

Formulation and Evaluation of Herbal Lozenges for Mouth Ulcer

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ABSTRACT:

This research presents the development and evaluation of herbal lozenges tailored for the treatment of mouth ulcers, incorporating Neem (*Azadirachta indica*) and Tulsi (*Ocimum sanctum* L) as primary ingredients. Neem, renowned for its rich array of therapeutic compounds, exhibits potent anti-inflammatory, antimicrobial, and wound-healing properties. Tulsi, esteemed in traditional medicine for its anti-inflammatory and analgesic effects, complements Neem's healing attributes. The lozenges are formulated to dissolve gradually in the mouth, delivering sustained contact with ulcerated oral tissues to alleviate pain and accelerate healing. The synergistic combination of Neem and Tulsi offers a promising natural solution for managing mouth ulcers, addressing symptoms effectively while promoting oral health and well-being.

Keywords :Mouth ulcer, Lozenges, Herbs, Medicinal Properties

I. INTRODUCTION

MOUTH ULCER

Mouth ulcer: Mouth ulcers, medically termed aphthous ulcers or canker sores, are small, painful lesions that develop on the mucous membranes inside the mouth. These ulcers can make eating, drinking, and even speaking uncomfortable, impacting daily life significantly. While various factors can contribute to their development, including stress, injury, or underlying health conditions, finding effective treatments is crucial for managing symptoms and promoting healing.

Types of mouth ulcer :

Minor Aphthous Ulcers: Small, typically less than 1 cm in diameter. Round or oval-shaped. Typically heal within 1 to 2 weeks without scarring.

Major Aphthous Ulcers: Larger than minor ulcers, often exceeding 1 cm in diameter. - Can have an irregular shape. - May take longer to heal, and scarring is possible.

Herpetiform Ulcers: Individual ulcers are usually 1 to 3 millimeters in diameter. - Small, round or oval-shaped. - Usually heal on their own within 1 to 2 weeks.

Cause of Mouth ulcer:

Mechanical Trauma: Accidental biting of the cheek, tongue, or lip. Dental appliances, braces, or rough or sharp edges of teeth that cause irritation.

Stress and Anxiety: Emotional stress and anxiety can weaken the immune system, making individuals more susceptible to developing mouth ulcers.

Nutritional Deficiencies: Insufficient intake of essential nutrients, such as vitamin B12, iron, folic acid, and zinc, can contribute to the formation of mouth ulcers.

Food Sensitivities: Certain foods, especially acidic or spicy ones, may trigger the development of mouth ulcers in sensitive individuals.

Certain Medications: Side effects of medications like nonsteroidal anti-inflammatory drugs (NSAIDs), beta-blockers, and certain antibiotics can include mouth ulcers.

Smoking and Tobacco Use: Smoking or using other tobacco products can irritate the oral tissues and contribute to the development of mouth ulcers.

Symptoms of Mouth ulcer :

Pain: Mouth ulcers are often associated with pain or discomfort, particularly when eating, drinking, or brushing teeth.

Difficulty Eating or Drinking: Due to the pain and sensitivity associated with mouth ulcers, individuals may find it uncomfortable or painful to eat or drink, especially when consuming acidic or spicy foods.

Irritation or Burning Sensation: Some people may experience a burning or tingling sensation in the area surrounding the ulcer.

Swelling: The tissues around the ulcer may appear slightly swollen or inflamed.

Red or White Lesion: The ulcer itself may be red or white, with a defined border.

II. LOZENGES

Lozenges are solid formulations that include medications in a sweet and flavored base. They are meant to dissolve slowly in the mouth, like medicated candies, providing relief to the irritated tissues in the throat. Lozenges are a commonly used type of medicine. The advantages of medicated lozenges include prolonging the time the medicine stays in the mouth, improving its absorption, reducing stomach irritation, and avoiding the initial metabolism in the liver.

Types of lozenges:

Medicated lozenges.

Non-medicated lozenges.

Classification of lozenges:

I. According to its site of action:

Local Effect (Example Antiseptics, Decongestant.)

Systemic Effect (Example Vitamins, Nicotine.)

II. According to its texture and composition:

Chewable lozenges: These lozenges combine the benefits of herbal ingredients with a chewable texture, offering a convenient and palatable way to

deliver medicinal compounds to the affected oral tissues. (Example: Vitamins.)

Hard lozenges: These lozenges have a firm and rigid consistency, designed to slowly dissolve in the mouth, allowing the release of herbal extracts that may have soothing, anti-inflammatory, and healing effects on the affected oral tissues. Example: Lollipops.

Soft lozenges: These lozenges are designed to dissolve or disintegrate slowly in the mouth, allowing the release of herbal extracts with therapeutic properties to soothe, heal, and alleviate discomfort associated with mouth ulcers. (Example: Bentalil)

Compressed lozenges: The heat labile ingredients i.e heat sensitive ingredients are not possible to formulate by procedure same as that of soft lozenges, hard lozenges. Simply the compression method is applicable for such type of ingredients, same as like compressed tablet. The only difference between them is non-disintegrating and slower dissolution profile. The granulation method is used in compressed lozenges. Example: Troches.

How its Work ?

- Lozenges typically take 02-03 minutes to dissolve.
- The dissolution process is influenced by the patient, as they control the rate by sucking on the lozenge until it completely dissolves in the mouth.
- Lozenges are designed to stay in the oral cavity for an extended period, maximizing the local activity of the drug.
- They play a crucial role in treating mouth ulcers.
- Lozenges are used to treat mouth ulcers by reducing pain and inflammation, promoting healing as they remain in the mouth for an extended period.

III. METERIAL AND METHODS

A. COMPOSITION

Table no. 1 :Formulation Table of herbal lozenges

Sr. No	Ingredients	Quantity Taken
1.	Tulsi	280 mg
2.	Neem oil	2-5 drops
3.	Dextrose	7000 g
4.	Sugar	7000g
5.	Honey Flavour	QS
6.	Isomalt	QS

B. INGREDIENTS PROFILE

B¹. NEEM

Neem: *Azadirachta indica*, commonly known as neem, margosa, nimtree or Indian lilac, is a tree in the mahogany family Meliaceae. It is one of two species in the genus *Azadirachta*.

Neem (*Azadirachta indica*) is well known for its medicinal properties. Neem is the most useful traditional medicine as a source of many therapeutic agents in the Indian culture and grows well in the tropical and semi-tropical countries.

Scientific name: *Azadirachta indica*

Family: Meliaceae

Order: Sapindales

Kingdom: Plantae

The earliest Sanskrit medical mention the numerous benefits of various parts of the neem tree, including its fruits, seeds, oil, leaves, roots, and bark have been used traditionally for the treatment of inflammation, infections, mouth ulcer, fever, skin diseases and dental disorders..

These parts have been extensively utilized in Indian Ayurvedic and Unani medicinal systems, and are now integral to the production of modern pharmaceuticals, cosmetics, toiletries, and medicinals.

According to the Hindus, it is believed that the goddess of the chicken pox, Sithala lives in the neem tree.

Neem tea is taken to reduce headache and fever. Its flowers are used to cure intestinal problems. Neem bark act as an analgesic and can cure high fever as of malaria. Even the skin diseases and mouth ulcer can be cured from the neem leaves

B^{1,2}. Phytochemicals Properties of Neem

Nimbin: Nimbin is a triterpenoid compound found in neem leaves. It exhibits anti-inflammatory and analgesic properties, contributing to neem's traditional use for skin conditions and joint inflammation.

Nimbidin: Nimbidin is another important triterpenoid found in neem seeds and leaves. It has been studied for its potential anti-inflammatory and immunomodulatory effects.

Salannin: Salannin is a bitter compound present in neem seeds. It has been reported to have antifungal and antiviral properties.

Quercetin: Neem leaves contain flavonoids, including quercetin, which is known for its antioxidant and anti-inflammatory properties. Quercetin contributes to neem's potential therapeutic effects on various health conditions.

Beta-sitosterol: Beta-sitosterol is a plant sterol found in neem seeds. It has anti-inflammatory properties and may contribute to neem's traditional use in managing skin conditions and inflammation.

Gallic Acid: Gallic acid is a phenolic compound found in neem leaves. It possesses antioxidant and anti-inflammatory properties and may contribute to the overall health benefits of neem.

Polyphenols: Neem contains various polyphenolic compounds, which contribute to its antioxidant and anti-inflammatory activities. Polyphenols are known for their potential health-promoting effects.

B^{1,2,3}. Medicinal Properties of Neem

Antibacterial and Antiviral: Neem exhibits strong antibacterial and antiviral properties. It is used to treat various infections, both internally and externally. Neem extracts have been studied for their effectiveness against a range of bacteria and viruses.

Antifungal: Neem has antifungal properties, making it beneficial for treating fungal infections of the skin and nails. Neem oil is often applied topically for its antifungal effects.

Anti-inflammatory: Compounds like nimbidin and nimbin in neem have anti-inflammatory effects. Neem is traditionally used to alleviate inflammation associated with various conditions, including arthritis.

Antioxidant: Neem contains antioxidants, such as flavonoids and polyphenols, which help neutralize free radicals in the body. Antioxidants play a role in reducing oxidative stress and may contribute to overall health.

Immunomodulatory: Neem is believed to have immunomodulatory effects, helping to regulate and strengthen the immune system. This property is thought to contribute to neem's ability to combat infections and support overall health.

Wound Healing: Neem promotes wound healing due to its antibacterial and anti-inflammatory properties. Neem oil or neem paste is often applied topically to wounds, cuts, and bruises.

Analgesic (Pain-Relieving): Neem has mild analgesic properties, and it may help reduce pain and discomfort. This can be beneficial for conditions such as arthritis or oral ulcers.

Antidiabetic: Some studies suggest that neem may have antidiabetic effects by helping regulate blood sugar levels. Compounds like nimbidin and quercetin may contribute to this property.

Anti-parasitic: Neem has been used traditionally to combat various parasites, including intestinal

worms. It is believed to have anti-parasitic effects that can help in maintaining gastrointestinal health.

Dental Health:Neem is known for its oral health benefits. It has antimicrobial properties that can help prevent gum diseases and reduce plaque and bacteria in the mouth.

Skin Health:Neem is widely used in skincare for its ability to treat acne, eczema, and other skin conditions. It helps cleanse the skin and reduce inflammation.

B². TULSI:

TULSI *Ocimum sanctum* L, commonly known as holy basil or tulsi, is an aromatic perennial plant in the family Lamiaceae. It is native to tropical and subtropical regions of Australia, Malesia, Asia, and the western Pacific. It is widely cultivated throughout the Southeast Asian tropics.

Scientific name: *Ocimum tenuiflorum*

Family: Lamiaceae

Order: Lamiales

Kingdom: Plantae

Tulsi plant has a great deal of essentialness for humankind, Tulsi leaves are broadly utilized in the readiness of Ayurvedic prescriptions. It is indigenous to the Indian subcontinent and been utilized inside Ayurvedic medication over 3000 years. It is known to advance the life span of life. In the Ayurveda framework, tulsi is frequently used as a "Solution of Life" for its mending powers and has been known to treat a wide range of basic wellbeing conditions. In the Indian Materia Medica the Tulsi plant are widely brought to use for relieving different illnesses, for example, the basic cold, irritation, intestinal sickness, coronary illness, migraines, stomach issue, kidney stones, heart issue, and some more.

Tulsi is the most well-known family plant in India and it is hallowed in Hindu custom. Numerous Hindu legends clarify the significance, properties and employments of Tulsi. Tulsi is an erect pleasant smelling bush which develops upto a stature of 3 - 5 feet. It is ordinarily developed in gardens and in the outskirts of sanctuaries. It has an impactful taste and fragrant smell. It is the main plant that can retain carbon dioxide for a mind-blowing duration. It discharges the oxygen in the early morning which is useful for the individuals in breathing disorders.

B² ¹Phytochemical Properties of Tulsi

Eugenol:This is a volatile oil that gives tulsi its distinctive aroma and flavor. Eugenol has been

found to have anti-inflammatory, analgesic (pain-relieving), and antimicrobial properties. It's also thought to contribute to the plant's antioxidant activity.

Ursolic Acid and Oleanolic Acid:These triterpenoid compounds are known for their anti-inflammatory, antioxidant, and antihyperlipidemic (reducing lipid levels in the blood) activities. Ursolic acid, in particular, has been studied for its potential to inhibit certain types of cancer cells and to promote wound healing.

Rosmarinic Acid:This compound has strong antioxidant properties, helping to protect cells against damage caused by free radicals. It also has anti-inflammatory, antimicrobial, and antiviral activities.

Apigenin:A flavonoid that has been found to possess anti-cancer, anti-inflammatory, and antioxidant properties. It's also known to have a calming effect and may contribute to tulsi's adaptogenic properties, helping the body to manage stress.

Luteolin:This flavonoid has antioxidant, anti-inflammatory, and anti-allergic properties. Luteolin is also researched for its potential in preventing and treating various diseases, including cancer.

Caryophyllene:A sesquiterpene that contributes to tulsi's unique flavor and aroma. Caryophyllene has anti-inflammatory and analgesic properties and has been investigated for its potential to treat anxiety and depression.

Tannins:These polyphenolic compounds have astringent properties and contribute to the antioxidant activity of tulsi. They also have antimicrobial properties, making them useful in preventing infections.

Saponins:Saponins have been found to have immunomodulatory (modifying immune response) and antimicrobial effects. They can also contribute to the plant's anti-inflammatory and antioxidant activities.

Alkaloids:Compounds that have diverse physiological effects on humans and animals. In tulsi, alkaloids may contribute to its adaptogenic (stress-fighting) properties.

B².^{1,2} Medicinal Properties of Tulsi

Antioxidant Effects:Tulsi contains compounds like eugenol, Rosmarinic acid, and various flavonoids that have antioxidant properties. These antioxidants protect the body against damage from free radicals, which can lead to chronic diseases and aging.

Anti-inflammatory: The phytochemicals in Tulsi, such as eugenol and Ursolic acid, exhibit anti-inflammatory properties. This makes Tulsi beneficial in reducing inflammation and can help in the management of inflammatory conditions such as arthritis.

Antimicrobial Activity: Tulsi has been shown to have broad-spectrum antimicrobial activity against a range of bacteria, viruses, fungi, and protozoa. This property can help in preventing and treating infections.

Cardioprotective: Tulsi may have a positive effect on blood pressure and cholesterol levels, contributing to heart health. Its antioxidant and anti-inflammatory effects also support cardiovascular system protection.

Immunomodulatory Effects: Tulsi can modulate the immune system, enhancing immune response. This makes it beneficial in fighting off infections and boosting overall immunity.

Anti-diabetic Properties: Some studies suggest that tulsi can help in regulating blood sugar levels, making it beneficial for people with diabetes or those at risk of developing diabetes.

Neuroprotective Effects: The antioxidant properties of tulsi may protect the brain from oxidative stress, potentially reducing the risk of neurodegenerative diseases like Alzheimer's.

Anti-cancer Properties: Some phytochemicals in tulsi, like eugenol, have been studied for their potential to inhibit cancer cell growth.

Anti-anxiety and Antidepressant: Tulsi has been used to reduce anxiety and depression symptoms. Its adaptogenic properties may help in balancing stress hormones in the body.

Digestive Health: Tulsi can aid in digestion and may help to treat various digestive disorders. It's also used to soothe stomach aches and reduce bloating.

Respiratory Benefits: Tulsi is traditionally used for the treatment of respiratory ailments like bronchitis, asthma, and colds due to its antimicrobial and anti-inflammatory properties.

C. AIM, NEED AND OBJECTIVE

Formulation of herbal lozenges for treatment of mouth ulcer.

The develop herbal lozenges for mouth ulcers is to provide relief by reducing pain and inflammation, fighting oral infections.

To develop a formula for lozenges of various herbs to achieve better palatability.

To study of neem tree (Azadirachta indica) and Tulsi along with its major and essential constituents

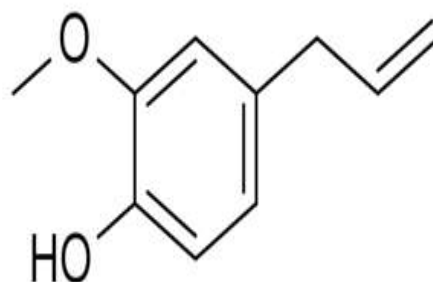
and their phytochemical and pharmaceutical importance.

Eugenol

Molecular Formula : C₁₀H₁₂O₂

Molecular Weight : 164.2 g/mol

Solubility : Eugenol (4-allyl-2-ethoxyphenol) is the major compound of clove oil, comprising 83–95 % of the oil. It is slightly water-soluble and easily soluble in organic solvent, colourless or yellowish in colour.



D. METHODOLOGY

- Check weigh powdered sugar and liquid glucose in a suitable beaker.
- Heat liquid glucose so as to reduce its viscosity.
- Add sugar slowly with continuous stirring so as to dissolve all the sugar and maintain the temperature at 110 to 130.
- After thorough mixing of sugar, add Tulsi powder Neem oil and mix properly till the powder is dissolved completely.
- The colour obtained was intense dark so to reduce the colour intensity, white colour was added.
- Add the desired colours and flavours and pour into the mould and set aside to air dry.

E. EVALUATION PARAMETER

Physical parameters :The medicated lozenges were examined in terms of clarity, texture and consistency. Texture of lozenges in terms of stickiness was evaluated by visual inspection of the product.

Weight variation test :6 lozenges from each batch were individually weighed in grams on an analytical balance. The average weight and standard deviations are measured -Height 1 cm,Width 1.5cm.

Diameter and thickness: Diameter and thickness is a physical property of tablet and it should be essential for patient acceptance as well as for tablet

uniformity. It is calculated by using vernier scale and measured in mm.

Thickness test: The thickness in millimetres was measured individually for 10 pre weighed lozenges by using verniercalipers.

Hardness Test:To check the hardness of prepared lozenges we use Pfizer tester.

Mouth dissolving time: The time taken by the lozenge to dissolve completely was determined by placing each lozenge in separate beaker containing 100 ml phosphate buffer pH 6.8 at 50 rpm using mechanical stirrer and time was noted at 37°C.

Moisture content: By Gravimetric method, one gram sample is weighed and placed in a desiccator at for 24 h.

Stability studies: The optimized formulations were subjected to stability studies at temperature i.e., 40°C/75% RH for a period of month.

IV. CONCLUSION

- In conclusion, the formulation of herbal neem lozenges for mouth ulcers holds promise as a natural and potentially effective remedy.
- The formulation process involves careful selection of ingredients, optimization of proportions, and adherence to regulatory standards to ensure safety and efficacy.
- Through laboratory testing, the formulation can be refined to optimize taste, texture, and therapeutic benefits.
- Herbal neem lozenges have the potential to alleviate pain, reduce inflammation, combat infections, and promote the healing of mouth ulcers.
- However, further research, including clinical studies, is needed to validate their effectiveness and safety.
- Overall, herbal neem lozenges represent a promising alternative for individuals seeking natural remedies for mouth ulcers.

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