

# Extraction and formulation of poly herbal lozenges for upper respiratory congestion

Shobha<sup>1</sup>, Sonali<sup>2</sup>, Ms. Tehreen Parveen\*

<sup>1,2</sup> Student, \*Assistant Professor, School of Pharmaceutical Sciences, RIMT University, Mandi Gobindgarh, Punjab.

<sup>1</sup> [shobha4265@gmail.com](mailto:shobha4265@gmail.com), <sup>2</sup>[sonali74650@gmail.com](mailto:sonali74650@gmail.com), \*[tehreen.parveen26@gmail.com](mailto:tehreen.parveen26@gmail.com)

## Abstract:

Upper respiratory tract infection is a frequently occurring condition marked by nasal obstruction, coughing, throat irritation and breathing difficulty that increased by allergies or infections. Although Conventional medications can provide symptomatic relief, but prolonged use may cause serious side effects. This study explores the extraction, formulation and evaluation of herbal lozenges as a natural and safer alternative for treating congestion. Liquorice (*Glycyrrhiza glabra*), ginger (*Zingiber officinale*), and eucalyptus oil (*Eucalyptus globulus*) are the medicinal plants, which were selected based on their well-documented anti-inflammatory, antimicrobial, and expectorant activities. The plant materials contain bioactive constituents like alkaloids, tannins, flavonoids and glycosides. Soft lozenges were using formulated using jaggery as a base through the melting and molding technique. The prepared lozenges were evaluated for various parameters such as organoleptic properties, hardness, thickness, weight variation, moisture content, and friability and disintegration time. Results demonstrated satisfactory of physical characteristics, stability, and uniformity along with good mechanical strength and acceptable disintegration behavior. Thus, the developed polyherbal lozenges represents a safe, effective, and patient-friendly dosage form for relieving upper respiratory congestion with minimal side effects.

**Keywords:** Upper respiratory congestion, Polyherbal formulation, Herbal lozenges and Solid dosage form.

## Introduction

Upper respiratory congestion is an acute infection which affect the people of all ages caused by viruses or bacteria to nose, sinuses, pharynx, and larynx. Most URIs are short, mild, and self-limiting, but some can lead to serious complications, resulting in heavy social and economic burden on individuals and society [1]. It is known as a 'common cold' which is the most frequent illness in humans. The main symptoms of URI are nasal stuffiness, discharge, sneezing, sore throat, and cough. The presence of low-grade fever is variable and more common in children than in adults [2]. Some bacterial infections are a leading cause of upper respiratory tract infections, with *Staphylococcus aureus* and *Streptococcus* species being the most common sources of infection [3]. Antihistamines, corticosteroids and nasal decongestants are the conventional medicines but their excessive uses causes serious side effects such as sedation, rebound congestion, dryness of mucosa and potential dependency etc [4,5].

In recent years, people demand on herbal and plant-based medicines increased due to their highly safety, efficacy, and fewer adverse effects. Traditional systems of medicine, including Ayurveda and Traditional Chinese Medicine, have long utilized medicinal plants for the treatment of respiratory ailments. These plants contain a diverse range of phytochemicals such as alkaloids, flavonoids, glycosides, tannins, and essential oils, which exhibit pharmacological activities including anti-inflammatory, antimicrobial, expectorant, and immunomodulatory effects [6]. The concept of

polyherbal formulation, which involves the use of multiple herbs in combination, is based on the principle of synergism, where the therapeutic efficacy is enhanced while minimizing toxicity.

The lozenges are widely accepted solid dosage form and intended to be dissolved or disintegrated slowly in the oral cavity. They contain one or more active ingredients, flavored and sweetened so as to be pleasant tasting. It consists of sugar and gum which giving strength and cohesiveness to the lozenges facilitating slow release of the medicaments [7]. Medicated lozenges are beneficial in the management of throat irritation, cough, and congestion, as they combine soothing effects with therapeutic action [8].

**Liquorice** (*Glycyrrhiza glabra*) usually known as Mulaithi, Yashtimadu or licorice is a common herb. It is traditionally used in Ayurvedic and Chinese medicine for its mystic effects to cure numerous diseases such as hepatitis C, ulcers, pulmonary and skin diseases. The most imperative is bioactive compound is Glycyrrhizin. Due to these elements it has important pharmacological activities such as antioxidant, antibacterial, antiviral and anti-inflammatory as well. [9]

**Ginger:** Ginger (*Zingiber officinale*) is one of the more commonly used herbal supplements. Gingerol is the active principle of fresh ginger, it is normally found as a yellow pungent oil and has spicy-sweet aroma. It has pharmacological activities such as antioxidant Activity, antifungal Activity, antibacterial Activity and anti-inflammatory etc [10].

**Eucalyptus:** Dried leaves and essential oil of *Eucalyptus globulus* L. belongs to the family *Myrtaceae*. The plant has been reported to possess potent antiseptic, astringent, deodorant, diaphoretic, expectorant, inhalant, insect repellent, rubefacient and suppurative properties [11].

Therefore, the present study is aimed at the extraction and phytochemical screening of selected medicinal plants and formulation of polyherbal lozenges for effective management of upper respiratory congestion. This approach will combine the advantages of traditional herbal medicine with modern pharmaceutical formulation techniques to develop a safe, effective, and patient-friendly dosage form.

## 2. Material and Methods

1. **Selection of Plants:** The liquorice, Ginger and Eucalyptus were purchased from local markets and authentication were confirmed through the Department of Pharmacognosy, RIMT University, Mandi Gobindgarh, Punjab.
2. **Preparation of various extracts:** The fresh plant materials were dried under shade for 15 days and powdered using mixer grinder. The 40 g powdered liquorice were extracted with 250 ml of Ethanol through soxhlation process at temperature of 80°C. The 20 g of Ginger is extracted with decoction process and Eucalyptus oils were collected by using Clevenger apparatus.



**Figure 2:** Preparation extract by using soxhlet appatus

- 3. Formulation of Lozenges:** Soft lozenges were prepared by melting and molding techniques. The 120g of Jaggery was melted on water bath. The sufficient quantity of plant materials were taken as mention in the table 1 and mixed in a melted jiggery to form homogeneous mixture. Then, mixture were poured into the stainless steel mold.

**Table 1:** This table 1 shows the ingredients used in the formulation of lozenges.

S. No.	Ingredients	Quantity for 40 lozenges
1.	Jaggery	120 g
2.	Liquorice	5 g
3.	Ginger	3 g
4.	Eucalyptus	2-3 drops



**Figure:** It has shown the heart shape herbal lozenges.

- 4. Evaluation of Lozenges:** The formulation developed in the laboratory and various evaluation parameters were checked [12].

**1. Organoleptic properties:** This test evaluates the sensory qualities of lozenges using human senses like sight, taste, smell, touch, and sound, assessing their general acceptance and quality, and highlighting their responsibilities.

**2. Thickness:** The tablet thickness test is a crucial quality control procedure in pharmaceutical tablet production, ensuring consistency and uniformity in size measurement.

**3. Hardness:** A hardness test evaluates a tablet's mechanical strength and resistance to breaking or crushing, crucial for pharmaceutical tablets to meet quality standards and ensure smooth handling and shipping.



**Figure 2:** Lozenges hardness testing by Pfizer.

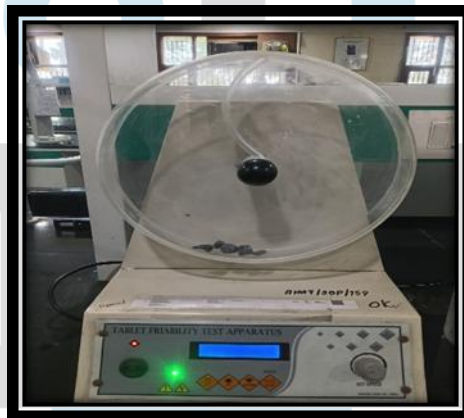
**5. Disintegration time:** It is a crucial pharmaceutical quality control test that measures the time it takes for a tablet to break down into smaller pieces when submerged in a specific liquid media, ensuring its effective dissolution and release upon swallowing.

**6. Moisture content:** By the gravimetric method, 1 g sample was weighed and placed in an oven at 60–70°C for 12–16 h. Final weight was determined to utilize a delicate muslin fabric and its weight was rechecked. Percentage friability is given by the equation.

$$\% F = (\text{Initial weight} - \text{Final weight} / \text{Initial weight}) \times 100.$$

**7. Weight variation:** Ten lozenges were randomly selected from each batch and individually weighed. The average weight and standard deviation of 10 lozenges were calculated. The batch passes the test for weight variation test if not more than 2 of the individual lozenges weight deviates from the average weight.

**8. Friability:** It is a measure of mechanical strength of tablets. Roche friabilator (Electro lab, Mumbai, India) was used to determine the friability by following procedure. Pre-weighed lozenges (20 tablets) were placed in the friabilator. The lozenges were rotated at 25 rpm for 4 minutes (100 rotations). At the end of test, the lozenges were re-weighed, loss in the weight of lozenges is the measure of friability and is expressed in percentage



**Figure 3: Friability apparatus**

$$\% \text{ Friability} = [(W1 - W2) / W1] \times 100$$

Where, W1 = Initial weight of 20 tablets

W2 = Weight of the 20 tablets after testing

**Results and Discussion:** Lozenges are a widely used and effective dosage form which delivers both local and systemic effects in the oral cavity. It enhance bioavailability and minimize inflammation and first-pass metabolism in the GI tract. This modification in the method in which the medication is given has a beneficial effect on patient comfort as well as medicine performance.

The prepared polyherbal lozenges showed satisfactory physicochemical properties. The formulation exhibited good organoleptic characteristics, suggesting patient acceptability. The average weight of soft lozenges are 2.4 g and thickness were uniform, confirming consistency in molding. The evaluation of hardness and friability tests indicated sufficient mechanical strength for handling and transportation. The disintegration time fell within the desirable range allowing for prolonged release of active constituents in the oral cavity. Moisture content was within acceptable limits, suggesting good stability and reduced risk of microbial growth.

**Table 2: Evaluation parameters of herbal lozenges**

S. No.	Parameter	Observed Result	Inference
1	Organoleptic Properties	Colour: Brown Odor: pleasant Taste: sweet Texture: smooth	Pass
2	Thickness	3.5 ± 0.2 mm	Pass
3	Hardness	1.8–2.0 kg/cm <sup>2</sup>	Pass
4	Disintegration Time	3–4 minutes	Pass
5	Moisture Content	7%	Pass
6	Weight Variation	2.2 ± 0.08 g	Pass
7	Friability	1.56%	Acceptable

Overall, the formulation demonstrated effective characteristics suitable for relieving upper respiratory congestion through local soothing and anti-inflammatory action.

### Conclusion:

The polyherbal lozenges formulated with jaggery, liquorice, ginger, and eucalyptus oil were successfully developed and evaluated. The scaled up batch of 50 lozenges demonstrated uniformity and acceptable quality control standards. The results indicate that the developed lozenges are stable, effective, and suitable for managing upper respiratory congestion, offering a natural and patient-friendly alternative to conventional dosage forms.

**Acknowledgement:** Author is very thankful to International Journal for Research Trends and Innovation for publishing this journal.

### References:

- Wang DY, Eccles R, Bell J, Chua AH, Salvi S, Schellack N, Marks P, Wong YC. Management of acute upper respiratory tract infection: the role of early intervention. *Expert review of respiratory medicine*. 2021 Dec 2;15(12):1517-23.
- Bellussi LM, Passali FM, Ralli M, Vincentiis MD, Greco A, Passali D. An overview on upper respiratory tract infections and bacteriotherapy as innovative therapeutic strategy. *European Review for Medical and Pharmacological Sciences*. 2019;23(1):27-38.
- Majekodunmi SO. A review on lozenges. *American journal of medicine and medical sciences*. 2015 Jan 1.
- Dicpinigaitis PV, Bhat R, Rhoton WA, Tibb AS, Negassa A. Effect of viral upper respiratory tract infection on the urge-to-cough sensation. *Respiratory medicine*. 2011 Apr 1;105(4):615-8.
- Litster A, Wu CC, Leutenegger CM. Detection of feline upper respiratory tract disease 3Weintraub pathogens using a commercially available real-time PCR test. *The Veterinary Journal*. 2015 Nov 1;206(2):149-53.
- Pandey, A., & Tripathi, S. (2014). Concept of standardization, extraction and pre phytochemical screening strategies for herbal drug. *Journal of Pharmacognosy and Phytochemistry*, 2(5), 115–119.
- Roberts NJ, Lloyd-Owen SJ, Rapado F, Patel IS, Wilkinson TM, Donaldson GC, Wedzicha JA. Relationship between chronic nasal and respiratory symptoms in patients with COPD. *Respiratory medicine*. 2003 Aug 1;97(8):909-14.
- Allen, L. V. (2013). *Pharmaceutical Dosage Forms and Drug Delivery Systems* (9th edition.). Lippincott Williams & Wilkins.
- Pastorino G, Cornara L, Soares S, Rodrigues F, Oliveira MB. Liquorice (*Glycyrrhiza glabra*): A phytochemical and pharmacological review. *Phytotherapy research*. 2018 Dec;32(12):2323-39.
- Moghaddasi MS, Kashani HH. Ginger (*Zingiber officinale*): A review. *Journal of Medicinal Plants Research*. 2012 Jul 11;6(26):4255-8.
- Hayat U, Jilani MI, Rehman R, Nadeem F. A Review on Eucalyptus globulus: A new perspective in therapeutics. *Int. J. Chem. Biochem. Sci*. 2015 Jan;8:85-91.
- Pothu R, Yamsani MR. Lozenges formulation and evaluation: A review. *International Journal of Advances in Pharmaceutical Research*. 2014 May;5(5):290-8.
- Chanda R, Nallaguntla L. Formulation and evaluation of medicated lozenges for sore throat. *Asian Journal of Pharmaceutical and Clinical Research*. 2020 Oct 7:62-7.