

Formulation And Evaluation of Polyherbal Cough Syrup from Calendula Officinalis L. Extract

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Abstract—*Calendula officinalis*, also known as Pot Marigold, is a well-known medicinal plant celebrated for its anti-inflammatory, antimicrobial, and soothing properties. Recent studies have highlighted C16-hydroxylated triterpenoids, such as faradiol and arnidiol, as crucial elements in diminishing inflammatory mediators like interleukin-6 (IL-6) by affecting immune activation pathways. These active ingredients, along with flavonoids, saponins, and essential oils, support the traditional use of *Calendula* extracts in easing respiratory problems and throat discomfort. This research focused on developing and evaluating an herbal cough syrup with *Calendula officinalis* flower extract as the primary therapeutic component. There are other two drugs also present such as *Vasaka* in which the *Vasicine*, *vasivinol*, *Alkaloids*, essential oils are present and give activity such as expectorant, Bronchodilator, antitussive and anti-inflammation. There is *shunthi* also added because it contains the gingerol, shogol, Zingiberene, these are active ingredient of the *shunthi* that show antitussive and antimicrobial activity. The syrup was crafted using standard herbal methods and examined for its physicochemical characteristics, including pH, viscosity, appearance, microbial stability, and taste. The naturally occurring triterpenoids are expected to boost the syrup's anti-inflammatory and mucosal-soothing effects, potentially helping to relieve cough and upper respiratory tract irritation. The study aimed to establish *Calendula officinalis* as a valuable herbal ingredient for creating safe, effective, and user-friendly cough syrup formulations.

Index Terms—*Calendula officinalis*, Pot marigold, Herbal cough syrup, Herbal antitussive, Natural expectorant, Respiratory relief, Triterpenoids, Faradiol, Arnidiol, Anti-inflammatory activity, Phytochemical constituents, Asteraceae, Traditional medicine, Mucosal soothing agents, Botanical extract, Herbal formulation, Respiratory infections.

I. INTRODUCTION

Respiratory tract infections and cough are among the most frequent clinical complaints worldwide, affecting individuals across all age groups. Although synthetic antitussives and expectorants are widely prescribed, concerns regarding adverse effects, drug tolerance, and long-term safety have encouraged a shift toward herbal remedies. Herbal formulations, particularly those derived from medicinal plants with historical and experimentally validated therapeutic properties, have gained widespread acceptance for the management of cough and related respiratory discomfort. Within this context, *Calendula officinalis*, commonly known as Pot Marigold, has emerged as a valuable medicinal species, with a long tradition of use and strong scientific support for its anti-inflammatory and soothing actions.

Calendula officinalis belongs to the Asteraceae family and is widely recognized by several synonyms and vernacular names, including Pot Marigold, Garden Marigold, Scottish Marigold, Holligold, Marybud, Ruddles, and Gold Bloom. This should not be confused with the ornamental marigolds of the *Tagetes* genus, although both share similar common names. The therapeutic reputation of *Calendula* has stretched for thousands of years. Historical records indicate that its medicinal use was documented as early as the first century by Pliny the Elder and has been widely utilized in European, Middle Eastern, and Ayurvedic medicine. Traditionally, *Calendula* flowers have been incorporated into preparations for the treatment of wounds, burns, skin infections, gastric complaints, menstrual irregularities, and inflammatory conditions. Infusions and extracts have also been used as soothing

remedies for sore throat, dry cough, and respiratory irritation due to their demulcent and anti-inflammatory properties.

In traditional European herbalism, Calendula is known for its “sun-like” warming and healing qualities, which are often applied to reduce swelling and promote tissue repair. Ayurveda is valued for its ruksha (drying), tikta (bitter), and kashaya (astringent) characteristics, which make it beneficial in conditions involving excess mucus or inflammatory heat. These widespread cultural uses highlight the broad therapeutic applicability of this plant and support its inclusion in herbal formulations designed to relieve respiratory discomfort.

Modern phytochemical research has provided strong validation for many traditional claims. Calendula flowers contain a rich spectrum of biologically active compounds including flavonoids, carotenoids, saponins, essential oils, phenolic acids, and triterpenoids. Notably, findings from the referenced scientific literature show that C16-hydroxylated triterpenoids, such as faradiol, arnidiol, and their fatty acid esters, are the primary contributors to anti-inflammatory activity. These compounds significantly inhibited the release of pro-inflammatory cytokines, particularly interleukin-6 (IL-6), in activated immune cells. There are studies also demonstrated that calendula extracts can modulate STAT3-dependent inflammatory signalling, providing mechanistic insight into its long-recognized healing properties.

The anti-inflammatory potential of calendula is complemented by its antimicrobial, antiviral, antioxidant, and mucosal-soothing actions, all of which are highly relevant to cough management. Irritation of respiratory mucosa often triggers persistent coughing. Agents that reduce inflammation, protect epithelial surfaces, and inhibit microbial aggravation are central to effective relief of symptoms. Therefore, the phytochemical profile of Calendula makes it a compelling ingredient for herbal cough syrup formulations aimed at providing gentle yet effective relief.

Given the growing interest in phytomedicine and the need for safe, natural alternatives to synthetic cough suppressants, the formulation and evaluation of an herbal cough syrup based on *Calendula officinalis* is both scientifically justified and therapeutically valuable. This study aimed to develop a stable and palatable syrup using Calendula floral extracts and

evaluate its physicochemical properties, stability profile, and expected therapeutic potential. By integrating traditional knowledge with modern analytical and pharmacological insights, this formulation aims to contribute to the development of evidence-based herbal remedies for managing cough and associated respiratory discomfort.

What is Cough?

A cough is a natural defense mechanism of the respiratory system that helps remove irritants, mucus, or foreign particles from the airways. It occurs when sensory nerves located in the throat, larynx, trachea, or bronchi detect irritation or obstruction. These nerves send signals to the cough center in the brainstem, which coordinates a rapid inhalation followed by forceful expulsion of air. This reflex protects the lungs from harmful substances, prevents airway blockage, and assists in clearing infections or accumulated secretions.

Types of Coughs

Coughs can be classified based on duration, nature of secretions, and underlying cause. The main types include:

1. Acute Cough

Lasts less than three weeks and is commonly caused by respiratory infections such as the common cold, flu, or acute bronchitis.

2. Sub-acute Cough

Persists for three to eight weeks and often appears after recovery from an infection because of prolonged airway irritation or postnasal drip.

3. Chronic Cough

Lasts longer than eight weeks and is associated with long-term conditions such as asthma, COPD, GERD, smoking, or allergies.

4. Dry Cough (Non-productive Cough)

Occurs without mucus production. It is typically due to throat irritation, viral infections, medication use, or allergies. It may cause discomfort or a scratchy sensation in the throat.

5. Wet Cough (Productive Cough)

Produces mucus or phlegm and is commonly seen in infections such as bronchitis, pneumonia, or chronic respiratory diseases where excess mucus is present.

6. Allergic Cough

Triggered by exposure to allergens such as dust, pollen, or pet dander. It is usually dry and accompanied by sneezing or itchy throat.

7. Nocturnal Cough

Worsens at night and may be associated with asthma, reflux, or postnasal drip.

8. Whooping Cough (Pertussis)

A severe, contagious bacterial infection characterized by violent coughing fits followed by a high-pitched “whoop” sound.

9. Croup Cough

A cough with a harsh, barking sound, commonly occurring in children due to swelling around the vocal cords.

What is Herbal cough Syrup?

An herbal cough syrup is a liquid formulation made from medicinal plant extracts designed to relieve cough and soothe irritation of the respiratory tract. Unlike synthetic cough suppressants, herbal syrups rely on natural bioactive compounds such as flavonoids, saponins, tannins, essential oils, and triterpenoids to provide therapeutic effects. These ingredients may act as expectorants, demulcents, anti-inflammatory agents, or antimicrobial agents, helping to reduce throat irritation, loosen mucus, and support respiratory comfort. Herbal cough syrups are generally considered safer, gentler, and more acceptable for long-term use because they are derived from natural sources.

II. TYPES OF COUGHS CAN BE TREATED WITH CALENDULA OFFICINALIS

Calendula officinalis (Pot marigold) contains several active constituents, including triterpenoids, flavonoids, carotenoids, and essential oils, which contribute to its anti-inflammatory, antimicrobial, and soothing actions. These properties make it suitable for treating various forms of cough, particularly those involving throat irritation and inflammation. The types of coughs most responsive to *Calendula* include:

1. Dry or Irritative Cough

Calendula helps reduce throat inflammation and soothes irritated mucosal surfaces. Its demulcent and anti-inflammatory effects can calm persistent, non-

productive coughing caused by irritation, dust exposure, viral infection, or throat dryness.

2. Cough Associated with Mild Respiratory Infections

Due to its antimicrobial and immune-modulating properties, *Calendula* can be useful in coughs arising from common viral or bacterial upper respiratory infections, where inflammation and sore throat are present.

3. Allergic Cough

Calendula's soothing and anti-inflammatory actions help ease coughing triggered by allergens by reducing irritation of the airway lining.

4. Post-infectious Sub-acute Cough

After a respiratory infection, lingering inflammation can cause prolonged cough.

Calendula's ability to reduce inflammatory mediators, especially interleukin-6 (IL-6), supports recovery and reduces cough duration.

5. Nocturnal or Throat-Tickle Cough

Its mucosal-protective effects help reduce nighttime coughing caused by dryness or irritation of the throat.

Pharmacological Mechanism of Action of *Calendula officinalis* in Cough

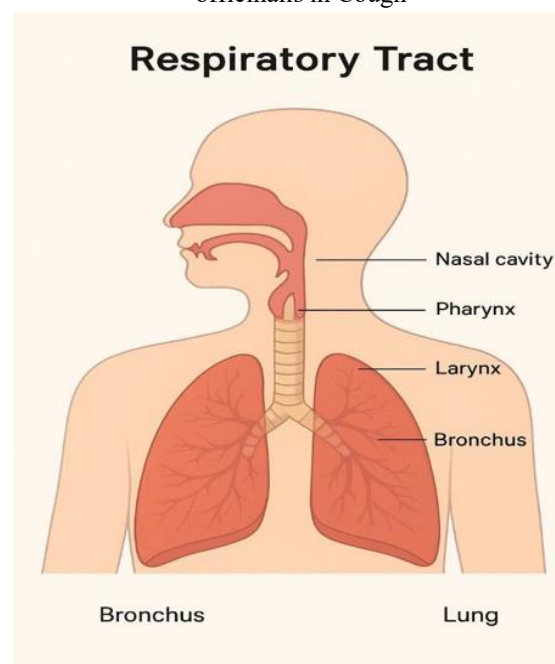
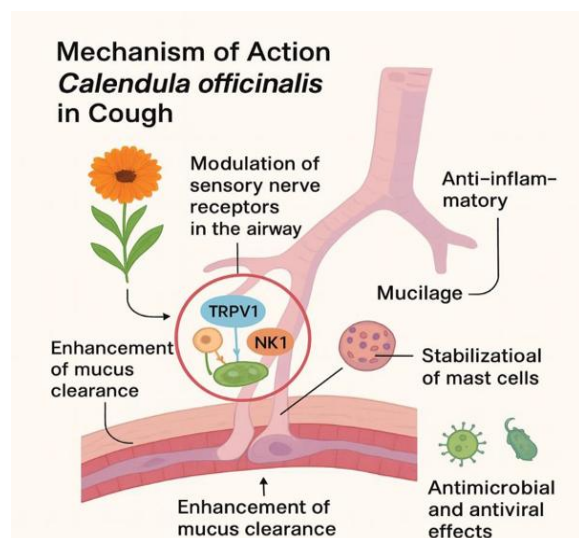


Fig.1 Respiratory system

Fig. 2 MOA of *Calendula officinalis*

Modulation of Sensory Nerve Receptors in the Airway
Calendula officinalis reduces cough first by acting on the sensory receptors that initiate the cough reflex. Its flavonoids regulate the TRPV1 (Transient Receptor Potential Vanilloid-1) receptors, which are major irritant receptors activated by heat, acidity, and inflammation. By reducing TRPV1 sensitivity on C-fiber sensory neurons, calendula decreases the impulses that travel to the medullary cough center. Additionally, calendula influences the P2X3 receptors, which are activated by ATP released during chronic airway irritation. By reducing extracellular ATP, calendula indirectly weakens P2X3-mediated cough signalling. It also modulates the NK1 (Neurokinin-1) pathway by reducing Substance P release, thereby decreasing NK1-driven airway hyper responsiveness.

Anti-inflammatory Action on Airway Tissue

Calendula exerts a strong anti-inflammatory effect on the bronchial and throat mucosa. Its triterpenoids and flavonoids inhibit COX-2 (Cyclooxygenase-2) and LOX (Lipoxygenase) enzymes, which lowers the production of prostaglandins and leukotrienes, two major irritants that aggravate cough receptors. *Calendula* also reduces inflammatory cytokines including IL-1 β , IL-6, IL-8, and TNF- α , leading to decreased mucosal swelling and less sensitivity of cough-triggering nerve endings. Stabilization of mast cells further reduces the release of histamine, preventing excessive H1-receptor activation and calming allergic or irritation-induced coughing.

Demulcent and Protective Mucilage Coating

The natural mucilage content in calendula forms a soothing, protective film over the throat and upper airway mucosa. This coating reduces friction, shields epithelial cells from chemical and mechanical irritants, and decreases activation of both mechanoreceptors and chemoreceptors involved in cough reflex initiation. This demulcent effect is especially beneficial for dry, non-productive cough, where direct irritation is the main trigger.

Relaxation of Bronchial Smooth Muscle

Calendula provides gentle antispasmodic effects on the bronchial smooth muscle. Its flavonoids and saponins reduce calcium entry by inhibiting voltage-gated Ca²⁺ channels, leading to decreased muscle contraction and relief of airway spasms. There is also a mild indirect support of β_2 -adrenergic pathways, contributing to bronchodilation. Additionally, calendula reduces levels of Leukotriene D4, a potent bronchoconstriction, helping ease spasmodic bouts of coughing.

Enhancement of Mucus Clearance and Expectorant Action

Calendula improves the removal of mucus from the airway through stimulation of seromucous glands mediated by M3 muscarinic receptors. This increases thin, watery secretions that dilute

thick mucus and make it easier to expel. *Calendula* also enhances ciliary beat frequency, which strengthens mucociliary clearance, preventing mucus accumulation that often leads to cough.

Antimicrobial and Antiviral Effects in Respiratory Infections

The plant's triterpenoids disrupt bacterial cell membranes, reducing bacterial growth within the respiratory tract. Its flavonoids inhibit viral replication pathways and block virus-host binding, thereby reducing inflammation and irritation caused by respiratory infections. These antimicrobial actions help reduce infection-related triggers of the cough reflex.

Antioxidant Protection of Airway Tissue

Strong antioxidant compounds such as carotenoids and flavonoids neutralize reactive oxygen species in the airway. By preventing oxidative stress, calendula protects epithelial and endothelial cells and prevents TRPV1 receptor hypersensitization, which contributes

to chronic cough. This antioxidant protection supports long-term restoration of normal airway sensitivity.

Integrated Pathway Effect on the Cough Reflex
Through its combined actions on TRPV1, P2X3, NK1, COX-2, LOX, mast cells, calcium channels, M3 receptors, and microbial pathways, calendula acts at

both peripheral and neural levels to reduce cough. It calms irritated airway surfaces, reduces inflammation, relaxes bronchial muscles, improves mucus movement, protects tissues from oxidative damage, and decreases neural hypersensitivity, resulting in a comprehensive reduction of cough.

III. LITERATURE REVIEW TABLE

(also include some academic thesis & other studies)

Author & Year	Topic / Study Title	Conclusion
S. Bhinge et al., 2017	Formulation & Evaluation of Calendula Cough Syrup	The study successfully developed a Calendula-based cough syrup that showed acceptable stability and physicochemical qualities. It also provided noticeable soothing benefits for cough and throat irritation.
Kataria R.K. et al., 2024	Honey-Based Herbal Cough Syrup Formulation	Among the tested batches, the formulation containing 45% honey demonstrated the most favourable viscosity, stability, and patient acceptance, making it a promising herbal cough preparation.
RCP College of Pharmacy, 2020	Preparation & Antimicrobial Assessment of Calendula Cough Syrup	The Calendula syrup displayed stable physical properties and meaningful antimicrobial activity. Quercetin was confirmed as a key compound through HPTLC profiling.
Golubova D. et al., 2025	Traditional Uses of Calendula officinalis	Calendula has long been used in traditional medicine for managing wounds, reducing inflammation, and easing respiratory discomfort, including cough-related symptoms.
Golubova D. et al., 2025	Phytochemical Profile of Calendula	Researchers identified major bioactive constituents faradiol derivatives, arnidiol, and taraxasterol which contribute significantly to the plant's anti-inflammatory action.
Golubova D. et al., 2025	Anti-Inflammatory Activity of Calendula Triterpenoids	Faradiol esters demonstrated strong suppression of inflammatory markers such as IL-6 and TNF- α , supporting Calendula's potent anti-inflammatory potential.
Golubova D. et al., 2025	Biosynthesis of Calendula Active Constituents	The study mapped key enzymes involved in producing Calendula's triterpenoids, helping explain how the plant naturally synthesizes its medicinal compounds.
Golubova D. et al., 2025	Reconstruction of Biosynthetic Pathway	The study show, the complete triterpenoid pathway of Calendula was reconstructed in <i>Nicotiana benthamiana</i> , showing that these compounds can be produced through bioengineering methods.
Silva D. et al., 2021	In-Vitro Anti-Inflammatory Activity	The extract reduced nitric oxide and inflammatory cytokine release in cell models, indicating strong anti-inflammatory action relevant to cough relief.
Bashir S. et al., 2006	Spasmolytic & Spasmogenic Effects	The study reported that Calendula exhibited both smooth-muscle relaxing and mild stimulating activities, possibly through calcium-channel modulation.
Babae N. et al., 2013	Calendula Mouthwash in Oral Mucositis	Calendula mouthwash reduced mucositis severity and improved mucosal healing, which supports its use for soothing throat and oral irritation.
Khairnar M.S. et al., 2013	Calendula Mouthwash for Gingivitis	The mouthwash effectively reduced inflammation and plaque levels, confirming Calendula's anti-inflammatory capacity.
Mehrabani D. et al., 2011	Calendula in Ulcerative Colitis (Animal Study)	Treatment improved mucosal healing and reduced inflammation in animal models, suggesting broader anti-inflammatory activity.
Braga & Silva et al., 2021	Cell-Based Anti-Inflammatory Studies	Calendula extracts inhibited multiple inflammatory mediators in cell studies, reinforcing their therapeutic potential.
Herbal Formulation Studies, 2024–2025	Calendula Cough Syrup Formulation Research	Recent formulation studies confirm that Calendula cough syrups are feasible and stable, though human clinical evidence is still lacking.

Sapkota, 2024	Review on Calendula Phytochemistry & Pharmacology	The review highlights strong laboratory and animal data but notes that clinical research on Calendula specifically for cough is still limited.
EMA/HMPC Monograph, 2019	Regulatory Herbal Assessment (Calendula)	The monograph states Calendula is considered safe for topical and mucosal applications, though internal use for cough lacks confirmed clinical support.
Villalva M. et al., 2021	Extraction Techniques & Phytochemical Yield	Modern extraction approaches improve the recovery of key active compounds, supporting standardized herbal preparations.
Rezai S. et al., 2023	Calendula in Wound and Burn Healing	The plant enhanced wound healing and reduced inflammation, strengthening its overall medicinal profile.
Chaudhary M.A. et al., 2012	Bronchodilator/Gut Modulatory Potential	Calendula contributed to bronchodilation and smooth-muscle relaxation in polyherbal mixtures, indicating possible respiratory benefits.
Kodiyani & Patel, 2015	Calendula for Mucositis Care	The study found Calendula effective in reducing mucosal inflammation, which may be helpful for throat irritation during cough.
ClinicalTrials.gov (Various)	Registered Calendula Clinical Studies	Several trials involving Calendula exist, but none directly evaluate Calendula-only cough syrup in humans.
Reviews (IJPR, IJPRA; 2024–2025)	General Reviews of Calendula	Comprehensive reviews show strong pharmacological evidence, with limited clinical trials focused on respiratory conditions.
Antibacterial/Biofilm Studies, 2020–2021	Calendula Against Respiratory Pathogens	Calendula extracts displayed moderate antibacterial effects, potentially supporting their inclusion in herbal cough formulations.

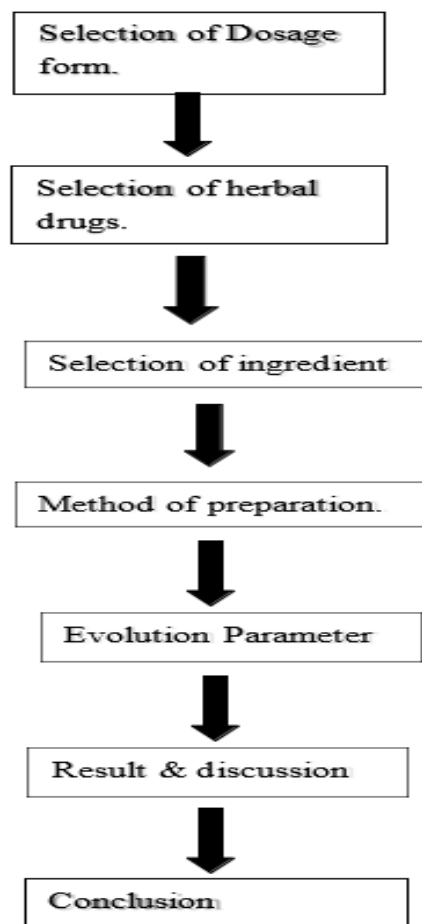
IV. AIM

To Formulation and Evaluation of Polyherbal cough syrup from *Calendula officinalis* linn. Extract. The formulation should be safe, effective, stable made up from the selected herbal extract from plant to cure respiratory problem such as cough and irritation.

V. OBJECTIVES

- To select medicinal plants having antitussive, expectorant, and anti-inflammatory properties.
- To prepare herbal extracts using suitable extraction methods.
- To formulate the polyherbal cough syrup using appropriate excipients such as sweeteners, preservatives, and flavoring agents.
- To evaluate organoleptic properties like color, odor, taste, and appearance.
- To determine physicochemical parameters such as pH, viscosity, and density.
- To study the stability of the formulation under different storage conditions.
- To evaluate antimicrobial activity of the formulation if required.
- To ensure safety, quality, and efficacy of the prepared syrup.

VI. PLAN OF WORK



VII. MATERIAL USED IN POLYHERBAL COUGH SYRUP PREPARATION:



Fig. 1 *Calendula officinalis* L.

- Biological Name: *Calendula officinalis* Linn.
- Synonyms: Pot marigold, English marigold, Bride of the Sun, Bull flower, Butterwort.
- Family: Asteraceae
- Biological source: Dried or fresh flower heads (florets) of *Calendula officinalis* Linn.

Chemical Constituent	Pharmacological Activity	Role in cough Cough Syrup
Faradiol	Known for strong anti-inflammatory action; helps control release of inflammatory mediators.	Helps calm irritation in the throat and reduces the discomfort that triggers dry, persistent cough.
Faradiol-3-O-laurate	Supports healing of inflamed tissues and reduces swelling.	Useful in soothing the throat lining, especially in cough caused by dryness or irritation.
Faradiol-3-O-palmitate	Protects soft tissues and shows notable anti-inflammatory effects.	Contributes to a smoother soothing action in the syrup and helps ease sore throat symptoms.
Arnidiol	Shows both anti-inflammatory and mild antimicrobial activity.	Helps reduce throat redness and prevents irritation caused by minor infections.
Arnidiol esters	Assist in lowering inflammatory cytokines in the body.	Support relief from cough Connected with inflamed airways.
τ-Farandole	Acts as a gentle immune-supporting and inflammation-reducing compound.	Helps in recovery from cough that lingers after a cold or infection.
Flavonoids (quercetin, rutin, etc.)	Possess antioxidant, anti-allergic and antimicrobial effects.	Help protect the throat lining, reduce allergic-type cough, and limit irritation caused by microbes.
Carotenoids (lutein, β-carotene)	Aid tissue repair and protect cells against damage.	Strengthen the throat mucosa, especially in long-lasting cough.
Essential oils (plant terpenes)	Mild antimicrobial and light expectorant properties.	Help loosen thick mucus and reduce microbial irritation in productive cough.
Saponins	Natural expectorants; also form a soothing protective layer.	Help in softening and expelling mucus while reducing irritation during coughing.
Phenolic acids	Antioxidant and germ-inhibiting effects.	Prevent further irritation and support the healing of sensitive throat tissues.
Polysaccharides	Work as natural demulcents, forming a protective film.	Reduce the tickling sensation that triggers dry cough and provide overall comfort.



Fig. 2. Vasaka

- Biological Name: *Adhatoda vasica* Nees
- Synonym: *Justicia adhatoda* Linn.
- Family: Acanthaceae
- Biological Source: Dried leaves of the plant *Adhatoda vasica*, a small evergreen shrub commonly found in India and used in respiratory disorders.

Chemical Constituent	Pharmacological Activity	Role in Cough Syrup
Vasicine	Expectorant, Bronchodilator	Helps in loosening and expelling mucus, improves airflow
Vasicinone	Bronchodilator, Antitussive	Reduces cough and eases breathing
Essential Oils	Antimicrobial	Prevents infection in respiratory tract
Flavonoids	Anti-inflammatory, Antioxidant	Reduces inflammation and irritation in throat
Saponins	Expectorant	Promotes removal of sputum from airways
Tannins	Astringent, Antimicrobial	Soothes mucous membrane and reduces irritation



Fig. 3 Shunthi

- Biological Name: Zingiber officinale Roscoe
- Synonym: Zingiber officinale (commonly known as Dry Ginger)
- Family: Zingiberaceae
- Biological Source: Dried rhizomes of Zingiber officinale, widely used as a spice and medicinal plant for treating cough, cold, and digestive disorders.

Chemical Constituent	Pharmacological Activity	Role in Cough Syrup
Gingerols	Anti-inflammatory, Antitussive	Reduces throat inflammation and suppresses cough
Shogaols	Antitussive, Antioxidant	Helps in relieving persistent cough and irritation
Zingerone	Antimicrobial, Anti-inflammatory	Protects against respiratory infections and soothes throat
Essential Oils	Carminative, Antimicrobial	Provides warming effect and relieves congestion
Oleoresin	Expectorant	Helps in loosening mucus for easy expulsion



Fig 4. Honey

- Biological Name: Apis mellifera L.
- Synonyms: Madhu, Bee honey, Natural honey, Shehad/Shahad, Mel
- Family: Apidae
- Biological Source: Honey obtained from the nectar collected and processed by worker bees of the genus Apis (mainly Apis mellifera, Apis dorsata, Apis cerana).

Chemical Constituent	Pharmacological Activity	Role in Cough Syrup
Fructose & Glucose	Provide energy and act as natural humectants	Soothe the throat and reduce dryness, making coughing less frequent
Flavonoids (quercetin, chrysin, galangin)	Antioxidant, anti-inflammatory, antimicrobial	Reduce throat irritation, protect mucosal lining, and help control infection-related cough
Phenolic acids (caffeic, ferulic acid)	Antioxidant and antimicrobial	Prevent microbial growth and reduce inflammation in the throat
Enzymes (glucose oxidase, catalase)	Produce hydrogen peroxide and show antibacterial action	Help reduce mild throat infections that trigger cough
Amino acids (trace amounts)	Support tissue repair	Aid healing of irritated throat tissues in persistent coughing
Vitamins (B-complex, vitamin C)	Immuno-supportive and antioxidant	Strengthen natural defense and improve recovery in cough caused by infections

Minerals (calcium, magnesium, potassium)	Support metabolic functions and tissue health	Maintain throat comfort and assist in faster healing
Organic acids (gluconic acid)	Maintain acidity and antimicrobial effect	Help prevent microbial irritation and maintain syrup stability
Sugars as demulcents	Form a soothing coating on mucosa	Reduce tickling sensation in dry cough and provide immediate relief

VIII. METHOD OF PREPARATION.

At first the ingredients are dried and their ash value is tested so, we can check the purity of the material and contamination or impurities.

Preparation of herbal extract.

The herbal extract of the calendula officinalis, Vasaka, and Shunthi is Prepared by the hot-maceration and long steeped infusion. In this the material is soaked (each separately) in hot water (70°C). for 24 hrs. after that the extraction is filtered.

Formulation table:
For 30ml syrup preparation

Sr.no.	Ingredients	Quantity
1.	Calendula extract	5ml
2.	Vasaka extract	1ml
3.	Shunthi extract	1ml
4.	Honey	15ml
5.	Water	8ml
6.	Sodium benzoate	0.5mg

Preparation of Polyherbal Cough Syrup

The herbal extract of ingredient is added together and then the honey as the base and sweetening agent is added, it can also enhance the viscosity. After that the volume is make up by water.

The sodium benzoate added as the preservative, and additives flavours also can be added (optional).



IX. EVALUATION OF POLYHERBAL COUGH SYRUP.

1. Organoleptic evaluation test
 - Colour: Golden brown
 - Odour: bitter smell like herb but sweet smell also present
 - Taste: sweet but slightly bitter

2. Ph. Test: (normal range 4-7)

The Ph. is found to be 4.4



3. Specific Gravity test

The Specific gravity of Syrup is found to be 1.29



4. Density test:

The density of syrup is found to be 1.29 g/ml

5. Viscosity test

Typical viscosity range for cough syrups

- Usually around 20-100cp acceptable range
- Ideal range is 30-70cp



Liq Sample	Time of Flow (sec)			Mean Time (sec)	Density (g/ml)	Viscosity (cp)
	1	2	3			
Distilled Water	35.35	28.96	28.33	30.88	0.997	0.997
Syrup	545.81	502.72	495.30	514.61	1.29	21.5

6. Membrane filtration microbial count method.

The colony count estimated visually; NaCl crystals excluded from counting.

During the culture media preparation there are some ingredients added like yeast extract, NaCl etc. so, they are quite visible but tiny particles in culture media hence they are not included in count. The dots on the upper surface are considered as the bacterial count.

The sample was processed without any prior dilution. Between the observed petri plates there is Two plates

yielding colonies within the acceptable range and was countable for calculation of microbial load.



Colony counts from three plates were recorded to estimate the microbial concentration of the sample in CFU/ml.

Plate No.	Colony Count	CFU/mL (colonies ÷ 30 mL)	Countability	Inclusion in Analysis
Plate 1	93	3.10 CFU/mL	Above acceptable range (>80)	Excluded
Plate 2	78	2.60 CFU/mL	Acceptable range (20– 80)	Included
Plate 3	80	2.67 CFU/mL	Acceptable range (20–80)	Included

Only the plates that fell within the acceptable counting limits (20–80 colonies) were used for further calculation.

Plate 1 was not considered because the colony count exceeded the recommended range.

The average microbial count was determined using the valid readings:

$$\text{Average CFU/mL} = (2.60 + 2.67) / 2 = 2.64 \text{ CFU/mL}$$

X. RESULT & DISCUSSION.

The polyherbal cough syrup from calendula officinalis is prepared and evaluated. There are other ingredients also shows the therapeutic activity and help to enhance the result of syrup. the studies shows that the calendula is a effective medication for the cough as well as other respiratory problems. the calendula officinalis, vasaka, shunthi all are very helpful to maintain and enhance

the respiratory heath. the syrup was prepared and evaluated following the tests such as Ph, viscosity, density, specific gravity test, membrane filtration microbial count method. All test proves that the medication is safe, stable, effective, palatable, and can be used to cure cough.

XI. CONCLUSION

The overall studies shows that the calendula officinalis is a safe, effective, stable, and can cure cough. The syrup formulated from calendula officinalis, vasaka, shunthi shows the effectiveness to treat cough and

respiratory tract infections. The syrup also passes all the test needed to be in acceptable. It is an easy to administer also easily available ingredients are present in it. the syrup is cost effective and shows desired effect related to cough.

Hence it is concluded that this polyherbal cough syrup is good option in treatment of cough.

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