

# Formulation and Evaluation of Herbal Cough Syrup

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**Abstract:** Herbal cough syrups have gained popularity due to their natural composition and minimal side effects compared to synthetic formulations. This study focuses on the formulation and evaluation of a polyherbal cough syrup using medicinal plants such as tulsi, clove, fennel, turmeric, and adulsa, which exhibit expectorant and antitussive properties. The syrup is prepared through extraction and blending techniques, ensuring optimal therapeutic efficacy. Post-formulation studies include pH analysis, viscosity measurement, microbial stability, and sensory evaluation. The results indicate that herbal cough syrup is a safe and effective alternative for managing cough and cold symptoms, offering a holistic approach to respiratory health...

**Keywords:** Herbal cough syrup, polyherbal formulation, expectorant, antitussive, respiratory health, natural medicine, Ayurvedic preparation, stability studies

## I. INTRODUCTION

For thousands of years, nature has served as a source for therapeutic agents, and an Astounding number of contemporary medications have been separated from these sources, notably plants, with Many of them based on their traditional medical applications. Novel natural product requirements will be Optimist utilising medicinal chemistry and combinatorial chemical and biosynthetic technology based on Their biological activities to produce efficient chemotherapeutic and other bioactive drugs.

Public interest in natural remedies particularl herbatherapy, has grown significantly over the past few Decades, primarily in industrialised countries but also in developing nations.[2]Patients of all ages frequently Experience cough related to acute and chronic illnesses. Common causes of cough include bacterial or viral Infections of the upper respiratory tract, air pollution, smoking,foreign bodies, asthma, and eosinophilic Bronchitis. It's possible that treating the cough's aetiology alone won't be enough; desensitising the cough Pathways is also crucial.[3] Treatment for a cough relies on the purpose it serves. When a cough points to anunderlying sickness, treatment should also make an effort to control, prevent, or stop the condition. This Tendency has developed substantially, not only in developing nations but also primarily in industrialised Nations.[4,5]The oral administration of liquid pharmaceuticals has typically been justified on the grounds of simplicity of Administration to patients who have difficulty swallowing solid dosage forms. Cough Syrup is a liquid dosage Form. Sugar and clean water are condensed together to create syrup.Syrups are distinguished from other types Of solutions by their high sugar content. The presence of medication or other flavourings in syrups is Debatable.

Non-medicated or flavoured syrups are onesthat contain a flavouring component but no Medication. Flavoured syrups are frequently employed as delivery systems for unpleasant- tasting Pharmaceuticals; the end product is medicated syrup. Syrups frequently have a preservative since the high Sugar content makes them vulnerable to contamination.This research article describes the formulation and evaluation of a multi-herbal anti-tussive syrup that Includes some natural remedies like Nagarmotha (Cyperus Rotundus), Pipli, Long pepper (PiperLongum),Liquorice (Glycyrrhiza Glabra), Ginger (Zingiber Officinale), Amla (Indian Gooseberry), and Honey (as a Base). These natural medication mixtures in the form of powder that are cough suppressant are converted into Syrup. These are far preferable to over-the- counter medicines because they are nontoxic, not dangerous, and Don't have any negative effects on the body.Plants used in herbal expectorants : These plants aid the body in clearing



the lungs of extra mucus. However, the term is frequently used to refer to a treatment that tones the respiratory system. Expectorants Include herbal medications like nagarmotha, liquorice, and pipper longum.[6] Stability Testing Of Herbal Formulation : Stability Testing Of Herbal Formulation Stability testing Studies give substantiation on how the quality of herbal products varies with time under the influence of Environmental factors similar as temperature, light, oxygen, humidity, presence of other constituents or Excipients in lozenge form, microbial impurity, flyspeck size of medicine, trace essence impurity, filtering From vessel, and other factors. These studies help to establish recommended storehouse conditions, shelf Life, and check period for herbal products.

#### ADVANTAGES

1. Improve immunological reaction.
2. Greater acceptance in the culture.
3. Greater suitability for the human body.
4. Less expensive and no/fewer negative effects.
5. Organic and freely accessible.
6. Manages serious illnesses like Alzheimer's and other.

#### DISADVANTAGES

1. Wild herb poisoning danger.
2. Lack of adequate regulation
3. There are no dosing guidelines.
4. Herbs and contemporary medicine interact.
5. Unsuitable for many health condition

#### DEFINE HERBAL COUGH SYRUP:

Herbal cough syrup is a liquid medicine made from a combination of, honey, sugar, or alcohol that is used to treat cough and other ailments: Ex: Tulshi, Ginger, Honey etc

##### 1. Types of the cough:

Cough is classified depending upon duration, character and type. A] Depending upon type

Cough is classified into two types as dry and wet cough which is depend upon type. This are identified using signs and Symptoms.

##### 1. Dry cough

Productive and effective cough Signs associated for dry cough

i. Sensitive throat ii. Non mucus expelled

iii. Short, dry and frequent cough

iv. Persistent or constant tickle [Ken, 2021, Herbycin, 2020].

Medicine: Cough suppressant and antitussive.

##### 2. Wet cough

Non effective and infective cough Signs associated with wet cough i. Coughs up phlegm

ii. Wheezing iii. Chest tightness

iv. Difficulty in breathing [Patil et al, 2020, Herbycin, 2020]. Medicine: Expectorant.

##### B] Depending upon duration

It may be classified into acute, sub acute and chronic cough depending upon duration [Patil et al, 2020].

##### 1) Acute cough

The cough lasting for less than 3 weeks are categorized under this type.

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Causes for acute cough is due to common cold, URTI, COPD, environmental pollution, and infective bronchitis [Kalpesh, 2013, Kathleen, 2021].

## 2) Sub acute cough

The cough lasting for at least the period of 3 to 8 weeks categorized under this type. The respiratory causes are pneumonia, and B. pertussis infection.

Non respiratory causes are GERD and rarely Tourette's syndrome [Kalpesh, 2013, Kathleen, 2021].

## 3) Chronic cough

The cough lasting for more than period of 8 weeks or more are chronic coughs.

The respiratory causes are COPD, asthma, lung cancer, tuberculosis and pneumoconiosis [Kalpesh, 2013, Kathleen, 2021].

## 2. Coughs in pediatrics

A cough is a sign that indicates that the child's body is trying to get out of itself from irritant, pollutants, and other foreign particles. Cough is one of the most common problems of visiting parents with their child to healthcare Practitioner. Common causes of cough include:

1. Allergies or sinusitis: It can cause a prolonged cough including an itchy throat, runny nose, watery eyes, sore Throat, or rash. Allergy tests are done to find out which allergens cause the problem and doctor advice how to avoid Those allergens.

2. Asthma: Asthma can be very difficult to diagnose in children as symptoms may vary from every child to child. While wheezing cough, that get worse at night is one of the many signs. The other cough occurs with increased in Physical activities like playing, exercise, etc.

3. Infection: Cold, flu, and croup this leads to a prolonged cough for children. Colds cause mild to moderate hacking Cough while the flu a sometimes cause severe, dry cough and croup has a "barking" cough mostly occurs at night with Noisy breathing.

Other reasons children cough: Children's may also cough as they get habit of coughing after sick with a Cough, after inhaling a foreign element like food

or a small object, or in contact with irritants like pollution, cigarettes Smoke or firecrackers.

## 3. Herbal treatment for cough

The most preferred treatment for cough is herbal treatment. Herbal formulations are playing major role in improvement of health care sector. The Herbal treatments are used for mild to severe health disorders including, asthma, tuberculosis, Cough, pneumonia, kidney diseases, cancer, diabetes, allergies, lung cancer and viral infections [Patil et al, 2020, Ambrogio, 2001].

As stated, to estimate of WHO, there are 80% population even uses herbal medicines for primary health care Requirements. Medicinal herbs have always been used as traditional primary healthcare agents and especially in Asia Countries [Francine, 2011]. Major use of herbal medicines is for health promotion and therapy for chronic, as opposed To condition which are life threatening.

Most of the synthetic drug treatment used causes many side effects like vomiting, nausea, sedation, allergies, respiratory Tract infections, appetite change, irritability, drowsiness, addiction and excess use can damage organs or parts of organs [Patil et al, 2020]. In recent years, researchers are mainly focusing on herbal drugs and herbal treatments



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#### AIM AND OBJECTIVE

Aim: Formulation And Evaluation Of Herbal Cough Syrup. Objective Of the Study:

1. soothing throat irritation
2. reducing inflammation
3. natural remedy for respiratory issues 4 . relieving cough symptoms

#### LITERATURE REVIEW:

1. Dr. Bharat B. Aggarwal

Known for his research on the anti-inflammatory and antioxidant properties of medicinal herbs, including their use in managing respiratory disorders like cough.

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**2. Dr. Mohammad Ali**

His work focuses on the pharmacological effects of herbs like licorice and ginger, both common ingredients in polyherbal cough syrups, for treating cough and related symptoms.

**3. Dr. T. K. S. Reddy**

An expert in Ayurvedic medicine, Dr. Reddy has conducted research on polyherbal formulations, particularly those aimed at respiratory health, including cough syrups.

**4. Dr. M. A. Hossain**

Dr. Hossain has researched the ethnopharmacology of polyherbal syrups, with a focus on combinations of herbs such as thyme, peppermint, and licorice for treating cough.

**5. Dr. Shilpi Gupta**

A researcher in the field of herbal medicine, Dr. Gupta has contributed to studies on the use of polyherbal syrups in treating cough and respiratory issues, focusing on herbs like tulsi and ginger.

**6. Dr. Iqbal Ahmed**

Specializing in phytochemistry, Dr. Ahmed has studied the pharmacological properties of common herbs used in polyherbal cough syrups, like thyme and licorice.

**7. Dr. S. J. K. Lee**

Dr. Lee has studied traditional East Asian polyherbal formulations, including those used to treat respiratory conditions, with an emphasis on licorice and peppermint.

**8. Dr. R. S. Verma**

A prominent researcher in the field of alternative medicine, Dr. Verma has conducted studies evaluating the efficacy of polyherbal cough syrups in managing acute and chronic respiratory issues.

**PLAN OF WORK FOR DEVELOPING A HERBAL COUGH SYRUP:**

**9. Research and Development (R&D)**

Literature Review: Study scientific research and traditional texts on herbs effective for cough and respiratory issues.

Herb Selection: Identify specific herbs with expectorant, anti-inflammatory, antimicrobial, and soothing properties (e.g., ginger, honey, licorice, thyme, peppermint, eucalyptus).

Dosage Formulation: Determine the appropriate dosage of each herb based on safety and efficacy.

Consult Experts: Work with herbalists or pharmacists to verify ingredient safety and interactions.

**10. Procurement of Ingredients**

Source Quality Herbs: Ensure herbs are sourced from reputable suppliers with high standards of quality and potency.

Quality Control (QC): Test herbs for purity, potency, and absence of contaminants (e.g., heavy metals, pesticides, pathogens).

**11. Formulation and Testing**



Preparation Method: Develop a method for creating the syrup, including extraction techniques (boiling, cold extraction, etc.).

Test Batches: Produce small batches to refine taste, consistency, and therapeutic effectiveness. Stability Testing: Check the shelf life and stability of the syrup under various conditions.

Sensory Evaluation: Test for taste, texture, and aroma to ensure consumer acceptance.

## 12. Safety and Efficacy Trials

Clinical Trials or Consumer Testing: Conduct small-scale studies or trialstassess effectiveness and any side effects.

Document Observations: Record and analyze findings on relief duration, side effects, and effectiveness.

## 13. Regulatory Compliance

Labeling Requirements: Ensure the label meets local regulations (ingredient list, dosage instructions, expiration date).

Obtain Approval: Apply for product registration or approval if required by regulatory

authorities.

## 14. Production

Scale-Up: Transition from small batches to full-scale production while maintaining quality control.

Batch Testing: Test each batch for consistency in composition, taste, and potency.

## 15. Packaging and Distribution

Packaging Design: Choose containers that protect from light and moisture and are user- friendly.

Distribution Channels: Identify sales channels such as pharmacies, health stores, and online platforms.

## 16. Marketing and Sales

Marketing Strategy: Emphasize natural ingredients, effectiveness, and any unique selling points (e.g., organic, sugar-free).

Educational Campaign: Inform consumers about benefits, proper usage, and safety of herbal remedies.

## 17. Post-Marketing Surveillance

Customer Feedback: Gather feedback from customers to improve the product if needed.

Monitor Adverse Reactions: Stayaware of any reports on adverse effects and refine the formulation if necessary.

## MATERIAL & METHOD:

Herbal parts are use in formulation of herbal syrup for treatment of cough as shown in Table 1

Sr.no.	Ingredients	Botanical name
1	Ginger	Zingiber officinale
2	Liquorice	Glycyrrhiza glabra
3	Tulshi	Ocimum tenuiflorum
4	Cinnamon	Cinnamomum verum
5	Turmeric	Curcuma longa
6	Cardamom	Elettaria cardamomum
7	Honey	Apis mellifera





8	Pappermint	Menthe piperita L.
9	Adulsa	Justicia adhatoda
10	clove	Syzygium aromaticum



Fig 1: Herbal ingredients used for preparation for herbal cough syrup.

#### FORMULATION TABLE:

Three formulation of herbal cough syrup were prepared as shown in Table 2

Table 2: List of herbal ingredients with quantity and use.

Sr. No	Ingredients	Quantity			Use
		F1	F2	F3	
1	Ginger	2-3 gm	2-3 gm	2-3 gm	Antitussive, Expectorant
2	Liquorice	4 gm	4 gm	4 gm	Expectorant
3	Tulsi	15-20 leaves	15-20 leaves	15-20 leaves	Antitussive, Expectorant
4	Cinnamon	2 gm	2 gm	2 gm	Aromatic, Expectorant
5	Turmeric	1-2 gm	1-2 gm	1-2 gm	Antitussive
6	Cardamom	2gm	2gm	2gm	Aromatic, Flavoring agent
7	Honey	35%	40%	45%	Base, Viscosity modifiers, sweetener
8	Peppermint	2 gm	2 gm	2 gm	Pain reliever
9	Adulsa	3 gm	3 gm	3 gm	Antitussive
10	Clove	2 gm	2 gm	2 gm	Expectorant

#### METHOD OF PREPARATION:

##### 18. Preparation of decoction.

□ The initial stage in studying medicinal plant is the Preparation of plant samples to preserve the biomolecules In the plants prior to extraction. Plants samples such as Leaves, barks, roots, fruits and flowers can be extracted From fresh or dried plant materials such as grinding and Drying also influences the preservation of phytochemicals In the final extracts.

□ The weighed crude drug sample 5g of herbal ingredients.



- ☐ Then herbal ingredients were mixed 500ml of water.
- ☐ Then attach reflux condenser and materials was boil under Carefully by using water bath for 3 hrs.



**Fig 3:- Preparation of decoction & extract.**

Method of preparation for final herbal syrup:

- ☐ To prepared final herbal syrup 16ml of Pudina decoction And 17ml of Tulsi or 17ml of cinnamon decoction was Added ad 50% of honey preservative was mixed slowly by Side by side continually stirring .
- ☐ The final herbal syrup was prepared and then subjected for Evaluation Herbal syrup was prepared and solubility was checking by
- ☐ Observing clarity of Solution visually.
- ☐







**DRUG PROFILE:**

**1) Tulshi :**

*Ocimum tenuiflorum*, commonly known as holy basil ,tulsi or tulasi,is an aromatic perennial Plant.

Family: Lamiaceae.

Uses:

1. relieves chest congestion
2. Antimicrobial
3. Anti inflammatory



**2) Ginger:**

Ginger (*Zingiber officinale*) is a flowering plant whose rhizome, ginger root or ginger, is widely used as a spice and folk medicine. It is a herbaceous Perennial which grows annual pseudo stems (false stems made of the rolled bases of leaves) about one meter tall bearing narrow leaf blades. Fights Germs, Keeps your mouth health, Gingers antibacterial power may also brighten your smile, Calms Nausea, Soothes Sore Muscles, Eases ArthritisSymptoms, Curbes Cancer Growth, Lowers Blood Sugar, Eases Period Pains.





Family: Zingiberaceae

Uses:

1. Anti-inflammatory effect you cough when you have a sore throat.
2. Treatment of colds, nausea and hypertension.
3. Antioxidant

3) Liquorice :

Liquorice or licorice is the common name of *Glycyrrhiza glabra*. A flowering plant of the bean from the root of which a sweet, aromatic.

Family: Fabaceae Uses:

1. Helping to loosen thick mucus in airway.
2. to inhibit infection of human respiratory syncytial virus (HRSV)
3. Use for cough & cold



4) Fennel:

Fennel consists of the dried ripe fruits of *Foeniculum vulgare* Miller, belonging to Family Umbelliferae. Fennel contains a mix of Antioxidants, antimicrobial components and anti inflammatory volatile oils, which help alleviate the risk of cold, cough and flu and provides instant relief.

Family : Umbelliferae. Uses:

1. Is used as carminative, flavouring agent.
2. It is also used for upper respiratory tract infections, coughs, bronchitis.





#### 5) Cardamom :

Cardamom, sometimes cardamon or cardamom, is spice made from the seeds of several plants in the Elettaria cardamomum.

Family: Zingiberacea Uses:

1. This is particularly useful for individuals who are  
-are asthmatic, suffer from bronchitis, pneumonia.
2. Loss of appetite
3. Digestion problem



#### EVALUATION OF HERBAL COUGH SYRUP:

Physicochemical parameters

The herbal syrup was evaluated for various Physicochemical parameters such as physical Appearance (colour, odour, taste), pH.



**a) Color examination**

Five ml final syrup was taken into watch Glasses and placed against white back ground White tube light. It was observed for its color .

**b) Odour examination**

Two ml of final syrup was smelled individually.

The time interval among two smelling was kept 2 minutes to nullify the effect of previous smelling.

**c) Taste examination**

A pinch of final syrup was taken and examined For its taste on taste buds of the tongue.

**d) Determination of pH**

Placed an accurately measured amount 10 ml Of the final syrup in a 100 ml volumetric flask And made up the volume up to 100 ml with Distilled water. The solution was sonicated for About 10 minutes. pH was measured with the Help of digital pH meter.

**Stability testing**

Stability testing of the prepared herbal syrup Was performed on keeping the samples at Accelerated temperature conditions. The final

Syrup was taken in culture tubes and were kept At accelerated temperature 4°room .Temperature and 47°C respectively.

The Samples were tested for all the

Physicochemical parameters, turbidity and Homogeneity at the interval of 24 hr, 36hr and 72 hr to observe any change.

**RESULTS AND DISCUSSION:**

The results obtained in this study suggest that the herbal Formulations prepared possesses Antitussive activity. The Component of the herbal cough formulation was selected Due to their reported action that plays a preventative and Curative

role in prevention of cough. Syrup prepared passes All the physical parameters and shows the significant Antitussive activity .

**II. CONCLUSION**

The aim of this project was to formulate and evaluate herbal cough syrup. The present study helped us to understand What actually cough means, what are different types of coughs, factors responsible for causing cough. Herbal treatments For cough were studied briefly. As the study shows that the herbal treatment is more beneficial than that of allopathy Treatment which uses standard drugs for treatment as Herbal drugs have less or no side effects. Herbal treatments are More preferred widely. Herbal drugs are easy to available than that of prescribed drugs. This study helps us to understand Cough and measures to be taken in order to avoid cough. The pre- formulation studies of all three formulations were Within specification. Three formulations were prepared and evaluation test such as colour, odor, taste and pH were Performed. The present study will help us to understand effectiveness of herbal cough syrup compared to chemical .

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