

FORMULATION AND EVALUATION OF AN OKRA MUCILAGE-BASED HERBAL  
COUGH SYRUP AS A NATURAL SUGAR - FREE DEMULCENTSonia Rambachan Kanojia<sup>1\*</sup>, Rudra Adhik Khanolkar<sup>2</sup>, Hemant Mahadev Koyande<sup>3</sup>, Dnyaneshwar S.  
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**ABSTRACT**

Cough is one of the most frequently reported symptoms in respiratory tract infections and inflammatory throat conditions. Conventional cough syrups commonly contain sucrose and synthetic excipients, which may limit their use in diabetic patients and individuals preferring herbal or sugar-free formulations. This has created a need for the development of natural, safer, and patient-compliant cough preparations. In the present study, an attempt was made to formulate and evaluate a herbal cough syrup using okra mucilage (*Abelmoschus esculentus*) as a natural sugar-free demulcent. Okra mucilage, a plant-derived polysaccharide, possesses excellent soothing and viscosity-enhancing properties, making it suitable for relieving throat irritation. Mulethi (*Glycyrrhiza glabra*) aqueous extract was selected as the active herbal ingredient due to its traditional use and proven antitussive and anti-inflammatory activities. Okra mucilage was extracted from fresh pods by aqueous extraction and incorporated into the syrup formulation along with mulethi extract, preservative, pH adjuster, and natural flavouring agent. Different formulations were prepared and evaluated for organoleptic properties, pH, viscosity, density, and clarity. The formulation included sodium saccharin as a sweetening agent and caramel colour as a colouring agent to improve palatability and appearance. Stability studies were conducted to assess the physical stability of the formulation under various storage conditions. The optimized formulation showed satisfactory physicochemical characteristics, good stability, and acceptable palatability. The findings of this study suggest that okra mucilage can be successfully used as a natural demulcent in sugar-free herbal cough syrup formulations. The developed formulation represents a promising and economical alternative to conventional cough syrups and provides scope for further pharmaceutical and clinical investigations.

**KEYWORDS:** Okra mucilage; *Abelmoschus esculentus*; Herbal cough syrup formulation; Natural demulcent; Sugar-free oral liquid; Plant-based excipients; Mulethi (*Glycyrrhiza glabra*).**1. INTRODUCTION**

Cough is a common protective reflex of the respiratory system that helps in clearing mucus, foreign particles, and irritants from the airways. It is one of the most frequently reported symptoms associated with upper respiratory tract infections, throat irritation, allergic conditions, and environmental pollution. Although cough serves a physiological purpose, persistent or recurrent cough can significantly affect quality of life by causing throat discomfort, sleep disturbances, and fatigue, thereby necessitating symptomatic treatment.<sup>[1]</sup>

Cough syrups are widely used oral liquid dosage forms intended to provide relief through demulcent, antitussive, or expectorant actions. Most conventional cough syrups available in the market contain high concentrations of sucrose, alcohol, and synthetic demulcents such as glycerin and cellulose derivatives. The presence of these components may lead to several limitations, including poor suitability for diabetic patients, alcohol sensitivity, dental problems, and reduced patient compliance in long-term use.<sup>[2]</sup> Therefore, the development of sugar-free and alcohol-free cough formulations has become an important area of pharmaceutical research.

In recent years, herbal medicines have gained considerable attention due to their safety, cost-effectiveness, biodegradability, and better acceptance among patients. Herbal formulations are often preferred because they are associated with fewer adverse effects compared to synthetic preparations. Additionally, there is a growing interest in the use of natural plant-derived polymers as pharmaceutical excipients, particularly as alternatives to synthetic viscosity enhancers and demulcents.<sup>[3]</sup>

Okra (*Abelmoschus esculentus*), commonly known as lady's finger, is a widely cultivated edible plant belonging to the family Malvaceae. The pods of okra are rich in mucilage, a natural polysaccharide composed mainly of galactose, rhamnose, and galacturonic acid. Okra mucilage exhibits excellent viscosity-enhancing, soothing, and film-forming properties. Previous studies have reported the use of okra mucilage as a binder, suspending agent, and controlled drug release polymer, indicating its suitability as a pharmaceutical excipient.<sup>[4,5]</sup> Due to its natural origin, non-toxic nature, and demulcent property, okra mucilage has strong potential for use in oral liquid formulations.

Mulethi (*Glycyrrhiza glabra*), commonly known as licorice, is a well-established medicinal plant used traditionally in the treatment of cough, sore throat, and respiratory disorders. It possesses antitussive, anti-inflammatory, and soothing properties, which make it a valuable herbal ingredient in cough formulations. Mulethi is also known to improve palatability and provide a mild natural sweetness, which is beneficial in sugar-free formulations.<sup>[6]</sup>

Despite the extensive use of herbal ingredients in cough syrups, limited scientific studies are available on the utilization of okra mucilage as a primary sugar-free demulcent base in herbal cough syrup formulations. Most existing formulations rely on sucrose or synthetic polymers to achieve viscosity and throat-coating action. Therefore, there exists a research gap in exploring okra mucilage as a natural, economical, and sugar-free alternative for demulcent action in cough syrups.

In view of these considerations, the present research was undertaken to formulate and evaluate an okra mucilage-based herbal cough syrup using mulethi extract as an active herbal component. To improve patient acceptability, a non-nutritive sweetening agent (sodium saccharin) and a suitable colouring agent (caramel colour) were incorporated in the formulation.

The study aims to develop a natural, sugar-free, and patient-friendly herbal cough syrup suitable for preparation in a college laboratory setting, while also exploring the potential of okra mucilage as a novel plant-based pharmaceutical excipient.

## 2. REVIEW OF LITERATURE

Herbal medicines have been widely explored for the management of respiratory disorders due to their safety profile and long history of traditional use. Several studies have highlighted the increasing demand for herbal cough formulations as alternatives to synthetic syrups, mainly because of concerns related to sugar content, alcohol presence, and adverse effects associated with long-term use of conventional preparations.<sup>[7]</sup>

Natural demulcents play a crucial role in cough syrup formulations by forming a protective coating over the irritated mucosal lining of the throat. Plant-derived mucilages have been investigated as effective natural demulcents owing to their soothing action, biocompatibility, and non-toxic nature. Researchers have reported the successful use of mucilages obtained from plants such as *Plantago ovata* (Isabgol), *Trigonella foenum-graecum* (fenugreek), and *Aloe vera* as viscosity enhancers and throat-soothing agents in oral liquid dosage forms.<sup>[8,9]</sup>

Okra (*Abelmoschus esculentus*) mucilage has attracted pharmaceutical interest due to its high polysaccharide content and excellent rheological properties. Several studies have demonstrated the potential of okra mucilage as a tablet binder, suspending agent, and controlled drug delivery polymer. Its ability to increase viscosity even at low concentrations makes it a promising natural excipient. Olorunsola *et al.* reported that okra mucilage exhibited good swelling index and viscosity characteristics comparable to commonly used synthetic polymers.<sup>[10]</sup>

Further studies have evaluated okra mucilage for its safety and compatibility with pharmaceutical formulations. Toxicological and compatibility studies have suggested that okra mucilage is non-irritant, biodegradable, and safe for oral use. Its demulcent property is attributed to the formation of a smooth, viscous film that provides a soothing effect on mucosal surfaces, making it suitable for cough and throat preparations.<sup>[11]</sup>

Mulethi (*Glycyrrhiza glabra*) is one of the most extensively studied medicinal plants for respiratory ailments. Various pharmacological studies have confirmed its antitussive, anti-inflammatory, expectorant, and mucoprotective activities. The presence of glycyrrhizin and flavonoids contributes to its soothing effect on the throat and reduction of cough reflex. Mulethi has been commonly incorporated in herbal cough syrups, lozenges, and throat formulations.<sup>[12]</sup>

Several herbal cough syrup formulations containing mulethi in combination with other herbs such as *vasaka*, *tulsi*, and *ginger* have been reported in the literature.

These formulations demonstrated satisfactory physicochemical properties and patient acceptability.

However, most of these formulations relied on sucrose or synthetic polymers as the syrup base, which limits their suitability for diabetic and sugar-restricted patients.<sup>[13]</sup>

Recent research trends emphasize the development of sugar-free and alcohol-free herbal oral liquid formulations. Studies have explored the replacement of sucrose with artificial sweeteners or natural polymers to achieve acceptable viscosity and palatability. However, limited literature is available on the use of okra mucilage as a primary sugar-free demulcent base in herbal cough syrups, indicating a clear research gap.<sup>[14]</sup>

From the reviewed literature, it is evident that while okra mucilage and mulethi have been individually studied for pharmaceutical and therapeutic applications, their combined use in a sugar-free herbal cough syrup formulation has not been extensively explored. This highlights the novelty and relevance of the present study, which focuses on utilizing okra mucilage as a natural demulcent and mulethi extract as an active herbal component in the development of a herbal cough syrup.

### 3. AIM AND OBJECTIVES

#### Aim

The aim of the present research work was to formulate and evaluate an okra mucilage (*Abelmoschus esculentus*)-based herbal cough syrup as a natural, sugar-free demulcent, using mulethi (*Glycyrrhiza glabra*) extract as the active herbal component, suitable for safe oral administration.

#### Objectives

The specific objectives of the present study were:

- 1) To extract mucilage from fresh okra pods using a simple aqueous extraction method.
- 2) To prepare aqueous extract of mulethi by the decoction method.
- 3) To formulate a sugar-free herbal cough syrup using okra mucilage as a natural demulcent base.
- 4) To avoid the use of sucrose and synthetic demulcents by employing plant-derived mucilage.
- 5) To evaluate the formulated syrup for organoleptic properties such as colour, odour, taste, and appearance.

### 4.2 METHODS

- Preparation of Extraction of Okra Mucilage



A. OKRA PODS



B. Washing

- 6) To determine physicochemical parameters including pH, viscosity, density, and clarity of the formulation.
- 7) To study the short-term stability of the formulated herbal cough syrup under different storage conditions.
- 8) To assess the suitability of okra mucilage as a natural pharmaceutical excipient for herbal liquid formulations.
- 9) To incorporate a suitable non-nutritive sweetening agent (sodium saccharin) to improve taste without adding sugar.
- 10) To incorporate a suitable colouring agent (caramel colour) to enhance the appearance of the formulation.

### 4. MATERIALS AND METHODS

#### 4.1 Materials

The materials used for the formulation of okra mucilage-based herbal cough syrup are listed below:

##### Plant Materials

- Fresh okra pods (*Abelmoschus esculentus*)
- Mulethi powder (*Glycyrrhiza glabra*)

##### Excipients and Chemicals

- Citric acid
- Sodium benzoate
- Natural flavouring agent (peppermint)
- Distilled water
- Sodium saccharin (sweetening agent)
- Caramel colour (colouring agent)

##### Instruments and Apparatus

The following instruments and apparatus were used during the experimental work:

- Beakers (100 ml, 250 ml)
- Measuring cylinders
- Hot plate
- Glass rods
- Knife and chopping board
- Muslin cloth / Whatman filter paper
- Digital pH meter
- Ostwald viscometer
- Pycnometer
- Thermometer
- Amber-coloured glass bottle



**C. CHOPPING** **D. MUCILAGE FORMATION**  
**Figure 1: Extraction and Isolation of Okra Mucilage from *Abelmoschus esculentus*.**

#### Materials Required

- Fresh okra pods (*Abelmoschus esculentus*) – 10 g
- Distilled water – 100 ml
- Beaker (250 ml)
- Hot plate
- Glass rod
- Muslin cloth / Whatman filter paper
- Thermometer

#### Procedure

- 1) Fresh okra pods were procured and washed thoroughly with distilled water to remove adhering dirt and surface impurities.
- 2) The cleaned okra pods were cut into small, uniform pieces using a sterile stainless-steel knife.
- 3) Accurately weighed 10 g of chopped okra pieces were transferred into a 250 ml beaker containing 100 ml of distilled water.
- 4) The mixture was heated on a hot plate at a controlled temperature of 50–60 °C with continuous stirring using a glass rod.
- 5) Heating was continued for 30–40 minutes until a viscous, mucilaginous solution was formed. Boiling was strictly avoided to prevent degradation of mucilage.
- 6) The heated mixture was allowed to cool to room temperature.
- 7) The viscous solution was filtered through a clean muslin cloth (or Whatman filter paper) to remove solid plant residues.
- 8) The clear, viscous filtrate obtained was collected as okra mucilage.
- 9) The extracted mucilage was stored in a well-closed container and kept under refrigerated conditions (4–8 °C) until further use.

#### Note

- The mucilage was used within 24 hours to prevent microbial contamination.
- Avoid overheating as it may reduce the viscosity and quality of the mucilage.

#### ● Preparation of Mulethi Aqueous Extract

##### Materials Required

- Mulethi powder (*Glycyrrhiza glabra*) – 5 g
- Distilled water – 100 ml

##### Apparatus

- Beaker (250 ml)
- Measuring cylinder
- Hot plate
- Glass rod
- Whatman filter paper / muslin cloth

##### Method:- Decoction method

##### Procedure

- 1) Accurately weighed 5 g of mulethi powder was transferred into a clean and dry 250 ml beaker.
- 2) 100 ml of distilled water was added to the beaker containing mulethi powder.
- 3) The mixture was heated gently on a hot plate and allowed to boil.
- 4) Heating was continued until the volume of the solution was reduced to approximately 30 ml, indicating proper extraction of water-soluble phytoconstituents.
- 5) The beaker was removed from the hot plate and allowed to cool to room temperature.
- 6) The cooled mixture was filtered using Whatman filter paper to remove insoluble plant residues.
- 7) The clear brown coloured filtrate obtained was collected as mulethi aqueous extract.
- 8) The extract was stored in a clean, closed container and used immediately for formulation.

##### Quantity Used in Formulation

Mulethi aqueous extract – 5 ml

##### Note

- Gentle heating was maintained to prevent degradation of active constituents.
- Freshly prepared extract was used to ensure maximum therapeutic activity.
- The extract was protected from contamination during filtration and storage.

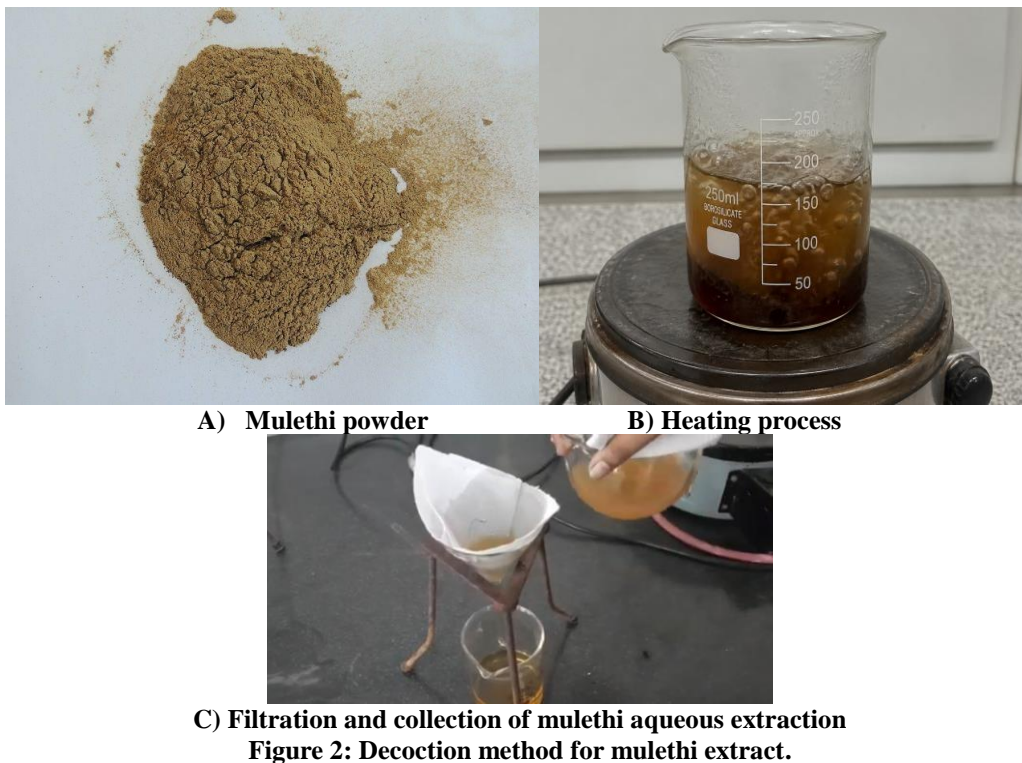


Figure 2: Decoction method for mulethi extract.

● Formulation of Okra Mucilage–Based Herbal Cough Syrup



Figure 3: Flowchart of herbal cough syrup formulation.

**Materials**

The following materials were used for the formulation of okra mucilage-based herbal cough syrup:

- Okra mucilage (prepared previously)
- Mulethi (*Glycyrrhiza glabra*) aqueous extract
- Citric acid
- Sodium benzoate
- Natural flavouring agent (peppermint)
- Distilled water
- Sweetening agent (sodium saccharine)
- Colouring agent (caramel colour)

**Apparatus**

- Beakers (100 ml, 250 ml)

**Formulation**

Ingredient	F1 (30 ml)	F2 (50 ml)	F3 (100 ml)	Role
Okra mucilage	12 ml	20 ml	40 ml	Natural polymer (viscosity enhancer)
Mulethi extract	3 ml	5 ml	10 ml	Active ingredient (antitussive)
Citric acid	0.12 g	0.2 g	0.4 g	pH adjuster
Sodium benzoate	0.06 g	0.1 g	0.2 g	Preservative
Sodium saccharin	0.03 g	0.05 g	0.07 g	Sweetening agent
Caramel colour	q.s	q.s	q.s	Colouring agent
Flavour (peppermint)	0.45 ml	0.75 ml	1.5 ml	Flavoring agent
Distilled water	q.s	q.s	q.s	Vehicle

**Procedure for Preparation of Herbal Cough Syrup**

(The same procedure was followed for F1, F2 and F3.)

1. The required quantity of okra mucilage was accurately measured according to the formulation (F1 – 30 ml, F2 – 50 ml, F3 – 100 ml) and transferred into a clean, dry beaker.
2. Mulethi aqueous extract (5 ml) was added slowly to the okra mucilage with continuous stirring using a glass rod.
3. Citric acid was dissolved separately in a small quantity of distilled water and added to the above mixture to adjust the pH.
4. Sodium benzoate was dissolved in a small quantity of distilled water and incorporated into the formulation as a preservative.
5. Sodium saccharin was dissolved in a small quantity of distilled water and added to improve sweetness.
6. Caramel colour was added in small quantity to impart an attractive brown colour.
7. Natural flavouring agent (peppermint) was added in appropriate quantity to improve taste and patient acceptability.
8. Distilled water was added gradually with continuous stirring to make the final volume up to 30 ml, 50 ml, or 100 ml depending on the formulation.
9. The formulation was stirred continuously until a uniform and homogeneous syrup was obtained.
10. The prepared syrup was filtered to remove air bubbles or any particulate matter and transferred into a clean amber-coloured bottle, properly labelled and stored for further evaluation.

- Measuring cylinder
- Glass rod
- Hot plate
- Whatman filter paper
- Amber-coloured bottle

**Method**

The herbal cough syrup was prepared by a simple mixing and dilution method using okra mucilage as a natural demulcent. Three trial formulations (F1, F2, and F3) were prepared by varying the concentration of okra mucilage while keeping other ingredients constant. Total volume adjusted to 30 ml, 50 ml, and 100 ml respectively.

**Selection of Final Formulation**

- F1 (30 ml) showed low viscosity and less soothing effect.
- F3 (100 ml) showed excessive viscosity and poor pourability.
- F2 (50 ml) showed optimum viscosity, good clarity, smooth pourability and best taste.

Therefore, F2 (50 ml) was selected as the optimized formulation.

**Table 2: Final Formulation Composition (Selected Batch – F2)**

Ingredient	Quantity
Okra mucilage	20 ml
Mulethi extract	5 ml
Citric acid	0.2 g
Sodium benzoate	0.1 g
Sodium saccharin	0.05 g
Caramel colour	q.s
Flavour (peppermint)	0.75 ml
Distilled water	q.s. to 50 ml

**Note**

- Freshly prepared okra mucilage and mulethi extract were used to avoid microbial contamination.
- Overheating was avoided during mixing to prevent degradation of herbal constituents.
- Continuous stirring was maintained to ensure uniform distribution of ingredients.
- The formulation was prepared under hygienic laboratory conditions.



Figure 4:- Final formulated syrup in amber bottle.

## 5 Evaluation of Okra Mucilage–Based Herbal Cough Syrup

The optimized formulation (F2 – 50 ml batch) was subjected to various physical, physicochemical, and stability evaluation parameters to assess its quality, safety, and suitability as an oral herbal cough syrup.

### 5.1. Organoleptic Evaluation

#### Purpose

To evaluate physical appearance and patient acceptability of the formulation.

#### Parameters Evaluated

- Colour
- Odour
- Taste
- Appearance

#### Method

The prepared herbal cough syrup was visually inspected and evaluated by sensory perception.

#### Results

Parameter	Observation
Colour	Light brown
Odour	Pleasant, characteristic
Taste	Sweet and palatable
Appearance	Clear, viscous liquid

### 5.2 Determination of pH

#### Purpose

To ensure the formulation is non-irritant and suitable for oral administration.

#### Method

- The pH meter was calibrated using standard buffer solutions.
- About 10 ml of herbal cough syrup was taken in a beaker.
- The electrode was dipped into the sample.
- The pH reading was noted.

#### Result

Parameter	Value
PH	5.5

### 5.3 Viscosity Measurement

#### Purpose

To evaluate the demulcent property and pourability of the syrup.

#### Method

- Viscosity was determined using an Ostwald viscometer.
- The time taken for the syrup to flow between two marks was recorded.
- Viscosity was calculated using standard formula.

#### Result

Parameter	Value
Viscosity	1200 cP

### 5.4. Density Determination

#### Purpose

To ensure uniform dosing and consistency.

#### Method

- A clean, dry pycnometer was weighed.
- It was filled with the herbal syrup and weighed again.
- Density was calculated using formula.

#### Result

Parameter	Value
Density	1.12 g/ml

### 5.5 Clarity Test

#### Purpose

To check absence of particulate matter.

#### Method

The syrup was visually inspected against black and white background.

#### Result

Parameter	Observation
Clarity	Clear, free from particles

### 5.6. Pourability Test

#### Purpose

To evaluate ease of pouring and dosing.

#### Method

The syrup was poured from the bottle and observed.

#### Result

Parameter	Observation
Pourability	Smooth, uniform flow

### 5.7. Stability Studies

#### Purpose

To evaluate stability under different storage conditions.

**Method**

The syrup was stored under the following conditions and observed for changes.

**Result**

Storage Condition	Duration	Observation
Refrigerated (4–8°C)	7 days	Stable
Room temperature (25 ± 2°C)	7 days	No change

**Organoleptic Evaluation**

Parameter	F1(30ml)	F2(50ml)	F3(100ml)
Colour	Light brown	Light brown	Dark brown
Odour	Pleasant	Pleasant	Strong
Taste	Less sweet	Sweet and palatable	Slightly thick taste
Appearance	Slightly viscous	Clear, viscous	Very thick

**Physicochemical Parameters**

Parameter	F1(30ml)	F2(50ml)	F3(100ml)
pH	5.4	5.5	5.6
Viscosity (cP)	800	1200	1800
Density (g/ml)	1.08	1.12	1.18

**Stability Study**

Condition	F1(30ml)	F2(50ml)	F3(100ml)
Room Temp (7 days)	Stable	Stable	Slight thickening
Refrigerated (7 days)	Stable	Stable	Stable

**7. DISCUSSION**

The results clearly indicate that the incorporation of okra mucilage significantly contributed to the viscosity and demulcent properties of the syrup. Okra mucilage acted as a natural polymer, providing a smooth and soothing texture which is essential for cough relief formulations.

Among all formulations, F2 (50 ml) was found to be the most optimized formulation. It showed balanced physicochemical properties including an ideal pH (5.5), optimum viscosity (1200 cP), and good organoleptic characteristics. The taste of F2 was more acceptable due to the presence of mulethi extract, which imparted natural sweetness and reduced bitterness.

F1 (30 ml) showed lower viscosity, indicating insufficient mucilage concentration, while F3 (100 ml) exhibited excessive thickness, which may affect patient compliance and ease of administration.

The pH values of all formulations were within the acceptable range for oral preparations, ensuring minimal irritation to the throat. The slightly acidic pH also helps in maintaining microbial stability of the formulation.

**8. CONCLUSION**

The present study successfully formulated and evaluated an okra mucilage-based herbal cough syrup as a natural, sugar-free demulcent. Okra mucilage was used as a natural viscosity enhancer and soothing agent, while mulethi extract provided antitussive and soothing effects.

**6. RESULTS AND DISCUSSION**

The formulated okra mucilage-based herbal cough syrup was evaluated for various physicochemical parameters including organoleptic properties, pH, viscosity, density, and stability. The results obtained for different formulations (F1, F2, and F3) are presented below and discussed accordingly.

Among all the formulations (F1 – 30 ml, F2 – 50 ml, and F3 – 100 ml), F2 (50 ml) was found to be the optimized formulation. It showed ideal physicochemical properties such as pH (5.5), viscosity (1200 cP), and density (1.12 g/ml), along with good taste, clarity, and pourability.

The formulation was found to be stable under different storage conditions and suitable for oral administration. The absence of sugar makes it suitable for diabetic patients and improves patient safety.

Therefore, the developed herbal cough syrup can be considered a safe, effective, and economical alternative to conventional cough syrups.

**9. FUTURE SCOPE**

The present study provides a foundation for the development of a natural, sugar-free herbal cough syrup using okra mucilage and mulethi extract. However, further research can be carried out to enhance the quality, efficacy, and commercial applicability of the formulation.

Future studies may focus on long-term stability studies under different environmental conditions to determine the exact shelf life and storage requirements of the formulation. Detailed microbial limit tests can also be performed to ensure the microbiological safety of the herbal syrup over an extended period.

In addition, clinical evaluation and in vivo studies can be conducted to establish the therapeutic efficacy and safety profile of the formulation in human subjects. This will help in validating the antitussive and soothing effects of the syrup scientifically.

Further research can explore the incorporation of additional herbal ingredients such as tulsi, ginger, or vasaka to enhance the therapeutic potential of the formulation. Optimization of flavouring agents may also improve patient compliance, especially in pediatric use.

Advanced formulation techniques can be applied to improve the stability, consistency, and scalability of the product for industrial production. Moreover, the development of different dosage forms such as lozenges or syrups with varying concentrations can be considered.

Overall, the present work opens new opportunities for the utilization of plant-based mucilage as a natural excipient in pharmaceutical formulations and supports the growing demand for safe, effective, and sugar-free herbal products.

## 10. PACKAGING, LABELLING AND STORAGE

### Packaging

The prepared herbal cough syrup was filled in a clean, dry, and sterilized amber-coloured glass bottle. The container was tightly closed using an air-tight cap to prevent contamination, oxidation, and evaporation.

Amber-coloured bottles were selected to protect the formulation from light, as herbal constituents are often sensitive to light and may degrade upon exposure.

### Labelling

The formulation was properly labelled to ensure correct identification, safety, and proper usage.

### Label Information

**Product Name:** Herbal Cough Syrup  
**Batch Number:** HCS/01/2026  
**Date of Manufacturing:** 25 April 2026  
**Date of Expiry:** 25 June 2026  
**Net Volume:** 50 ml

### Composition

**Okra mucilage** – 20 ml  
**Mulethi extract** – 5 ml  
**Citric acid** – 0.2 g  
**Sodium benzoate** – 0.1 g  
**Sodium saccharin** – 0.05 g  
**Caramel colour** – q.s.  
**Natural flavour** – 0.75 ml  
**Distilled water** – q.s.

**Directions:** Shake well before use

**Storage:** Store in a cool and dry place

**Caution:** For oral use only



Figure 5: Label.

## 11. STORAGE

The formulated herbal cough syrup was stored under appropriate conditions to maintain its stability and effectiveness.

### Recommended Storage Conditions

- Store in a cool and dry place
- Protect from direct sunlight

- Keep the container tightly closed after use
- Avoid exposure to excessive heat
- Proper storage helps in maintaining the physical and chemical stability of the formulation.

**Shelf Life and Expiry**

The shelf life of the formulated okra mucilage-based herbal cough syrup was estimated based on its composition and short-term stability observations.

Since the formulation is an aqueous herbal preparation prepared using natural ingredients and minimal preservatives, it may be more susceptible to microbial growth and physicochemical changes over time. Therefore, the product is expected to have a comparatively shorter shelf life than conventional commercially available cough syrups.

However, the absence of synthetic stabilizers and sugars enhances the safety and natural profile of the formulation, making it suitable for short-term use.

**Estimated Shelf Life**

- 1 to 3 months under recommended storage conditions

The formulation should be stored in a cool and dry place, protected from direct sunlight, and kept in a tightly closed container to maintain its stability and effectiveness.

Any noticeable changes in colour, odour, or consistency during storage may indicate degradation of the formulation, and such preparation should not be used.

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