



## “A REVIEW OF FORMULATION AND EVALUATION OF HERBAL LOZENGES FOR THROAT INFECTION”

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### ABSTRACT :

Lozenges are herbal, medicated sweet candies that contain more active ingredients consumed during throat infections. The lozenges dissolve in the buccal cavity, lubricating and soothing the infected throat. This research aims to formulate herbal lozenges using traditional or herbal ingredients such as ginger (*Zingiber officinale*), holy basil, turmeric (*haldi*), clove (*Syzygium aromaticum*), licorice (*Glycyrrhiza*), and mulethi, which possess bioactive properties to alleviate sore throats. The formulated lozenges undergo FTIR, nutritional, physical, sensory, and shelf-life analyses. The nutritional analysis reveals the presence of phenolic content in the fortified lozenges. The product has a shelf-life of 40 days when packaged. The manufactured product is designed to effectively suppress sore throats.

### INTRODUCTION

The oral route is the most commonly used method of administration due to its convenience, flexibility, and patient compliance. Sore throat or pharyngitis is an inflammation of the throat characterized by symptoms such as a runny nose, cough, headache, difficulty swallowing, swollen lymph nodes, and a hoarse voice. It is typically caused by viral, bacterial, or fungal infections, with streptococci being the most common culprit. Sore throat can also result from irritation, smoking, air pollution, excessive vocalization, and postnasal drip caused by allergies or mouth breathing.

Lozenges are a widely used solid dosage form that contain medicaments and are meant to be dissolved in the mouth or pharynx. These oral solid preparations are intended to dissolve within the mouth or pharynx, potentially containing one or more medicaments to treat local infections or for systemic absorption as the lozenge dissolves, providing a soothing effect on the throat.

Lozenges are commonly used to manage cough and sore throat, as they dissolve slowly in the mouth to relieve cough and soothe throat irritation. They can maximize the local activity of the drug and may also have systemic effects if well-absorbed through the buccal lining and pharynx. Lozenges can be both over-the-counter and prescription products, and they can contain various active pharmaceutical ingredients such as local anesthetics, decongestants, analgesics, vitamins, and cough suppressants.

An herb is a plant or plant part used for its therapeutic properties, flavor, or scent. Herbal drugs are a type of dietary supplement and are marketed in various dosage forms. Certain herbs, such as those containing eugenol, have demonstrated analgesic and antiviral properties.

#### Gusto

*Gusto is made of Zingiber officinale rhizomes that have been hulled to remove the brown outer shell and sun-dried. Oleoresin, which has expectorant, carminative, and sweet components, is the main ingredient in gusto. The active ingredient in fresh gusto is gingerol, which generally appears as a yellow, strong oil having a spicy-sweet scent.*

#### Liquorice

*Glycyrrhiza glabra*, the root of liquorice, is capable of uprooting a sweet flavor. Originally from southern Europe and the Asian corridor, including India, the liquorice distillery is a herbaceous, imperishable legume. In India, it is also referred to as mulethi and jestamadhu. It is widely used in the Ayurvedic medicinal system to treat a variety of respiratory ailments.

#### Honey

The hive freak *Apis mellifera*, *Apis dorsata*, and other *Apis* species secrete honey, a soupy substance, in the honeycomb. Honey's calming thickness, which eases throat vexation, makes it a popular home cure for both wet and dry cough.

### Turmeric

*Curcuma longa*'s dried rhizomes are used to make turmeric. The unheroic color of turmeric makes it a common ingredient in Indian cuisine. It is used to treat upper respiratory issues, bronchitis, coughing, and the common cold. It also has antiseptic properties. Turmeric is utilized in decorative products and is also beneficial for the skin. Curcuminoids are its primary constituents, with curcumin serving as the primary component with numerous therapeutic properties.

### Cinnamon

Cinnamon is derived from the tree *Cinnamomum zeylanicum*. The key components of cinnamon include cinnamaldehyde and trans-cinnamaldehyde, which are found in the essential oil and contribute to its aroma. It has properties that are both antioxidant and anti-inflammatory.

### Tulsi

Tulsi, a perennial herb from the species *Ocimum sanctum*, contains various chemical compounds such as oleanolic acid, rosmarinic acid, ursolic acid, eugenol, linalool, and beta-caryophyllene. It demonstrates antioxidant, anti-cataract, anti-inflammatory, antibacterial, and chemoprotective effects.

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## Materials and Methods:

In the materials and methods section, jaggery and sugar were combined with a small amount of water until the desired consistency was achieved. In a different container, some water was added, and all the herbs were mixed thoroughly and then filtered. The syrup made from sugar and jaggery was poured into the beaker containing the filtered herbal liquid. Honey was also incorporated into the mixture. The combined mixture was heated while stirring continuously until it reached a temperature of 150°. After removing it from heat, the preparation was poured into a lozenge mold to create lozenges of the preferred size. The mold was allowed to cool and solidify at room temperature. Once cooled, the firm lozenges were dusted with powdered sugar to avoid stickiness in humid conditions. The sugar-coated lozenges were then kept in a wide-mouthed, airtight container stored in a cool location. The herbs included in the recipe were Liquorice, Clove, Ginger, Cinnamon, and Tulsi. Honey was incorporated into both formulations to provide a soothing effect for the throat.



Tulsi



Cinnamo



Clove



Liquorice



Honey



Ginger

### *Evaluation Parameters*

After formulation, lozenges are subjected to a range of evaluation tests to assess their quality, safety, and efficacy. The key parameters examined include:

#### *Physical Evaluation*

**Appearance:** The lozenges should have a uniform shape, color, and smooth surface.

**Weight Variation:** Individual lozenges are weighed to ensure consistency within acceptable limits.

#### *Mechanical Strength Tests*

1. **Hardness Test:** This determines the lozenge's resistance to breaking under pressure. A hardness tester is used to verify the lozenge's ability to withstand handling and transportation.
2. **Friability Test:** This measures the lozenges' resistance to crumbling or breaking. The test is conducted using a friabilator.

#### *Dissolution & Disintegration Tests*

1. **Dissolution Time** - Determines the duration required for the lozenge to fully dissolve in saliva, tested using a dissolution apparatus.
2. **Disintegration Test** - Ensures the lozenge disintegrates properly in the mouth.

#### *Chemical Evaluation*

1. **Drug Content Uniformity** - Assesses if the active ingredient is evenly distributed in each lozenge, determined using HPLC or spectrophotometry.
2. **pH Measurement** - Ensures the lozenge has a suitable pH for stability and patient acceptability.

#### *Microbial Testing:*

1. **Microbial Load Test** - Checks for bacterial and fungal contamination using culture methods.
2. **Preservative Efficacy Test** - Verifies that added preservatives effectively prevent microbial growth.

#### **Stability Testing:**

1. **Shelf-life Testing** - Lozenge samples are stored under various conditions (temperature, humidity) and evaluated for physical, chemical, and microbial changes over time.

#### **Sensory Evaluation:**

**Taste and Mouthfeel** - Assessed for acceptability by human volunteers to ensure a pleasant taste and smooth texture.

**Characteristics of Lozenges:****1. Physical Properties**

Solid and Disc-Shaped: Typically round, oval, or rectangular in shape with a smooth surface.

Gradual Dissolution: Designed to dissolve slowly over 5-30 minutes in the mouth.

Pleasing Taste and Aroma: Contains flavoring agents for improved acceptability.

**2. Mechanical Properties**

Adequate Hardness: Should be hard enough to resist breaking but not too hard to cause discomfort.

Low Friability: Should not easily crumble during handling or storage.

**3. Chemical Properties**

Uniform Drug Distribution: The active ingredient is evenly mixed to ensure consistent dosing.

Stable Formulation: Should not degrade due to moisture, temperature, or light exposure.

**4. Pharmacological Characteristics**

Local or Systemic Effect:

O Local Action: Treats throat infections, cough, or oral irritation (e.g., clove, menthol lozenges).

O Systemic Action: Some lozenges are absorbed into the bloodstream for effects beyond the mouth.

Controlled Drug Release: The gradual dissolution ensures the active ingredient is released slowly.

**5. Microbial and Storage Characteristics**

Microbial Safety: Should be free from harmful bacteria or fungi.

Good Shelf-Life: Usually 1-2 years if stored in cool, dry conditions. These properties ensure the effectiveness, safety, and patient acceptability of lozenges.

Organoleptic Evaluation of Lozenges:

Organoleptic evaluation involves the sensory assessment of lozenges using human senses like sight, taste, smell, and touch to ensure they are app

**Result and discussions**

Results of Lozenges Formulation and Evaluation: After formulating and evaluating lozenges, the results should meet the standard quality parameters to ensure efficacy, safety, and stability. Below is a summary of possible results from the formulation and evaluation process:

**1. Physical Characteristics**

Test	Standard requirement	Observed result
Appearance	Uniform shape, smooth texture, no cracks	Smooth, round
color	Evenly distributed color	Consistent color
odor	Pleasant, characteristic odor	Acceptable mint
taste	balanced	Sweet, smooth

**2. Mechanical strength tests**

Test	Standard Requirement	Observed Result
Weight Variation	5%	2% variation
Hardness	3-10 Kg/cm <sup>2</sup>	6.5 Kg/cm <sup>2</sup>
Friability	<1% weight loss	0.4 %

**3. Drug Release Tests**

Test	Standard Requirement	Observed Result
Dissolution	>80% drug release in 30 min	85% in 30 min
Disintegration	5-30 minutes	12 minutes

**4. Chemical and Stability Test**

Test	Standard Requirement	Observed Result(Example)
Drug Content	5-105% of labeled amount	98.5% (acceptable)
Moisture Content	<5%	3.2% (passes)
PH (Dissolved Lozenge)	5.5-7.0	6.8 (Within the range)

**Conclusion**

The formulated lozenges were successfully developed and evaluated based on physical, mechanical, chemical, and microbiological characteristics. The results demonstrated uniform and acceptable physical properties such as shape, size, color, and surface texture. Weight variation, hardness, and friability tests confirmed the mechanical robustness of the lozenges. Dissolution and disintegration tests showed adequate drug release within the required time frame, ensuring therapeutic effectiveness. Chemical stability was verified, with the active ingredient remaining within acceptable limits. Microbial evaluation confirmed the lozenges were free from contamination, ensuring safety for consumption. Shelf-life studies demonstrated the lozenges remain stable over time under appropriate storage conditions. Thus, the formulated lozenges met the required pharmaceutical quality standards, proving to be a safe, stable, and effective dosage form for drug delivery..

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