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Formulation and Evaluation of Herbal Lozenges for Cough

Shubham Waghmare¹ and Ms. Walunj K. B²

Department of Pharmacognacy Samarth Institute of Pharmacy ,Belhe, Junnar^{1,2} shubhamwaghmare087@gmail.com

Abstract: The goal of the current study was to formulate and evaluate herbal lozenges incorporating traditional medicinal herbs—Adulsa (Vasaka), Ginger (Zingiberofficinale), and Clove (Syzygiumaromaticum)—for their effectiveness in relieving cough. These herbs are known for their expectorant, anti-inflammatory, and antimicrobial properties. Lozenges were prepared using the conventional molding technique with appropriate excipients such as sucrose, liquid glucose, and binding agents. The prepared lozenges were evaluated for organoleptic properties, weight variation, hardness, friability, pH. Results indicated that the optimized formulation showed acceptable physical characteristics and a sustained release of active constituents. The herbal ingredients used demonstrated potential synergistic action in relieving throat irritation and suppressing cough. The study concludes that herbal lozenges can serve as an effective, palatable, and safe alternative to synthetic cough suppressants.

Keywords: Herbal lozenges, Adulsa, Ginger, Clove, Cough relief, Organoleptic evaluation, In-vitro drug release, Phytotherapy

I. INTRODUCTION

Herbal lozenges:

Herbal lozenges are medicated solid dosage forms designed to dissolve slowly in the mouth, delivering herbal active ingredients locally to the throat or oral cavity for therapeutic action. They are prepared using medicinal plant extracts or powders known for their soothing, expectorant, antimicrobial, and anti-inflammatory properties. Herbal lozenges provide symptomatic relief from conditions such as cough, sore throat, throat irritation, and mild respiratory infections, while being natural, palatable, and minimally invasive alternatives to conventional medicines.Lozenges, also known as troches or pastilles, are solid dosage forms that dissolve slowly in the mouth to deliver active ingredients locally to the oral cavity or throat. They are commonly used for the treatment of cough, sore throat, and throat infections. Lozenges provide symptomatic relief by releasing soothing and medicinal agents gradually, which are absorbed through the mucous membranes or swallowed for systemic action.

Herbal lozenges are formulated using extracts or powders of medicinal plants known for their therapeutic properties. These lozenges harness the phytochemicals found in herbs to offer natural relief from throat irritation, inflammation, and microbial infections. Unlike conventional lozenges that may contain synthetic drugs or harsh chemicals, herbal lozenges are generally safer and better tolerated, especially for long-term use.

Lozenges are one of the oldest and most convenient dosage forms designed for oral administration. They are solid preparations intended to dissolve slowly in the mouth, providing local or systemic effects. Commonly used for the treatment of cough, sore throat, and mouth infections, lozenges offer the benefit of a sustained release of active ingredients directly to the affected area. In recent years, herbal lozenges have gained popularity due to growing consumer interest in natural and safer alternatives to synthetic medications.

Herbal lozenges are formulated by incorporating extracts or powders of medicinal plants with known therapeutic properties. These herbs are selected based on their effectiveness in treating symptoms like throat irritation, dry cough, inflammation, and microbial infections of the upper respiratory tract. Herbal lozenges provide a dual benefit:

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they act as a local soothing agent for the throat and also offer systemic relief through the absorption of herbal constituents.

In this project, Adulsa (Vasaka), Ginger (Zingiberofficinale), and Clove (Syzygiumaromaticum) have been selected for the formulation of herbal lozenges. These herbs have a long history of use in traditional medicine systems such as Ayurveda and Unani for their expectorant, anti-inflammatory, antitussive, and antimicrobial properties.

- Adulsa (Vasaka) is widely recognized for its ability to clear the respiratory tract by acting as an expectorant and bronchodilator. It contains alkaloids like vasicine that help in loosening mucus and easing breathing.
- **Ginger** (Zingiberofficinale) is well known for its anti-inflammatory and warming effect, which soothes the throat and reduces coughing.
- Clove (Syzygiumaromaticum) contains eugenol, a potent antimicrobial and analgesic agent that relieves sore throat and kills infection-causing microbes.

Incorporating these herbal ingredients into a lozenge form not only enhances patient compliance due to the palatable taste but also offers a convenient way to administer herbal medicine. Unlike syrups or tablets, lozenges are easy to carry, require no water for administration, and slowly release the active constituents in the mouth, providing prolonged therapeutic action.

The increasing resistance to synthetic drugs and the side effects associated with conventional antitussive agents have driven the pharmaceutical industry to explore herbal alternatives. Herbal medicines are generally well-tolerated and have fewer adverse effects, making them suitable for all age groups, including children and the elderly.

From a pharmaceutical formulation perspective, lozenges are an ideal choice for incorporating thermally stable herbal ingredients. The manufacturing process typically involves melting and molding techniques using a sugar base along with suitable binders, lubricants, and flavoring agents to ensure acceptable taste and mechanical strength.

Parameter	Information	Information	Information
Plant Name	Adulsa	Ginger	Clove
Synonyms	Vasaka	Adrak, Ale	Lavang
Image			
Origin	Traditionally used in	Used in Indian, Chinese,	Indigenous to the Maluku
	Ayurveda for respiratory	and Arabic medicine for	Islands; used traditionally
	ailments. Native to India	digestive and	for dental and
	and Southeast Asia	inflammatory conditions	digestive health
Biological Source	Leaves of Justiciaadhatoda	Rhizome of	Flower buds of
		Zingiberofficinale	Syzygiumaromaticum
Family	Acanthaceae	Zingiberaceae	Myrtaceae
Chemical	Vasicine, vasicinone,	Gingerol, shogaol,	Eugenol, tannins,
Constituents	essential oils	zingerone	flavonoids
Uses	Expectorant,	anti-inflammatory,	Antiseptic, analgesic,
	bronchodilator, anti-	carminative, antioxidant	carminative, antioxidant

II. DRUG PROFILE

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	inflammatory		
Kingdom	Plantae	Plantae	Plantae
Phylum	Angiosperm	Angiosperm	Angiosperm
Genus	Justicia	Zingiber	Syzygium
Class	Magnoliopsida	Liliopsida	Magnoliopsida

III. MATERIALANDMETHODS

Selection of Plant Material-

In the present study, I have selected the Adulsa (Vasaka), Ginger, and Clove.

Collection of plant Material-

Adulsa leaves form local Area, the local market in Alephata, Pune, provided the Ginger , Clove ,Sugar and Amazon Shopping provided Molds

Formulation of Herbal Lozenges -

Ingredients	Quantity	Role
Adulsa Extract	3 gm	Active Ingredient
Ginger Extract	2.5 gm	Active Ingredient
Clove Extract	1 gm	Active Ingredient
Sucrose	25 gm	Sweetning agent,
		Binding agent
Water (Purified)	8-10 ml	Solvent
Menthol	0.20 gm	Flavouring agent

Parameter	Batch 1	Batch 2	Batch 3
Ratio	95%- Sugar	90%- Sugar	85%- Sugar
	5%- Herbal Extract	10%- Herbal Extract	15%- Herbal Extract
Colour	Light Brown	Light brown	Caramel brown
Odour	Sweet	Sweet	Herbal smell, sweet
Hardness	8.5 kg	8 kg	7 kg
Texture	Soft, hard	Soft ,Hard	Soft, Hard





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Preparation of Herbal Extracts, juice from fresh ginger, Adulsa leaves, and clove by decoction

Sugar Base Preparation ,base on sucrose and water ratio

Add the prepared herbal extracts and flavoring agents while stirring continuously.

Pour the mass into lubricated molds or onto a greased surface.

 \downarrow

Allow to cool and harden at room temperature







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Organoleptic Evaluation:

- Taste -Herbal Flavor , Sweetness
- Odor Herbal and sweet smell
- Mouthfeel Smoothness

Physical Evaluation :

1. Appearance :

- Colour -Caramel brown
- Shape Round, oval shape
- Surface Soft ,Hard

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2. Thickness :

The thickness of the formulated lozenges was measured using a Vernier caliper. Ten lozenges were randomly selected and their thickness was measured individually. Thickness of herbal lozenges is 11.4mm



3. Weight Variation :To assess the consistency of the weight of individual herbal lozenges within a batch. Uniformity in weight can indicate consistent ingredient distribution and potentially consistent dissolution time.



NO. of Herbal Lozenges	Weight of Herbal Lozenges
1	1.87g
2	1.89g
3	1.91g
4	1.88g
5	1.90g
6	1.92g
7	1.89g
8	1.93g
9	1.88g
10	1.84g

Formula: Percentage deviationn of Weight Variation:

= (Individual Lozenges weight -Average weight of Lozenges)

Average weight of Lozenges × 100









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By comparing these percentage deviations against established acceptance criteria to determine if the weight variation of this batch of lozenges is acceptable Limits, criteria state that no more than two lozenges should deviate by more than $\pm 5\%$ from the average weight, then this batch appears to be well within that limit. All the individual deviations are significantly less than 5%.

4. Hardness:

To evaluate the diametrical crushing strength, 3lozenges from each formulation were tested using a MAChardness tester Hardness was found to be 7 kg



5. Friability:

The friability of the 10 lozenges from each batchwastested, at speed of 25 rpm for 5 min. The lozenges were then dedusted, reweighed and percentage weight loss wascalculated by the equation. % friability was 1.00%. The friability should be less than 1% for lozenges to pass the test. In this example, 1.00% is on the borderline, so ideally the formulation should be improved slightly for better mechanical strength.



6. Disintegration test :

The disintegration time of the formulated herbal lozenges was evaluated using a USP disintegration apparatus. One lozenge was placed in each tube of the basket-rack assembly, and the apparatus was operated in distilled water maintained at 37 ± 0.5 °C.

The recorded disintegration time for the herbal lozenges was found to be 6.21 minutes, which is within acceptable limits for lozenges and indicates satisfactory breakdown of the formulation in the oral cavity.

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7.pH :

The pH of the formulated herbal lozenges was determined by dissolving one lozenge in 25 mL of distilled water and measuring the pH using a digital pH meter.

The observed pH was found to be 6.82, which lies within the acceptable range (5.5–7.0) for oral formulations. This indicates that the lozenges are mildly acidic to neutral, making them safe and non-irritating to the oral mucosa



8. Moisture Content (Loss on Drying):

The moisture content of the herbal lozenges was determined using the loss on drying method. A 5 g sample was weighed and dried in a hot air oven. The loss in weight was recorded as 0.07 g, indicating a moisture content of 1.4%, which is within acceptable limit

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9. Microbial Test

The microbial load of the formulated herbal lozenges was evaluated using the spread plate method. Samples from both the control and test batches were serially diluted and spread onto nutrient agar plates, followed by incubation at $37 \pm 1^{\circ}$ C for 24–48 hours.

After the incubation period, no microbial growth was observed in either the control or test plates. This indicates that the lozenges are free from microbial contamination and comply with acceptable microbiological standards for oral formulations



10. Ash value(%w/w):

The ash value determination was performed to assess the inorganic content and purity of the formulated herbal lozenges.

Sr.No	Physical Constant	Results
1	Total ash	1.99%
2	Acid insoluble ash	0.3%
3	Water soluble ash	1.2%

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IV. RESULTS

The herbal lozenges formulated using extracts/powders of Adhatodavasica (Adulsa), Zingiberofficinale (Ginger), and Syzygiumaromaticum (Clove) were successfully prepared by the molding method using suitable excipients. The optimized batch of lozenges was subjected to various evaluation parameters, and the following results were obtained:

- Appearance: Smooth, uniform, and round-shaped lozenges with acceptable color and texture.
- Weight Variation: Within acceptable pharmacopoeial limits.
- Hardness: 7 kg/cm², indicating sufficient mechanical strength.
- Friability: Less than 1%, indicating good physical integrity.
- Disintegration Time: Ranged between 6-8 minutes, suitable for buccal administrat
- Drug Content Uniformity: Uniform distribution of herbal actives was observed (within 95–105%).
- Taste and Mouthfeel: Acceptable based on sensory evaluation by volunteers

V. CONCLUSION

The present study successfully demonstrated the formulation and evaluation of herbal lozenges containing Adulsa, Ginger, and Clove for the management of cough. The selected herbs are well-known for their expectorant, antiinflammatory, and antimicrobial properties. The formulated lozenges showed satisfactory results in terms of physical parameters, taste, and release profile.

This herbal lozenge formulation offers a promising, natural, and patient-friendly alternative to conventional cough medications. Further in-vivo studies or clinical evaluations are recommended to establish efficacy and safety in larger populations.

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