

Preparation And Evaluation of Polyherbal Cough Syrup: A Novel Approach

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Abstract:

Diseases in human life are one of the huddle to live life, which consist of chronic and acute diseases. Cough is a common respiratory symptom that can have a significant impact on the quality of life. Polyherbal formulations have been used for centuries in traditional medicine to treat coughs and other respiratory ailments. In this study, we prepared a polyherbal cough syrup using a combination of medicinal plants which act as a natural ingredients, like Vasaka: *Adhatoda vasaka* (Acanthaceae), Ginber: *Zingiber officinale* (Zingiberaceae), Turmeric: *Curcuma longa* (Zingiberaceae), Tulsi: *Ocimum santum* (Labiatae), and liquorice: *Glycyrrhiza glabra* (Legiminosae). In the present study the attempt was made to prepare cough syrup using a standardized procedure and its evaluation were carried out with respect to physical and physicochemical properties, safety etc. The formulation were found to more efficient in reducing cough. Furthermore the formulation has been evaluated on various aspects.

Keywords: Medicinal plants, *Adhatoda vasaka*, *Zingiber officinale*, *Curcuma longa*, *Ocimum santum*, *Glycyrrhiza glabra*, Antitussive etc.

1. Introduction:

1.1 Cough – What is mean by cough?

The human being are suffered with many acute diseases, among that cough is one of them. Coughing occurs when the body's cough reflex is triggered. The cough reflex is a protective mechanism that helps to clear the airways and throat of mucus, irritants, and foreign particles. When the lining of the airways becomes irritated or inflamed, sensory receptors in the airways send signals to the brainstem, which then triggers the cough reflex. This reflex involves a series of coordinated muscle contractions in the chest, diaphragm, and throat, which create a burst of air that forcefully expels the irritant or mucus out of the airways. The cough reflex can be triggered by a wide range of factors, including respiratory infections such as the common cold, flu, and pneumonia, as well as other conditions such as allergies, asthma, and acid reflux. Certain irritants such as smoke, dust, and pollution can also trigger coughing.¹. Such type of diseases are possible to treat by the potential of the natural component obtained from the herbs, consisting of various phytoconstituents like saponins, flavonoids and phenols.

1.2 Introduction to herbal cough syrup.

Herbal cough syrup is a type of natural remedy used to alleviate coughs and other respiratory symptoms. It is made from a variety of herbal ingredients such as honey, ginger, liquorice, vasaka, tulsi & turmeric which are believed to have beneficial properties for the respiratory system. The utilization of these are correlated with the Rasa of the plant material, which ultimately balances the tridosha of the body.

Herbal cough syrup is typically used as an alternative to conventional cough syrup, which often contains synthetic ingredients that can have unwanted side effects. Herbal cough syrup is generally considered to be safe and effective for most people, although it is important to consult with a healthcare professional before using any new herbal remedy.

Some of the common ingredients found in herbal cough syrup includes:

1. **Vasaka:** The leaves of Vasaka obtained from plant *Adhatoda vasica.*, belonging to the family Acanthaceae, also known as Malabar nut or *Adhatoda vasica*, is a plant commonly used in Ayurvedic medicine to treat respiratory problems. Including coughs. Vasaka leaves contain several active compounds, including vasicine and vasicinone, which have been shown to have bronchodilator. Expectorant, and anti-inflammatory properties.

Fig 1.1



2. **Liquorice:** The roots of liquorice are obtained from the plant *Glycyrrhiza glabra*, belonging to the family Leguminosae. Liquorice root can be used as a natural remedy for coughs. Liquorice root contains several active compounds, including glycyrrhizin which is a calcium and potassium salt of Glycyrrhizic acid, flavonoids, responsible for anti-inflammatory and soothing properties that can help to relieve coughs and other respiratory symptoms.



Fig 1.2

3. **Turmeric:** The rhizomes of turmeric are obtained from the plant *Curcuma longa* belonging to the family Zingiberaceae, a spice commonly used in Indian and Middle Eastern cuisine, has been traditionally used in Ayurvedic and Chinese medicine to treat various respiratory problems, including coughs. Turmeric contains a compound called curcumin, which has anti-inflammatory and antioxidant properties that can help to reduce inflammation and boost immunity.



Fig 1.3

4. **Tulsi:** The leaves of tulsi are obtained from the plant of *Ocimum sanctum* belonging to family Labiatae, which is also known as holy basil, is ethnobotanically used for various diseases and also well recognised herb of Ayurveda. This is meant for treatment of various respiratory problems, including coughs and skin diseases and immune booster. Tulsi contains several active compounds, including eugenol and Rosmarinus acid, which have anti-inflammatory and antimicrobial properties that can help to reduce inflammation and fight off infections that may be causing the cough.



Fig 1.4

5. **Ginger:** The rhizomes of ginger are obtained from the plant *Zingiber officinale* belonging to family Zingiberaceae. Ginger, a anti-aging drug, can be used as a natural remedy for coughs. Ginger contains several bioactive compounds, including gingerols and shogaols, which have anti-inflammatory and antimicrobial properties that can help to reduce inflammation and fight off infections that may be causing the cough.



Fig 1.5

6. **Honey:** The Honey is a viscid and sweet secretion stored in the honey comb by various species of bees, such as *Apis mellifera*, *Apis dorsata*, *Apis florea*, *Apis indica* and other species of *Apis*, belonging to family Apidae. Honey can be used as a natural remedy for coughs. Honey has been used for centuries as a cough suppressant and is believed to have both antimicrobial and anti-inflammatory properties that can help to soothe the throat and reduce coughing.



Fig 1.6

7. **Peppermint:** Peppermint oil is obtained from the Aerial Part of the *Mentha Piperita*., belonging to the family Lamiaceae, known as medicinal herb commonly used to treat various respiratory problems, including coughs. Mentha contains several active compounds, including menthol, which has anti-inflammatory and soothing properties that can help to reduce coughing and soothe the throat. ²



Fig 1.7

1.3 Benefits of herbal cough syrup.

Herbal cough syrups are natural remedies made from a combination of medicinal herbs and other natural ingredients, which can provide several benefits for people suffering from Coughs. Here are some potential benefits of herbal cough syrup:-

1. Reduces coughing: Herbal cough syrups may contain natural ingredients such as Honey, ginger, and tulsi, which can help to soothe the throat and reduce coughing.
2. Soothes throat irritation: Many herbal cough syrups contain herbs such as licorice root, marshmallow root, and slippery elm, which can help to soothe the throat and reduce irritation.
3. Boosts the immune system: Some herbs, such as Echinacea and elderberry, have been shown to boost the immune system, which can help the body fight off infections that may be causing the cough.
4. Provides relief from cold and flu symptoms: Herbal cough syrups may contain natural ingredients such as ginger, turmeric, and black pepper, which can provide relief from cold and flu symptoms such as congestion and fever.
5. Has fewer side effects: Unlike conventional cough syrups, which may contain synthetic ingredients that can cause side effects, herbal cough syrups are made from natural ingredients and are generally considered safe when consumed in moderation .³

1.4 Why to use herbal cough syrup over allopathic cough syrup?

Herbal cough syrups are derived from natural plant sources and contain ingredients that are traditionally used for cough and respiratory relief. Allopathic cough syrups, on the other hand, are typically made with synthetic chemicals and are designed to treat specific symptoms rather than addressing the underlying cause of the cough.

There are several potential benefits to using herbal cough syrup over allopathic cough syrup. Here are some of the reasons:

Natural ingredients: Herbal cough syrups are made with natural ingredients and are generally considered to be safe and non-toxic. They do not contain the colours, flavours, and preservatives often found in allopathic cough syrups,

Gentle on the body: Herbal cough syrups are generally less harsh on the body than allopathic cough syrups, which can contain strong chemicals that may cause side effects like drowsiness, dizziness, and upset stomach.

Supportive of the immune system: Many herbal cough syrups contain ingredients that can help support the immune system, such as Echinacea, ginger, and elderberry. These ingredients may help the body fight off infection and promote overall respiratory Health.

Fewer side effects: Because herbal cough syrups are made with natural ingredients, they tend to have fewer side effects than allopathic cough syrups. This makes them a good option for people who are sensitive to the chemicals commonly found in over-the-counter medications .³

Objective: The present study were undertaken with the various objectives such as

- To identify and select herbs with known therapeutic properties for respiratory ailments such as coughs, congestion, and sore throat.
- To develop a formulation that combines these herbs in a way that maximizes their therapeutic potential and minimizes any potential side effects.
- To prepare the herbal cough syrup according to established quality control standards to ensure its safety, purity, and efficacy.
- To evaluate the herbal cough syrup in clinical trials or studies to determine its safety and effectiveness in treating coughs and other respiratory ailments.
- To compare the safety and effectiveness of the herbal cough syrup with conventional cough syrups to determine its relative advantages and disadvantages.

2. Material & Equipment:

The various selected plant materials, apparatus and chemicals of Merck were used for the determination and the preparation of formulations including the evaluation parameters.

3. Methodology:-

3.1 Collection of Herbs: The various plants were selected collected based on the ethno-botanical uses and the older proved information. The plant material such as leaves of Vasaka: *Adhatoda vasaka* (Acanthaceae), rhizomes of Ginber: *Zingiber officinale* (Zingiberaceae), rhizome part of Turmeric: *Curcuma longa* (Zingiberaceae), leaves of Tulsi: *Ocimum santum* (Labiatae), and finally the rhizomes of liquorice: *Glycyrrhiza glabra* (Legiminosae). The collected material were shade dried for several days from 3 to 8 days.

3.2. Preparation of extract

The selected, dried plant material were pulverised to get a coarse powder. The coarse powder of each kind were taken for extraction process using 1:1 ratio. for the extraction using drinking water as a solvent for the removal of various phytoconstituents. The heat were provided to enhance the rate of extraction. Subsequently the content were exposed for the filtration. The filtrate were concentrated till dryness using cleaned china dish at 40°C.

3.2 Preparation of simple syrup:



Fig 3.1

The simple syrup were prepared using 66.7 gram of sucrose and finally dissolving in sufficient quantity of distilled water with ambient boiling. The volume were adjusted up to 100 ml.

3.4 Preparation of final poly herbal syrup

One part of decoction, which was prepared using 1:1 drug ratio was mixed with five parts of simple syrup IP (1:5). The selected plant material were used in the formulation due to various pharmacological actions which are enlisted in below given table. Subsequently required quantity of javakhar (potassium carbonate) was added as preservative, to the above mixture



Fig 3.2

followed by addition of 0.9 ml of peppermint oil. The continuous stirring were provided to dissolve the content. The unwanted extraneous matter (if present then only) would have been removed using 7 layer cloth of 0.01 mm thickness. The prepared herbal cough syrup were stored in air tight container.

Table: 3.1: Showing pharmacological properties of selected plant materials in formulation of cough syrup.

Name of Drug	Chemical constituent for cough suppressing activity	Activity
Vasaka	Vasicine , Vasicinone	Bronchodilatory , Anti-inflammatory
Turmeric	Curcumin	Antioxidant, Anti-inflammatory, Antimicrobial
Ginger	Gingerol , Shaogol	Antimicrobial
Tulsi	Eugenol, Rosmarinic acid	Antimicrobial, Immunomodulator
Liquorice	Glycerrizin	Expectorant
Peppermint oil	Menthol	Soothing effect to throat

3.5 EVALUTION TEST FOR THE POLY HERBAL COUGH SYRUP:-

The prepared herbal cough syrup were evaluated using several standard parameters and factors which are explain below.

a. Physicochemical parameters of syrup

The herbal syrup was evaluated for various physicochemical parameters such as physical Appearance (colour, odour, taste), pH, Density and Specific Gravity.

Table No. 3.5.1: Showing physicochemical parameters of the cough syrup.

Physicochemical parameter	Observed value
1. Colour	Greenish
2. Odour	Aromatic
3. Taste	Sweet
4. pH	6.88

5. Density	1.33gm/ml
6. Viscosity	879 cp
7. Specific gravity	1.29 gm

b. Colour Examination

Five ml final syrup was taken into watch Glass and placed against white back ground in white tube light. It was observed for its colour by naked eye.

c. 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.

d. Taste examination

A pinch of final syrup was taken and examined for its taste on taste buds of the tongue. or simply a pinch of syrup was put on tip off tongue for determining test.

e. 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.

f. Determination of density

Density of the syrup was determined by using the density bottle method by measuring the weight and the volume, by the density bottle average density was found to be 1.43g/ml. Specific gravity at 25°C A thoroughly cleaned and dry Pycnometer was selected and calibrated by filling it with recently Boiled and cooled water at 25°C and weighing the contents. Assuming that the weight of 1 ml of Water at 25°C when weighed in air of density 0.0012g/ml was 0.99602g. The capacity of the Pycnometer was calculated. Adjusting the temperature of the final syrup to about 20°C and the Pycnometer was filled with it. Then the temperature of the filled Pycnometer was adjusted to 25°C any excess syrup was removed and weight was taken. The tare weight of the Pycnometer was subtracted from the filled weight. The weight per ml was determined by dividing the weight in air expressed in g, of the quantity of syrup which fills the Pycnometer at the specified temperature, by the capacity expressed in ml, of the Pycnometer at the same temperature.

g. Determining the viscosity of syrup

The viscosity of the syrup was determined by using viscometer mainly capillary viscometer, the Average viscosity of any syrup at 21-30°C temperature is 700-1300 centipoise or cp, the determined Viscosity of syrup was 880cp.

h. Stability testing

Stability testing of the prepared poly herbal syrup was performed on keeping the samples at Accelerated temperature conditions. In amber cooled glass bottles and were kept at accelerated temperature at 7°C, Room temperature (Nearly 23-27°C) and 48°C respectively. The samples were tested for all the physicochemical Parameters, turbidity and homogeneity at the interval of 24 hr, 48 hr and 72 hr to observe any Change.

4. Result & Discussion:-

After the preparation of complete Poly herbal cough syrup, the prepared formulation were subjected towards various quality testing parameters for the maximum effectiveness and safety. It has been

concluded that the herbal cough syrup is up to all the parameter tested and have the property to treat cough. As it have Antitussive property, Anti-inflammatory, Antimicrobial, Expectorant property and have ability to get relief form cough.

Physiochemical parameters of syrup

The physiochemical characteristics of the syrup, including its colour, flavour, and viscosity, were measured. Table -3 provided the evaluation parameter results. The prepared Poly Herbal Anti-Tussive Syrup is Brownish Red, Sweet in Taste, pH-Neutral, and Has Good Pour ability. It was observed that the formulation were prepared using standard procedure and evaluating parameters were found to be significant in the comparison test. The phytochemical investigation were carried out using the successive solvent extraction followed by the qualitative testing of various phytoconstituents using tests.

Phytochemical analysis of polyherbal cough syrup

The polyherbal cough syrup contain the phytoconstituents that were present in the raw material also comes in the final syrup.

Table No.4.1: Showing the results for the phytochemical investigation of the selected plants separately.

Chemical constituent	Vasaka	Turmeric	Tulsi	Ginger	Liquorice
1. Alkaloids	+	+			
2. Glycosides	+				+
3. Flavonoids	+		+		+
4. Saponins					
5. Phenols	+	+	+	+	
6. Terpenoids	+		+	+	+
7. Tannins	+				
8. Steroids					
9. Sugar	+	+			+
10. Protein		+			
11. Resins		+			+

5. Conclusion:-

In the present study attempt was made to select plants based on pharmacological actions, later cough syrup was prepared. The prepared herbal cough syrup was the representative of various medicinal plants, used in ration of 1:1, this reflects the equal effect of drug in treatment. The study revealed that prepared formulation of significant in terms of physical parameters as well as in terms of pharmacological effect as a cough syrup. This comprehensive result is due the supportive action of plant constituents for the positive pharmacological actions. This is considered as synergistic effect of selected plant. The present study will be a better example to utilised the similar kind of drugs for the formulation of cough syrup as well as same kind of polyherbal formulation for another disease too.

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