



# FORMULATION AND EVALUATION OF HERBAL COUGH LOZENGES

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## ABSTRACT

This research article presents the formulation and evaluation of herbal cough lozenges using a combination of natural ingredients known for their medicinal properties. The ingredients include ginger, honey, clove, tulsi (holy basil), cinnamon, cardamom, saffron, turmeric, menthol, sugar, amla (Indian gooseberry), lemon juice, peppermint oil, fennel, and distilled water. Each ingredient was selected based on its traditional use in alleviating cough and throat irritation. The formulation process involved blending the ingredients to create a cohesive mixture, followed by shaping and drying to produce lozenges. The evaluation of the lozenges included physical characteristics such as weight uniformity, hardness, and disintegration time, as well as sensory attributes such as taste and aroma. Additionally, the efficacy of the herbal cough lozenges in providing relief from cough symptoms was assessed through a clinical trial. The results demonstrate the potential of these herbal cough lozenges as a natural and effective remedy for cough and throat irritation, offering a safer alternative to conventional cough medications.

**KEYWORDS:** Cough, Throat Infection.

## INTRODUCTION

Cough is a common symptom of respiratory infections and various other respiratory conditions, often causing discomfort and distress to individuals. While conventional cough medications are widely available, there is a growing interest in herbal remedies due to their perceived safety and potential efficacy in alleviating cough symptoms. Herbal ingredients have long been used in traditional medicine systems for their therapeutic properties, including their ability to soothe throat irritation, suppress coughing, and promote respiratory health.

This research aims to formulate and evaluate herbal cough lozenges using a combination of natural ingredients known for their medicinal properties. The selected ingredients include ginger, honey, clove, tulsi (holy basil), cinnamon, cardamom, saffron, turmeric, menthol, sugar, amla (Indian gooseberry), lemon juice, peppermint oil, and fennel. Each ingredient was chosen based on its traditional use in treating cough and throat irritation, as well as its potential synergistic effects when combined.

The formulation of herbal cough lozenges offers a promising approach to providing relief from cough symptoms while minimizing the use of synthetic drugs and their associated side effects. Furthermore, the inclusion of natural ingredients with proven medicinal properties may enhance the therapeutic efficacy of the lozenges.

### Symptoms of cough

1. A runny or stuffy nose
2. A feeling of liquid running down the back of your throat (postnasal drip)
3. Frequent throat clearing and sore throat
4. Hoarseness



5. Wheezing and shortness of breath

#### **Benefits of Herbal lozenges**

1. Temporarily help to relieve symptoms such as sore throat, throat irritation.
2. It work by providing a cooling, feeling and increasing saliva in the mouth .
3. Used to medicate the mouth and throat for the slow administration in digestion or cough remedies.
4. Maintains oral hygien.
5. Reduces pain and inflammation<sup>[1]</sup>
6. Relieve cold and Running nose
7. Relief for cough

#### **Active Ingredients**

- 1.MENTHOL
- 2.EUCALYPTUS.
- 3.HONEY
- 4.LEMON

#### **Characteristics of Herbal Lozenges**

1. They contain one or more active ingredient and are flavoured and are sweetened so as to be pleasant tasting
2. Lozenges are various shaped solid dosage form, usually containing a medicinal agent and a flavouring substance, that are interested to be dissolved slowly in the oral cavity for localised or systemic effects.

**PROPERTIES OF HERBAL LOZENGES :** 1. These types of lozenges often contain natural ingredients such as herbs, vitamin and minerals are marketed for a variety of health benefits, such as immune support, respirators health, relaxation & improved sleep.  
2.They provide a pleasant dosage.

#### **OBJECTIVE**

1. It is used to medicate the mouth and throat for the slow administration in digestion or cough remedies
2. Lozenges may contain an anaesthetic, a demulcent or an antiseptic.
3. Lozenges provide a pleasant dosage form for patients who are unable to swallow other types of solid dosage forms.
4. This are OTC and prescription product.
5. They maximize the local activity of the drug.

#### **THE FORMULATION CONTENT OF VARIOUS DRUGS**

1. Ginger =10gm
2. Honey =10gm
3. Clove= 10gm
4. Black paper= 10gm
5. Tulsi= 5gm
6. Cinnamon=5gm
7. Cardamom=5gm
8. Saffron=5gm
9. Turmeric=7gm
10. Menthol=5gm
11. Sugar=33.3gm
12. Amla=3gm
13. Distilled water=66.7ml
14. Lemon juice=2 ml
15. Peppermint oil=2.5ml
16. Funnel=5gm



### Procedures

1. Add all drug 67.7ml of water. Then boiled and filter out the given solution
2. Then filter out solution add to 33.3 gm of sugar.
3. Boiled up to the gelly formed.
4. Then add binder ( Dry mango powder)

Sugar : as used for lozenges are gelly preparation

Saffron: as used in colouring agent and use mostly in asthma patients.

Dry mango powder: used as binder & Digestion

They are used in digitation also

Tulsi: processed to dissolve slowly in the mouth to make use of its intrinsic cooling and freshening properties that provides relief to dry, irritated and sore throat.<sup>[2]</sup> In addition to being an anti-inflammatory agent, it also has anti-bacterial, anti-fungal and antioxidant properties.<sup>[3]</sup>

### Detailed Information

#### Ginger:



#### 1. **\*\*Taxonomical Information\*\***:

- Family: Zingiberaceae
- Genus: Zingiber
- Species: Zingiber officinale

#### 2. **\*\*Biological Source\*\***:

- Ginger is a flowering plant originating from Southeast Asia. The part used for its medicinal properties is the rhizome, which is the underground stem.

#### 3. **\*\*Synonyms\*\***:

- Some common synonyms for ginger include Zingiber officinale, ginger root, and simply ginger.

#### 4. **\*\*Organoleptic Characteristics\*\***:

- Ginger typically has a pungent aroma and a spicy, slightly sweet flavor. The rhizome is usually light brown in color with a rough outer texture.

#### 5. **\*\*Chemical Constituents\*\***:

- Ginger contains several bioactive compounds, including gingerol, shogaol, zingerone, and paradol, which contribute to its medicinal properties.

#### 6. **\*\*Uses\*\***:

- Ginger is widely used in traditional medicine for its anti-inflammatory, antioxidant, and digestive properties. It is commonly used to alleviate nausea, improve digestion, and reduce inflammation.

Ginger Boosts Immune System Ginger can soothe coughs and sore throats and improve your recovery time due to its compounds that can boost immunity. Most coughs caused by sore throats are caused by viruses. This includes the common cold, flu, and mononucleosis.<sup>[4]</sup> This are the carminative and Gastro-Intestinal Regulators



## Amla



### 1. **Taxonomical Information**:

- Family: Phyllanthaceae
- Genus: Phyllanthus
- Species: Phyllanthus emblica

### 2. **Biological Source**:

- Amla is a fruit-bearing tree native to the Indian subcontinent. It is commonly found in India, Pakistan, and other Southeast Asian countries.

### 3. **Synonyms**:

- Indian Gooseberry, Emblica officinalis, Amalaki

### 4. **Organoleptic Characteristics**:

- Amla fruits are round, greenish-yellow, and about the size of a small apple. They have a sour, tangy taste with a slightly bitter undertone. The fruit is juicy and often consumed raw, in pickles, or in various culinary preparations.

### 5. **Chemical Constituents**:

- Amla is rich in vitamin C and contains various other bioactive compounds such as polyphenols, flavonoids, tannins, and minerals like calcium and iron.

### 6. **Uses**:

- Amla is highly valued in Ayurvedic medicine for its numerous health benefits. It is known to boost immunity, improve digestion, promote hair health, enhance skin complexion, and provide antioxidant protection. In the context of cough lozenges, amla may contribute to the formulation's overall health-promoting and immune-boosting effects.

Amla is a great source for improving your immunity, and amla powder benefits your body during viral and bacterial infections as well as during the common cold. Amla Powder mixed with two teaspoons of honey provides relief from cough and cold when consumed about three to four times a day.<sup>[5]</sup>

## Black Pepper:



### 1. **Taxonomical Information**:

- Family: Piperaceae
- Genus: Piper
- Species: Piper nigrum



2. **Biological Source**:

- Black pepper is derived from the dried berries of the *Piper nigrum* vine, native to India and other parts of Southeast Asia.

3. **Synonyms**:

- Peppercorn, *Piper nigrum*

4. **Organoleptic Characteristics**:

- Black pepper is known for its pungent, spicy flavor and aroma. The dried berries are small, round, and dark brown to black in color.

5. **Chemical Constituents**:

- Black pepper contains several bioactive compounds, including piperine, which is responsible for its characteristic flavor and many of its health benefits. It also contains essential oils, alkaloids, and flavonoids.

6. **Uses**:

- Black pepper has been used for centuries in traditional medicine for its various health benefits. It is known to have antioxidant, anti-inflammatory, and antimicrobial properties. In the context of cough lozenges, black pepper may help soothe throat irritation, reduce coughing, and provide respiratory support.

Black pepper is the most important and most widely used spice in the world, cultivated in over 26 countries, together producing about 315–320 000 tons of pepper (black and white). Pepper is valued for its pungency contributed by the alkaloid piperine and flavor contributed by the volatile oil.<sup>[6]</sup> This chapter looks at production and international trade in pepper, cultivars, cultivation, post-harvest handling and grading. The chemical structure of pepper is presented, together with quality issues and techniques used in industrial processing. Finally, the functional properties of black pepper and its applications in medicine and in food are described.<sup>[7]</sup>

## Clove



1. **Taxonomical Information**:

- Family: Myrtaceae
- Genus: *Syzygium*
- Species: *Syzygium aromaticum*

2. **Biological Source**:

- Cloves are the aromatic flower buds of the clove tree, *Syzygium aromaticum*, which is native to the Maluku Islands in Indonesia.

3. **Synonyms**:

- Clove buds, *Eugenia caryophyllata*

4. **Organoleptic Characteristics**:

- Cloves have a strong, sweet, and spicy aroma. The dried buds are small, dark brown, and have a distinctive nail-like shape.

5. **Chemical Constituents**:



- Cloves contain several bioactive compounds, including eugenol, which is the primary component responsible for its aroma and medicinal properties. Other constituents include flavonoids, phenolic acids, and tannins.

6. **Uses**:

- Cloves have been used for centuries in traditional medicine and culinary applications. They are known for their analgesic, antibacterial, antifungal, and anti-inflammatory properties. In traditional medicine, cloves are used to alleviate toothaches, aid digestion, and relieve respiratory symptoms such as cough and sore throat.

## Turmeric



1. **Taxonomical Information**:

- Family: Zingiberaceae
- Genus: Curcuma
- Species: Curcuma longa

2. **Biological Source**:

- Turmeric is derived from the rhizomes of the Curcuma longa plant, which is native to South Asia, particularly India and Indonesia.

3. **Synonyms**:

- Indian saffron, Haldi

4. **Organoleptic Characteristics**:

- Turmeric has a distinct bright yellow-orange color. It has a warm, earthy aroma and a slightly bitter, peppery taste.

5. **Chemical Constituents**:

- The primary bioactive compound in turmeric is curcumin, which is responsible for its vibrant color and many of its health benefits. Other important constituents include volatile oils, such as turmerone and zingiberene, as well as various vitamins and minerals.

6. **Uses**:

- Turmeric has been used for centuries in traditional medicine, particularly in Ayurveda and traditional Chinese medicine (TCM). It is known for its anti-inflammatory, antioxidant, antimicrobial, and analgesic properties. Turmeric is used to treat a variety of conditions, including respiratory infections, digestive issues, and inflammatory conditions like arthritis.

In the formulation of herbal cough lozenges, turmeric may contribute its medicinal properties, including its anti-inflammatory and antimicrobial effects, which can help soothe throat irritation and support respiratory health. The curcumin content in turmeric may also provide antioxidant benefits and aid in reducing cough symptoms. Additionally, turmeric adds color and flavor to the lozenges, enhancing their overall appeal.

## Honey



1. **Taxonomical Information**:

- Honey does not have taxonomical information as it is a natural product rather than a plant or organism.

**2. Biological Source:**

- Honey is produced by bees from the nectar of flowers. It is a natural sweet substance that bees store in honeycombs within their hives.

**3. Synonyms:**

- Nectar, Bee honey

**4. Organoleptic Characteristics:**

- Honey varies in color and flavor depending on the flowers from which the bees collect nectar. It can range from light amber to dark brown and may have floral, fruity, or herbal notes. The texture can be thick and viscous or smooth and runny.

**5. Chemical Constituents:**

- Honey is primarily composed of sugars, mainly glucose and fructose, but it also contains trace amounts of vitamins, minerals, amino acids, and antioxidants. Its composition can vary depending on factors such as floral source and processing methods.

**6. Uses:**

- Honey has been used for centuries as a natural sweetener and for its medicinal properties. It is known for its antibacterial, anti-inflammatory, and wound-healing properties.<sup>[8]</sup> In the context of cough lozenges, honey may help soothe sore throats, suppress coughing, and provide a sweet flavor.

In the formulation of herbal cough lozenges, honey serves as a natural sweetener and may contribute its medicinal properties, including its ability to coat the throat, soothe irritation, and provide antimicrobial effects. Its sweet flavor also enhances the palatability of the lozenges.

**Cinnamon****1. Taxonomical Information:**

- Family: Lauraceae

- Genus: Cinnamomum

- Species: There are several species of Cinnamomum used for cinnamon, including Cinnamomum verum (true cinnamon) and Cinnamomum cassia (cassia cinnamon).

**2. Biological Source:**

- Cinnamon is obtained from the inner bark of trees belonging to the genus Cinnamomum. True cinnamon (Cinnamomum verum) is native to Sri Lanka, while cassia cinnamon (Cinnamomum cassia) is native to China and other parts of East Asia.

**3. Synonyms:**

- Cinnamomum zeylanicum (true cinnamon), Chinese cinnamon, cassia

**4. Organoleptic Characteristics:**

- Cinnamon has a warm, sweet, and woody aroma with a slightly spicy flavor. True cinnamon (Cinnamomum verum) is lighter in color and has a delicate, sweet taste, while cassia cinnamon (Cinnamomum cassia) is darker and has a stronger, more pungent flavor.

**5. Chemical Constituents:**

- The main bioactive compound in cinnamon is cinnamaldehyde, which is responsible for its characteristic flavor and aroma. Other constituents include eugenol, coumarin, and various essential oils.

**6. Uses:**

- Cinnamon has been used for centuries in traditional medicine and culinary applications. It is known for its antioxidant, anti-inflammatory, antimicrobial, and digestive properties. In traditional medicine, cinnamon is used to alleviate respiratory symptoms, improve circulation, and aid digestion.



In the formulation of herbal cough lozenges, cinnamon may contribute its medicinal properties, including its ability to soothe throat irritation, reduce coughing, and provide antimicrobial effects. The cinnamaldehyde content in cinnamon has been shown to have antiviral properties, which may help combat respiratory infections. Additionally, cinnamon adds a warm and comforting flavor to the lozenges.

## Fennel



### 1. **Taxonomical Information**:

- Family: Apiaceae (Umbelliferae)
- Genus: Foeniculum
- Species: Foeniculum vulgare

### 2. **Biological Source**:

- Fennel is a flowering plant native to the Mediterranean region but is also cultivated in other parts of the world. It is grown for its aromatic seeds and flavorful bulb-like stem.

### 3. **Synonyms**:

- Foeniculum officinale, Foeniculum dulce

### 4. **Organoleptic Characteristics**:

- Fennel seeds have a sweet, licorice-like aroma and a warm, slightly sweet flavor. The seeds are small, elongated, and ridged.

### 5. **Chemical Constituents**:

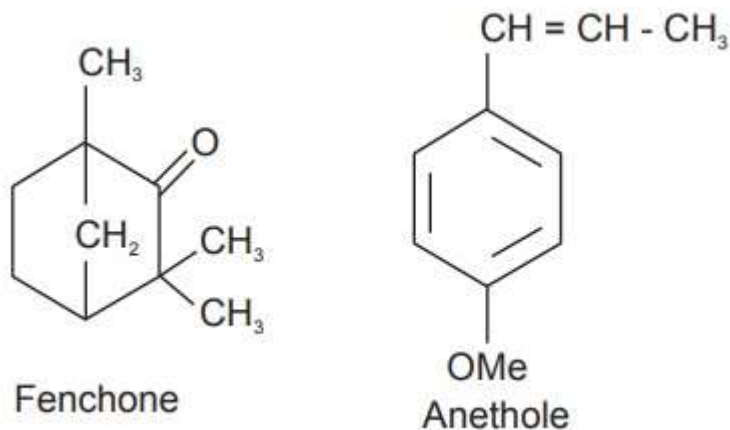
- Fennel seeds contain various bioactive compounds, including anethole, which is responsible for their characteristic flavor and aroma. Other constituents include flavonoids, phenolic compounds, and volatile oils.

### 6. **Uses**:

- Fennel has been used for centuries in traditional medicine and culinary applications. It is known for its carminative, digestive, and anti-inflammatory properties. Fennel seeds are commonly used to alleviate digestive issues such as bloating, gas, and indigestion. In traditional medicine, fennel is also used to relieve coughs and respiratory congestion.

In the formulation of herbal cough lozenges, fennel may contribute its medicinal properties, including its ability to soothe throat irritation, reduce coughing, and provide respiratory support. The anethole content in fennel seeds has been shown to have expectorant properties, which may help loosen mucus and facilitate its expulsion. Additionally, fennel adds a sweet and aromatic flavor to the lozenges.





### Cardamom



1. **Taxonomical Information**:

- Family: Zingiberaceae
- Genus: Elettaria (for true cardamom)
- Species: Elettaria cardamomum

2. **Biological Source**:

- Cardamom, also known as true cardamom or green cardamom, is a plant native to the Indian subcontinent and Southeast Asia. It is cultivated for its aromatic seeds, which are used as a spice.

3. **Synonyms**:

- Elettaria cardamomum, Elaichi (in Hindi), Cardamon

4. **Organoleptic Characteristics**:

- Cardamom seeds have a strong, sweet, and aromatic fragrance with a slightly spicy, minty flavor. The seeds are small, black, and found within papery pods.

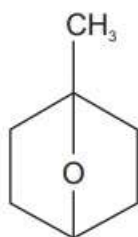
5. **Chemical Constituents**:

- Cardamom seeds contain various bioactive compounds, including essential oils such as cineole, terpinene, and limonene, as well as phenolic compounds like catechins and flavonoids.

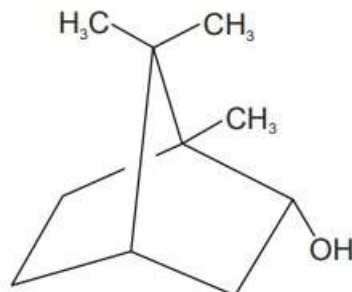
6. **Uses**:

- Cardamom has been used for centuries in traditional medicine and culinary applications. It is known for its carminative, digestive, and antimicrobial properties. Cardamom is commonly used to alleviate digestive issues such as indigestion, bloating, and gas. It is also used to freshen breath and relieve respiratory symptoms such as coughs and congestion.

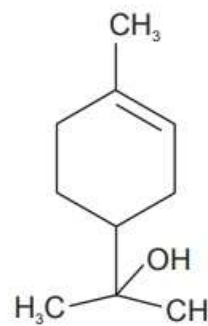
In the formulation of herbal cough lozenges, cardamom may contribute its medicinal properties, including its ability to soothe throat irritation, reduce coughing, and provide respiratory support. The aromatic compounds in cardamom may help clear nasal passages and promote easier breathing. Additionally, cardamom adds a pleasant flavor and aroma to the lozenges.



Cineole



Borneol

 $\alpha$ -Terpineol

### Peppermint Oil



#### 1. **\*\*Taxonomical Information\*\***:

- Family: Lamiaceae
- Genus: Mentha
- Species: Mentha × piperita (Peppermint)

#### 2. **\*\*Biological Source\*\***:

- Peppermint oil is derived from the leaves and stems of the peppermint plant, Mentha × piperita, which is a hybrid between watermint (Mentha aquatica) and spearmint (Mentha spicata). It is native to Europe and Asia but is now cultivated worldwide.

#### 3. **\*\*Synonyms\*\***:

- Mentha oil, M. piperita oil

#### 4. **\*\*Organoleptic Characteristics\*\***:

- Peppermint oil has a strong, refreshing aroma with a cooling sensation. It has a characteristic minty flavor with hints of sweetness.

#### 5. **\*\*Chemical Constituents\*\***:

- The main bioactive compound in peppermint oil is menthol, which is responsible for its characteristic cooling effect. Other important constituents include menthone, menthyl acetate, and various terpenes.

#### 6. **\*\*Uses\*\***:

- Peppermint oil has a wide range of uses in traditional medicine, aromatherapy, and culinary applications. It is known for its analgesic, anti-inflammatory, antimicrobial, and digestive properties. Peppermint oil is commonly used to alleviate headaches, soothe muscle pain, improve digestion, and relieve respiratory symptoms such as coughs and congestion.

In the formulation of herbal cough lozenges, peppermint oil may contribute its medicinal properties, including its ability to soothe throat irritation, reduce coughing, and provide a cooling sensation. The menthol content in peppermint oil acts as a mild anesthetic, numbing the throat and reducing the urge to cough. Additionally, peppermint oil adds a refreshing flavor and aroma to the lozenges.



## Lemon Juice



### 1. **Taxonomical Information**:

- Lemon juice does not have taxonomical information as it is a natural product obtained from citrus fruits.

### 2. **Biological Source**:

- Lemon juice is obtained from the citrus fruit *Citrus limon*, which belongs to the Rutaceae family. Lemon trees are native to South Asia but are cultivated in various parts of the world for their fruits.

### 3. **Synonyms**:

- Citrus limon juice

### 4. **Organoleptic Characteristics**:

- Lemon juice has a tart, tangy flavor with a refreshing citrus aroma. It is typically a pale yellow to bright yellow color and has a slightly acidic taste.

### 5. **Chemical Constituents**:

- Lemon juice contains various compounds, including citric acid, vitamin C (ascorbic acid), flavonoids, and other phytochemicals. It is also rich in minerals such as potassium and calcium.

### 6. **Uses**:

- Lemon juice is widely used in culinary applications for its flavor-enhancing properties and acidic tang. It is also used in traditional medicine and home remedies for its potential health benefits. Lemon juice is known for its vitamin C content, which boosts the immune system and provides antioxidant protection. It is also used to aid digestion, cleanse the body, and freshen breath.

In the formulation of herbal cough lozenges, lemon juice may contribute its acidic nature, which can help soothe throat irritation and provide a refreshing taste. Additionally, the vitamin C content in lemon juice may support immune function and help alleviate symptoms of coughs and colds. Lemon juice adds a tangy flavor and enhances the overall taste of the lozenges.

## Menthol



### 1. **Taxonomical Information**:

- Menthol does not have taxonomical information as it is a natural compound rather than a plant or organism.

### 2. **Biological Source**:

- Menthol is obtained from the essential oil of various mint species, particularly peppermint (*Mentha × piperita*) and cornmint (*Mentha arvensis*). It is a naturally occurring compound found in the leaves and stems of these plants.



3. **Synonyms**:

- No common synonyms; it's simply referred to as menthol.

4. **Organoleptic Characteristics**:

- Menthol has a characteristic minty aroma and flavor with a cooling sensation when applied to the skin or mucous membranes. It is typically a colorless or white crystalline solid at room temperature.

5. **Chemical Constituents**:

- Menthol is a cyclic terpene alcohol with the chemical formula C<sub>10</sub>H<sub>20</sub>O. It is the primary bioactive compound responsible for the minty flavor and cooling sensation of mint plants. Menthol is synthesized from menthone, which is another compound found in mint oils.

6. **Uses**:

- Menthol has a wide range of uses in pharmaceuticals, personal care products, and food and beverages. It is commonly used in cough drops, throat lozenges, and topical ointments for its cooling and soothing effects. Menthol is known for its analgesic, antipruritic, and decongestant properties. It is often used to relieve symptoms of coughs, sore throats, congestion, and minor skin irritations.

In the formulation of herbal cough lozenges, menthol may contribute its cooling and soothing effects, helping to relieve throat irritation and suppress coughing. It provides a refreshing sensation and may help alleviate congestion. Menthol is often included in cough lozenges for its ability to provide immediate relief from cough and throat discomfort.

### Evaluation Test

Hardness test- The Hardness testing was done by using Pfizer hardness tester for sampled lozenges and average hardness was determined and the results were indicated as kg/sq. cm <sup>[9]</sup>

Disintegration time- Ideally this test is not official for the formulation expected to be dissolved slowly in the mouth and hence the limits are not specific. Still the test was performed to find whether the lozenge dissolves in mouth and how much time it takes to dissolve completely so that the faster and localized onset of action can be obtained. The test was performed as per the procedure given in the monograph for uncoated tablets. The medium used was phosphate buffer pH 6.2 to simulate the pH of oral fluid. Sampled six lozenges revealed average disintegration time <sup>[10]</sup>

### CONCLUSION

Herbal lozenges are designed to provide various health benefits in the form of a small tablet that slowly dissolves in the mouth. The aim of herbal lozenges is to deliver the active herbal ingredients directly to the throat, mouth, and respiratory system to provide relief from various conditions.<sup>[11]</sup>

The cough lozenge is taken to relieve infections in the throat or sore throat caused by an infection or common cough and cold.<sup>[12]</sup> used to temporarily help relieve symptoms such as sore throat, throat irritation, or cough (due to a cold, for example). It works by providing a cooling feeling and increasing saliva in the mouth.<sup>[13]</sup>

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