SJIF Impact Factor (2025): 8.688| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 10 | Issue: 6 | June 2025 - Peer Reviewed Journal

COUGHCARE: FORMULATION AND EVALUATION OF ANACYCLUS PYRETHRUM-BASED HERBAL COUGH SYRUP

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ABSTRACT

Herbal remedies has safe and natural alternatives for managing cough. This study focuses on the formulation and evaluation of an herbal cough syrup derived from Anacyclus pyrethrum (Akarkara), known for its therapeutic effects. Using a standardized extraction process, the syrup was prepared with carefully selected excipients to optimize stability, viscosity, pH, and palatability. Physicochemical analyses confirmed that the syrup met acceptable standards for density, viscosity, pH, and organoleptic properties. Qualitative analysis identified key bioactive compounds, including polyacetylenes and alkylamides, responsible for its pharmacological effects. In vitro studies demonstrated the syrup's expectorant, bronchodilator, and anti-inflammatory activities, supporting its efficacy in alleviating cough symptoms. Stability testing further validated the product's shelf-life under recommended storage conditions. Sensory evaluation by volunteers revealed high acceptability in terms of flavor, texture, and ease of use. Overall, the formulated Anacyclus pyrethrum herbal cough syrup exhibits promising potential as a safe, effective, and patient-friendly treatment for cough. However, further clinical investigations are required to confirm its therapeutic benefits and establish its role in respiratory healthcare.

KEYWORDS: *Anacyclus Pyrethrum, Herbal Cough Syrup, Formulation, Evaluation, Expectorant, Bronchodilator, Acceptability*

INTRODUCTION

Oral drug delivery systems, which provide ease, efficacy, and variety, are essential ways to provide pharmaceuticals. Before being absorbed into the bloodstream, medications—whether in the form of tablets, capsules, liquids, or powders—go through a number of procedures in the gastrointestinal tract (GIT), which helps to achieve therapeutic effects. Their formulation, physicochemical characteristics, and patient characteristics including PH and gastrointestinal motility all affect how successful they are. To improve absorption and patient compliance, different formulations, including immediate release (IR), delayed release (DR), and extended release (ER), are made to regulate medication release rates and sites. Technologies that further maximize effectiveness and reduce negative effects include tailored distribution and systems based on nanoparticles.

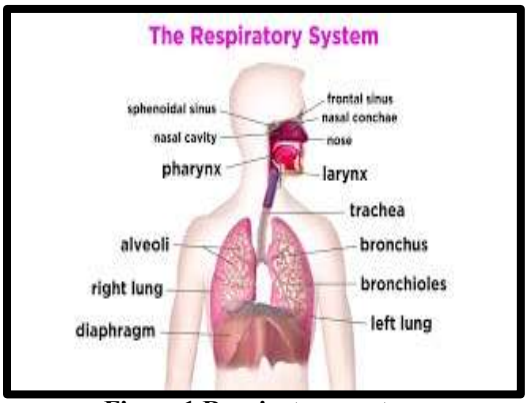


Fig no.1 Respiratory system

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The functions of oral drug delivery systems encompass facilitating drug absorption, safeguarding drugs from degradation, regulating drug release, targeting specific sites within the gastrointestinal tract, masking undesirable tastes, enhancing bioavailability, protecting gastrointestinal mucosa, and improving patient convenience and adherence.

Types of Coughs

The cough is mainly classified in two types
Dry cough: - It is an efficient and productive cough. These dry coughs are brought on by dust, smoke, or dry irritation
Wet cough: - These types of coughs are contagious and ineffective. It is most
helpful for clearing mucus and other.

On the basis of duration of action of cough is classified as:
1. Acute cough
2. Subacute cough
3. Chronic cough

Acute Cough

Coughs that last three weeks or less are referred to as acute coughs.The most
frequent causes of acute cough are acute bronchitis and upper respiratory tract infections.

Subacute Cough

The cough lasts for three to eight weeks. It is the cough began with an upper
respiratory tract infection. The mostcommon conditions to take into consideration are asthma, bacterial sinusitis, and post infectious cough.

Chronic Cough

The cough lasts for more than eight weeks is known as chronic cough.
Herbal cough syrup:
Herbal cough syrups made from concentrated herbal teas are kept in sugar or
honey. Herbal syrups have long been used to enhance the flavors and shelf life of
bitter medicinal plants.

Advantages of herbal cough syrup

1) No adverse effects.
2) Readily available.
3) Simple to modify the dosage for the child's weight.
4) There is no need for nursing care, therefore the patient can take it without help.
5) The liquid dosage form is executed for products like cough medicines.
6) Herbs Grow in everyday life.
7) By delaying oxidation while sugar is hydrolyzed into cellulose and dextrose, Antioxidant

Anacyclus Pyrethrum



Fig no. 2 Anacyclus pyrethrum

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Taxonomical classification of Anacycluspyrethrum:
1. Kingdom: plantae (Plants)
2. Phylum: Angiosperms (flowering plants)
3. Class:Magnoliopsida
4. Order:Asterales
5. Family: Asteraceae
6. Genus: Anacyclus
7. Species: pyrethrum

Biological source:Anacyclus pyrethrum dry flowers are harvested from the flowering tops of the Anacyclus pyrethrum plant, native to North Africa and the Mediterranean. They're utilized in traditional medicine for their anti-inflammatory, analgesic, and aphrodisiac properties.

Chemical constituents of Anacyclus pyrethrum:
1. Pyrethrins: Natural insecticides with insecticidal properties.
2. Alkylamides: Responsible for medicinal properties like anti-inflammatory and analgesic effects.
3. Sesquiterpene lactones: Potential anti-inflammatory, antifungal, and cytotoxic compounds.
4. Polyacetylenes: Contributing to therapeutic effects such as antimicrobial and anti-inflammatory properties.
5. Volatile oils: Essential oils with aromatic properties and potential health benefits.

Traditional uses of Anacyclus pyrethrum:
1. Digestive Disorders: Relieves bloating and indigestion.
2. Dental Health: Treats gum disease and eases toothaches.
3. Aphrodisiac: Boosts sexual performance and libido.
4. Respiratory Conditions: Addresses coughs, bronchitis, and asthma.
5. Arthritis and Rheumatism: Reduces symptoms by reducing inflammation.
6. Skin Conditions: Addresses wounds, dermatitis, and eczema.
7. Stimulant: Increases vitality and fights exhaustion.

Clove



Fig No.3 Clove

Synonyms:Caryophyllum Clove flower, clove bud, lavang
Biological sources:It consists of a dried flower bud of Eugenia caryophyllus
Chemical constituents:
It consists of volatile oil (15-20%), Eugenol (70-90%), AcetyEugenol, Tannins other substances mainly methyl furfural and dimethyl furfura
Clove has been traditionally used to help alleviate cough symptoms due to its natural analgesic and expectorant properties. You can make clove tea by steeping a few cloves in hot water and drinking it to soothe a sore throat and ease coughing. However, it's essential to consult with a healthcare professional for persistent or severe coughs, especially if accompanied by other symptoms.

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Cinnamon



Fig No. 4 Cinnamon

Synonyms: cinnamon bark, kalmi–dalchini, Ceylon cinnamon.
Biological sources: It consists of dried inner bark of the shoots of a copied tree of CinnamomumZeylanium Nees
Family: Lauraceae
Chemical Constituents
Cinnamon consists of a variety of resinous compounds, including cinnamaldehyde, cinnamate, cinnamic acid, and numerous essential oils.The presence of a wide range of essential oils, such as trans-cinnamaldehyde, cinnamyl acetate, eugenol, L-borneol, caryophyllene oxide, b-caryophyllene, L-bornyl acetate, E-nerolidol, α-cubebene, α-terpineol, terpinolene, and α-thujene, has been reported .

It also has anti-inflammatory, anti-diabetic, anti-microbial, and antioxidant properties. Cinnamon-infused water has been used traditionally to treat sore throats and heaging cold coughs, and it may increase insulin sensitivity.

Strong antibacterial and antifungal properties found in cinnamon support your immune system's natural defenses against infections. It contains a substance that may lessen throat irritation and inflammation, therefore easing cough symptoms.
How to Prepare Cinnamon Powder
Break the stick: To make it easier to turn the cinnamon stick into powder, break it up into little pieces.
Grinding: utilizing a pestle and mortar. Before using, make sure the grinder is dry and clean to avoid contamination or moisture damaging the powder. If required, grind the cinnamon pieces in batches until the consistency you want is achieved. Lastly, to preserve its flavor and freshness, put the ground cinnamon powder in an airtight container. for applying cough syrup.



Fig no. 5 Cinnamon Powder

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Ginger



Fig no. 6 Ginger

Synonyms: Zingiber, zingiberis
Biological sources: Fresh or dried peeled or unpeeled or coated rhizome of Zingiber officinale
Chemical constituents: It contains 0.25 – 3% volatile oil, (5-8%) Resinous matter, (56%) starch and protein, volatile oil contains a mixture of more than 25 constituents containing.
Family: Gingiber officials
A perennial herb belonging to the Zingiberaceae family, ginger (Zingiber officinale Roscoe) is one of the most extensively consumed food and herbal spices in the world today. Owing to its favorable attributes of aroma and biological and pharmacological activities, ginger has served as an essential ingredient in traditional Chinese, Ayurveda and Unani medicine across centuries.
Native to South-East Asia, the ginger rhizome has witnessed its widespread use in countries like China, India and the USA to manage a range of conditions, including cough, nausea, vomiting, diarrhea etc. Fresh root ginger, preserved ginger in syrup form and dried ginger spice is the three routinely available forms of ginger in the market.

Properties of Ginger:
Rich in various biologically active compounds like phenolic and flavonoids, ginger might possess a wide range of beneficial properties. These may include,

* It may have antioxidant activity,
* It may have anti-inflammatory action,
* It may have anti-cancer activity,
* It may have antimicrobial activity
* It may benefit in keeping a healthy weight.
* It may boost blood glucose tolerance
* It may augment lipid profile.

How to prepare Ginger powder
Grab a fresh ginger. The ginger is then chopped into tiny pieces and left in a dark room to dry entirely. Using a mortar and pestle, pound the ginger into a fine powder once it has dried completely and become brittle. To use as cough syrup, store ginger powder in an airtight container.



Fig no. 7Ginger Powder

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Spearmint



Fig no. 8 spearmint

Synonyms: spearmint, Garden mint,mackerel mint,green mint, lugli pudina.
Biological source: Mentha spicata
Chemical constituents: A total of 63 chemical constituents were identified in spearmint oil using GC/MS, constituting 99.9% of the total identified compounds. The main components were carvone (40.8% ± 1.23%) and limonene (20.8% ± 1.12%).
Family: Lamiaceae.
Vitamins, antioxidants, and other essential nutrients can be found in spearmint. It has a scent that is quite similar to peppermint. It has more limonene, dihydrocarvone, and cineol than peppermint, but less menthol. Compared to peppermint, it tastes sweeter.

Tulsi



Fig no. 9 Tulsi

Synonyms: Sacred basil, Holly basil, tulasi (Telgu)
Biological sources: Leaves of Ocimum sanctum, Ocimum basilicum
Chemical constituents: The leaves of Ocimum sanctum contains 0.7% volatile oil comprising about 71 % Eugenol and 20 % methyl eugenol. The oil also contains carvacrol sesquiterpene hydrocarbon caryophyllene

More than three thousand years of Ayurvedic medicine. Due to its healing properties, tulsi is commonly referred to as a "Solution of Life" in the context of Ayurveda and has been used to address a variety of fundamental health issues.

Tulsi is considered to be the monarch of natural plants and plays a vital role in our everyday lives. It is revered in Hinduism and is the most well-known family plant in India. Many Hindu myths explain the meaning, characteristics, and uses of tulsi.

Because of its many complex restorative benefits, the tulsi herb is extremely valuable to humanity. Tulsi leaves are frequently used to prepare Ayurvedic medications. It is known to lengthen life expectancy. The plant's extracts are commonly used to treat a variety

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of ailments, including the common cold, irritation, intestinal illness, cardiac illness, migraines, stomach problems, kidney stones, heart problems, and more. Tulsi, an Indian basil, also aids in environmental cleanup. In the fight against flies, mosquitoes, and creepy crawlies, the tulsi plant is an excellent repellent (Warrier 1995).

It is particularly significant in fighting malarial fever. Tulsi leaves fill in as the best solution for cut down fever. Tulsi is a fundamental fixing in the planning of Ayurvedic hack syrups. It is exceptionally valuable in disposing of cold and influenza.
The leaves of the medicinal plant Tulsi are, in fact, extremely valuable for treating sore throats. Just warm up the tulsi leaves in water and ask the patient to swirl in the mixture. The kidneys can be strengthened by tulsi. When taken regularly for six consecutive months, the decoction made by combining the juice of Tulsi leaves with honey can help people with renal kidney stones get rid of the stones through their urinary system.

Benefits of tulsi for our everyday health:
There are numerous therapeutic benefits to the tulsi plant. The leaves improve memory and act as a nerve tonic.They facilitate the expulsion of phlegm and catarrhal debris from the bronchial tube. The leaves encourage a lot of sweating and strengthen the stomach. The plant produces mucilaginous seeds. Common Cold and Fever: Basil leaves are unique for a variety of fevers. Tender leaves boiled with tea can help prevent dengue fever and malaria during the rainy season, when these illnesses are most common. A decoction of the leaves heated with powdered cardamom in half a liter of water and combined with milk and sugar lowers the temperature in cases of acute fevers.

Honey



Fig no. 10 Honey

Synonyms: Madhu, Madh, Mel
Biological source: Honey is a sugar secretion deposited in honey comb by the bees
Chemical constituents: Honey is an aqueous solution of glucose 35%, fructose 45%, and sucrose about 2 % The proportion of sugar may vary depending upon the source of nectar and enzymatic activity responsible for converting nectar into the honey. The other constituents of honey are maltose, gum, traces of succinic acid, acetic acid, dextrin, formic acid, colouring matter, enzymes (invertage, insulage).

One of the most prized and respected natural goods that has been available to humanity since ancient times is honey.Honey serves as a nutritional supplement as well as an alternative treatment for a variety of clinical ailments, from cancer to wound healing, according to traditional medicine. The purpose of this review is to highlight honey's many medical uses. Honey has long been used as a nutritional supplement and to cure a variety of ailments, including those related to the eyes, bronchial asthma, throat infections, TB, thirst, hiccups, exhaustion, dizziness, hepatitis, constipation, worm infestation, piles, eczema, ulcer healing, and wounds. Antioxidant, antibacterial, anti-inflammatory, antiproliferative, anticancer, and antimetastatic properties have been documented for honey's constituent.

Numerous studies support the use of honey in the management and treatment of conditions like diabetes mellitus, cancer, asthma, wounds, and neurological, gastrointestinal, and cardiovascular disorders. Because of its phytochemical, anti-inflammatory, antibacterial, and antioxidant qualities, honey may be used therapeutically to treat illness. The two primary bioactive compounds found in honey are flavonoids and polyphenols, both of which have antioxidant properties. Modern scientific literature suggests that honey may be helpful and protective for the treatment of a number of illnesses, including diabetes mellitus,

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respiratory,gastrointestinal, cardiovascular, and neurological disorders. Because honey contains a variety of antioxidants, it may even be helpful in the treatment of cancer. In conclusion, honey may be used for a variety of medicinal applications as a natural therapeutic agent.

How to make flower powder from Anacyclus pyrethrum:
ProceduresSteps:

1. Harvest and clean: Gather Anacyclus pyrethrum flowers and give them a thorough cleaning to get rid of any dirt or debris.
2. Dry the flowers: Use a dehydrator set to a low temperature or let the flowers air dry fully.
3. Grind into powder: Pulverize the dried flowers using a mortar and pestle or a grinder.
4. Sift and store: To maintain the powder's efficacy, store it in an airtight container after sifting to guarantee an equal texture.



Fig no. 11

Extraction Procedures
Powder is macerated in suitable Solvent such as Ethanol, Methanol, Hexane
distilled water to dissolve desired compound.
The solvent is then evaporated to obtain the extract



Fig no. 12

Method of Preparation of Cough Syrup:

1) To prepare final cough syrup, bring the water to a boil
2) Once a boiling, add a dried powder of clove, cinnamon, Ginger and boil for 20 minutes.
3) Then after 20 minutes filter the solution from filter paper.
4) Add this solution in anAnacyclus pyrethrum flower extract.
5) Then crushed the tulsi and spearmint leaves and boil for 10 min and filter out.

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6) Add a Honey as a sweetening agent, and add sodium benzoate, benzoic acid, propyl paraben as preservatives. Herbal cough syrup was prepared and Solubility was checked by observing clarity of solution visually.



Fig no. 13

Material And Method

Ingredients	Quantity	Use
Anacyclus pyrethrum flower	2.5 g	Antimicrobial
Clove	1g	Antimicrobial
Cinnanmom	1g	Antibacterial, antifungal
Ginger	1.5g	Anti viral
Tulsi	2	Antibacterial
Spearmint	2	Aromatic
Cardamon	2	Flavoring agent
Liquorice	2	expectorant
Honey	5ml	Sweetening agent
Sodium benzoate	3:1	preservatives

Evaluation Test

1) Colour Examination: 5 ml of prepared syrup was taken on watch glass.
   Watch glass placed against white background in white tubelight.
   Color was observed by naked eyes.
2) Odour Examination:
   2 ml of prepared syrup was taken and smelled by individually.
3) Taste Examination:
   A pinch of final syrup was taken and examined on taste buds of the tongue.
4) pH Determination:
   10 ml of prepared syrup taken in a 100 ml of volumetric flask.
   Make up volume to 100 ml with distilled water.
   Sonicare for 10 min.
   PH was measured by using digital PH meter.
5) Viscosity Determination:
   The viscosity of each formulation was determined by using Oswald u tube Viscometer.

Results

Formulation	Colour	Odour	Taste
F1	Light brown	Aromatic	Slightly pungent

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pH Observation

Formulation	pH
F1	6.2



Fig no. 14

CONCLUSION

The study successful developed and evaluated an herbal cough syrup using Anacyclus pyrethrum and other natural ingredients. Preformulation investigations of all the three herbal formulations confirmed they met the required specification.

The syrup showed good physical properties, pleasant taste, and promising expectorant, anti-inflammatory and bronchodilator effects. It was stable under proper storage and well accepted by volunteers. Overall, the herbal syrup offers a safe, effective and natural alternative to conventional cough medicines with fewer side effects. Further clinical studies are needed to confirm its benefits in treating cough and respiratory issues.

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