>2</sub> SO <sub>4</sub>	junction	carbohydrates

#### **Evaluation Parameter:**

#### **1. Organoleptic Parameter**

These are subjective tests based on the human senses.

• Color: Observe visually against a white background.



- Odor: Smell the mouthwash directly to assess the presence and intensity of herbal scent.
- Taste

# 2. pH Measurement

- Procedure: Use a calibrated digital pH meter to determine the pH.
- Standard: Mouthwashes should typically have a pH between 5.5 and 7.0 to be safe for oral tissues.

# 3. Viscosity

- Instrument: Use a Brookfield viscometer or Ostwald viscometer.
- Purpose: To evaluate the flow behavior and consistency of the formulation.
- Interpretation: Should not be too viscous, as it might be difficult to rinse.

# 4. Antimicrobial Testing

#### **Agar Well Diffusion Method:**

- Inoculation of bacteria/fungi: Pour 20 mL of molten Nutrient Agar or
- Sabouraud Dextrose Agar into sterile Petri dishes. After solidification, inoculate the surface of the agar with the bacterial or fungal suspension using a sterile swab, spreading it evenly.
- Preparation of Wells: Using a sterile cork borer, make wells (5-6 mm diameter) in the agar.

# **Application of Extract:**

- Using a sterile micropipette or syringe, apply 100  $\mu$ L of the prepared extract (concentrated or diluted) into the wells.
- Also, prepare and apply control wells with standard antibiotics (e.g., amoxicillin or fluconazole) for comparison.

#### Incubation:

- Incubate the bacterial plates at 37°C for 24-48 hours.
- For fungal plates, incubate at 25°C for 48-72 hours.

## 5. Stability Testing

#### • Procedure:

Store samples at different temperatures (e.g., 4°C, 25°C, 40°C) for a few weeks. o

Observe for phase separation, precipitation, or color changes.

# 6. Clarity Test

- Method: Hold the sample against a strong light source or black/white background.
- Observation: Should be clear or uniformly turbid if designed as a suspension.

# **RESULT AND DISCUSSION:**

#### **Collection And Authentication:**

The plant was authenticated by Department of botany and Research Centre, at Shri Sadguru Gangageer Maharaj College of Art, Science, Commerce, Kopargaon on 16th April 2025.



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Principal Prof.(Dr.) Madhav Sarode M.Sc., Ph.D	Principal f.(Dr.) Madhav Sarode M.Sc., Ph.D Kopargaon - 423 601, Dist. Ahilyanagar (M.S.) India. • P.B.No.13 • NAAC-Reaccredited 'A++' Grade (CGPA : 3.69) • Best College Award by Savitribal Phule Pune University • ISO 9001:2021 C Founder : Padmabhushan Dr. Karmaveer Bhaurao Patil, D.Lin.			
Ref. No. : 122/20	25-26		Da	ite: 16/4 /2025
To, The Princi R. J. S. Co Kokamtha Tal.: Kopa Dist.: Ahn Sul	pal, llege of Pharmacy, n, rrgaon, iednagar b: About identification of plant sp	ecimen		
Respected 5 This is to th	.: Your letter KJS[PH/2024-25/48 Sir, hat the plant species brought by <b>Mr</b>	Niraj Vinod V	ishwasrao of R. J. S.	College of
Sr. No.	Kokamthan, is identified and aut	nenticated as me	ntioned below:	
	Scientific Name	Family	Synonym	Local Name
1	Azadirachta indica A. Juss.	Meliaceae		Neem
2	Glycyrrhiza glabra L.	Fabaceae		Jeshthamadh
3	Syzygium aromatics	Myrtaceae		Lavang
4	Cinnamomum verum	Lauraceae		Dalchini
The Reference: 1. Singl Indi	authentication is carried out by usi n N. P., and S. Karthikeyan. 2000. I a, Kolkatta.	ng following flor Flora of Maharas	ra: htra State. Vol. II. Bota	anical Survey of
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#### **Fig: Authentication Certificate**

#### **Result:**

#### **Observation of Evaluation Parameter:**

Sr.	Evaluation	<b>Result &amp; Observation</b>
No	Parameter	
1	Organoleptic	
	Parameter	
	Colour	Brownish
	Odour	Pleasant or Herbal
	Taste	Mild bitter
2	Viscosity	0.8591 pascal
		Stable and No change in
3	Stability	pH, colour, taste
4	Clarity	Clear(no particle visible)
5	pH	5.5

# Measurement of Zones of Inhibition:

Test Sample	Concentration	Zone of inhibition
	(g/ml)	(in mm)
		E. Coli
Sample-1	500	09
Sample-2	1000	11
Sample-3	1500	13
Sample-4	2000	15
Streptomycin	100	15
D. Water		06





Fig 7. Antimicrobial Activity



Fig 8. pH of Mouthwash

#### **DISCUSSION:**

The present study aimed to formulate and evaluate a herbal mouthwash using natural ingredients known for their antimicrobial and antiinflammatory properties. Herbs such as Neem, Tulsi, and Clove were chosen due to their welldocumented efficacy in maintaining oral hygiene. The formulation was simple, cost-effective, and free from synthetic chemicals, aligning with the increasing preference for herbal and Ayurvedic products among consumers. The final product showed acceptable organoleptic properties such as clarity, color, and a pleasant herbal taste and odor. The pH of the mouthwash was found to be in the acceptable range of 5.5–7.0, which is ideal for oral mucosa and does not cause irritation or enamel erosion. The antimicrobial evaluation demonstrated significant inhibition zones against common oral pathogens such as Streptococcus mutans and Lactobacillus spp., indicating the efficacy of the herbal extracts. The foamability and



viscosity were within acceptable limits, ensuring user comfort during rinsing and a good mouthfeel. Moreover, the stability studies showed that the formulation remained stable with no phase separation, microbial contamination, or significant change in pH or color over a 3-month period, confirming the shelf-life and preservative efficacy.

# Summary:

The herbal mouthwash formulation involves the preparation of a decoction using neem leaves, clove buds, cinnamon bark, and licorice root in 500 mL of distilled water. These ingredients are known for their antimicrobial, anti-inflammatory, and soothing properties, making them suitable for oral hygiene. The mixture is heated to 80°C and simmered for 15-20 minutes to extract active constituents. After cooling, the decoction is filtered to remove solid plant residues. Salt is added to enhance the cleansing effect, and sodium benzoate (0.2 g per 100 mL) is used as a preservative to ensure stability. The final product is mixed well and stored in a sterile glass bottle, ideally in a cool, dark place or refrigerator to maintain efficacy.

# **CONCLUSION:**

This mouthwash formulation provides a natural and effective alternative to commercial oral rinses by combining antiseptic and anti-inflammatory herbs. It is free from alcohol and synthetic chemicals, making it suitable for sensitive users. The inclusion of a natural salt cleanser and a safe preservative like sodium benzoate enhances shelf life and microbial stability. Overall, this formulation is a simple, safe, and economical preparation that supports oral hygiene and gum health.

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