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EVALUATION AND PREPARATION OF HERBAL COUGH SYRUP BY IN-VITRO METHOD

Nikita Rajendra Ukarde[1*], Avinash D. Hatkar[2*], Dr.Sunil .S. Jaybhaye[3]
[1]Student of Bachelor in pharmacy, Dr.Babsaheb Ambedkar Technological University, Raigad,Lonere.
[2]Department of pharmacology, Faculty of pharmacology, Dr.Babsaheb Ambedkar Technological University , Raigad, Lonere
[3]Department of Pharmaceutical Analysis, Faculty of Pharmaceutical Analysis, Dr.Babsaheb Ambedkar Technological University , Raigad, Lonere

**Corresponding Author*

ABSTRACT
The cough is a most common problem are face by the all people .there are the two types of cough one is the dry cough and second is the wet cough. The dry cough is a no mucus and secretion while in wet cough there is a cough mucus or secretion .the syrup is most commonly used and popular Dosage form there is a used in cure the cough and cold because it having case of patients compliance. The herbal cough syrup was formulated using Anacyclus pyrethrum flower extract, cinnamon, clove, ginger extract, tulsi, spearmint leaves extract and Honey.

The herbal cough syrup is studied which is liquid Dosage form it is easy to administer than solid Dosage form and is more effective and fst acting in order to cure cough.

KEYWORDS: *Cough , Herbal syrup, Herbal Formulation.*

INTRODUCTION

A cough, also known as tussis, is a voluntary or involuntary act that clears the throat and breathing passage of foreign particles, microbes, irritants, fluids, and mucus; it is a rapid expulsion of air from the lungs. Coughing can be done deliberately or as part of a reflex.[1] Although coughing can be a sign of a serious illness, more often, it will clear up on its own without the need for medical attention Coughing is a quick, repeating activity that helps to cleanse the airways of various fluids, irritants, microorganisms, and foreign objects. The brain detects any obstruction or discomfort in the upper airway or throat and signals the body to cough to expel the particle

Types of cough

The cough is mainly classify in two types-[2]

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.[2]

Subacute cough:-

The cough is 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.[2]

Chronic cough:-

The cough lasts for more than eight weeks is known as chronic cough.[2]

Needs of plants:-

Man has employed plants and herbs to treat sickness since the dawn of time.[] For a range of purposes, including the treatment of several diseases, shelter, food, clothing, writing, weapons, and cosmetics, plants have offered and continue to offer essential materials. There is no question that the great civilizations of prehistoric China, India, and North Africaleft written records of chronic coughing. The resourcefulness of man in employing plants to treat a variety of diseases.

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Most commonly prescribed cough medicines are made from botanical extracts. Numerous compounds, including those derived from diverse plant species and their derivatives, are well-known western medications for treating cough or underlying disorders, including codeine, morphine, noscapine, bromhexine, guaifenesin, ephedrine, and cromolyn.[3]

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 flavour and shelf life of bitter medicinal plants.[4]

Advantages of herbal cough syrup:-[4]

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

Material and Methods

Anacyclus pyrethrum flowers extract
Cinnamon
Clove
Ginger
Spearmint
Tulsi

Honey

Anacyclus pyrethrum

Kingdom: plantae
Class : magnoliospidia
Species : Anacyclus pyrethrum
Family : Asteraceae
Chemical constituents:
flowers contain sesquiterpene lactones, alkamides, flavonoids, and polysaccharides, which contribute to their medicinal properties and biological activities. These compounds are sourced from the plant's metabolism and play important roles in its ecological interactions and potential therapeutic applications. Anacyclus pyrethrum, Indian trade name is ‘Akkarkara’ is a small hairy herbaceous perennial belonging to the family of Asteraceae. The plant mainly contains Alkaloids, tannins, flavonoides, steroid some trace metals and phenols

Bioactive compounds produced in plant species are usually responsible for their pharmacological properties such as antidiabetic, anti-inflammatory, anticancer, and antimicrobial activities Bacteria, fungi, and viruses are responsible for causing many infectious diseases .Antimicrobial resistance has been observed with time, even though many modern antimicrobial drugs have been developed to manage contagious diseases.

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The plant is used as sex stimulant, antidiabetic, antioxidant, treating asthama, cardiac diseases, and throat problems, remove laziness, nerves weakness, carminative, stomache, arthritis, sciatica, diuretic, tooth and gum problems, aphrodisiacs[5], hiccoughs, epilepsy, headache, pains, muscle relaxant, worm infestation, anti-rheumatism, anticonvulsant, brain tonic, common cold and other human related disorders

How to prepare Anacyclus pyrethrum flower powder:


Wash the plant flower to remove impurities, then dry them completely under dark room until there is no remaining moisture. Macerate the dried flower into the grinder till it becomes form fine powder.

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 [6]

Cinnamon

Synonyms:

cinnamon bark , kalmi – dalchini , Ceylon cinnamon.[7]

Biological sources:

it consists of dried inner bark of the shoots of a copied trees of cinnamomum zeylanium Nees

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Chemical Constituents

Cinnamon consists of a variety of resinous compounds, including **cin**namaldehyde, 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.[8]

Family : Lauraceae

Scientific name : cinnamomum verum

In addition to being an antioxidant, anti- inflammatory, Anti- diabetic, anti- microbial .it may improve insulin sensitivity, cinnamon infused water has been a traditional remedy for heaging cold cough and sore throat.

Cinnamon content potent anti- Bacterial and anti- fungal quality that that help your immune system naturally fight off pathogen. It contains compound that may help alleviate cough symptoms by reducing inflammation and irritation in a throat.

How to prepare cinnamon powder:

Break the stick :

Break the cinnamon stick into a small small pieces this will make them easier to into a powder.

Grinding:

using morter and pestle. It's important to ensure that the grinder is clean and dry before use to prevent contamination or moisture affecting the powder

Grind the cinnamon pieces in batches if necessary, until achieve the desired consistency

Finally store the ground cinnamon powder in an airtight container to maintain it's freshness and flavor. For using cough syrup.

Clove :

Synonyms:

Caryophyllum Clove flower, clove bud , lavang

Biological sources:

It consists of a dried flower bud of Eugenia caryophyllus

Chemical constituents:

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It consists of volatile oil (15-20%), Eugenol (70-90%), Acety Eugenol ,Tannins other substances mainly methyl furfural and dimethyl furfural.
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.

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 favourable 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, diarrhoea etc. Fresh root ginger, preserved ginger in syrup form and dried ginger spice are the three routinely available forms of ginger in the market.[9]

Properties of Ginger
Rich in various biologically active compounds like phenolic and flavonoids, ginger might possess a wide range of beneficial properties.[10] 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.

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Take a fresh ginger
Then a cut the ginger into a small small pieces
Then they place in a dark room for a completely dry
Once a ginger completely dried and brittle grind it into a fine powder using a morter and pestle
Store a ginger powder into a airtight container for using cough syrup.

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%).

Mentha species belong to the family Lamiaceae and are widely distributed in Europe, Asia, Africa, Australia, and North America .Plants from this genus can be found in multiple and diverse environments .

Recent data, based on morphological, cytological and genetic characteristics, have shown that genus *Mentha* can be classified into 42 species, 15 hybrids and hundreds of subspecies, varieties and cultivars. Indeed, mint taxonomy is highly complex and there is not always a consensus. The *Mentha* genus is often divided into 5 sections: *Audibertia*, *Eriodontes*, *Mentha*, *Preslia*, and *Pulegium* . Genus *Mentha*, a member of Lamiaceae family, encompasses a series of species used on an industrial scale and with a well-described and developed culture process. Extracts of this genus are traditionally used as foods and are highly valued due to the presence of significant amounts of antioxidant phenolic compounds.

Many essential oil chemotypes show distinct aromatic flavor conferred by different terpene proportions. Mint extracts and their derived essential oils exert notable effects against a broad spectrum of bacteria, fungi or yeasts, tested both *in vitro* or in various food matrices.[11] Their chemical compositions are well-known, which suggest and even prompt their safe used.

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In this review, genus *Mentha* plant cultivation, phytochemical analysis and even antimicrobial activity are carefully described.[12] Also, in consideration of its natural origin, antioxidant and antimicrobial properties, a special emphasis was given to mint-derived products as an interesting alternative to artificial preservatives towards establishing a wide range of applications for shelf-life extension of food ingredients and even foodstuffs.[13,14]

Spearmint contains vitamins, antioxidants, and vital nutrients. Its aroma is very similar to that of peppermint. It contains less menthol than peppermint, but it is rich in limonene, dihydrocarvone, and cineol. It has a sweeter taste than peppermint.

Like other herbs of the mint family, spearmint has a square-shaped stem. Its leaves are around 5 centimeters to 9 centimeters long and 1.5 centimeters to 3 centimeters wide. The tips of the leaves are pointed, like spears, hence its name.[15]

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 contain carvacrol sesquiterpene hydrocarbon caryophyllene
Tulsi (Ocimum sanctum L.) in Hindi or Tulasi in Sanskrit (holy basil in English) is an exceptionally adored culinary and restorative fragrant herb from the family Lamiaceae that is indigenous to the Indian subcontinent and been utilized inside Ayurvedic medication over 3000 years. In the Ayurveda framework tulsi is frequently alluded to as a "Solution of Life" for its mending powers and has been known to treat a wide range of basic wellbeing conditions.

Medicinal Properties
1. Antimicrobial Activity
- Tulsi has strong antibacterial, antiviral, and antifungal properties, making it effective against a variety of pathogens. This is attributed to its essential oils and compounds like eugenol and beta-caryophyllene.

2. Anti-inflammatory Effects
- The herb is known to reduce inflammation due to the presence of compounds such as eugenol and rosmarinic acid. This makes it beneficial for conditions like arthritis and inflammatory diseases.

3. Antioxidant Properties
- Tulsi is rich in antioxidants, which help in neutralizing free radicals, thereby protecting the body from oxidative stress and associated chronic diseases.

4. Respiratory Health
- Tulsi is particularly beneficial for respiratory ailments. It helps in relieving symptoms of asthma, bronchitis, and other lung diseases. Its expectorant properties aid in expelling mucus from the respiratory tract.

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5. Cardiovascular Health
- It helps in reducing blood lipid levels, thus protecting against cardiovascular diseases. Eugenol, in particular, has a beneficial effect on blood pressure and cholesterol levels.

6. Antidiabetic Effects
- Tulsi has been shown to improve blood sugar levels and enhance insulin sensitivity, making it a supportive herb for managing diabetes.

7. Gastrointestinal Health
- The herb aids digestion and can help alleviate gastrointestinal issues such as indigestion, gas, and ulcers due to its carminative properties.

Health Benefits in Daily Life
1. Boosts Immunity
- Regular consumption of tulsi tea or leaves can enhance the immune system, making the body more resilient to infections and diseases.

2. Stress Relief
- Tulsi helps in reducing stress and anxiety levels, promoting mental clarity and focus. It can be consumed as tea or in supplement form for its adaptogenic benefits.

3. Respiratory Relief
- Inhaling steam with tulsi leaves or consuming tulsi-based herbal cough syrups can provide relief from cold, cough, and other respiratory conditions.

4. Oral Health
- Chewing tulsi leaves or using tulsi-based oral care products can help in maintaining oral hygiene and preventing dental issues.

5. Skin and Hair Health
- Tulsi's antimicrobial and anti-inflammatory properties are beneficial for skin health. It can be used in face packs to treat acne and other skin conditions. Additionally, tulsi oil can promote healthy hair growth and reduce dandruff.

6. Digestive Aid
- Consuming tulsi can help in digestion and alleviate digestive disorders. It is often included in detox drinks for its digestive benefits.

Honey :

Synonyms:
Madhu , Madh , Mel
Biological source :
Honey is a sugar secretion deposited in honey comb by the bees
Chemical constituents:
Honey is a aqueous solution of glucose 35%, fructose 45%, and sucrose about 2 %

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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).

Medicinal Properties

1. Antimicrobial Activity
   - Honey exhibits strong antibacterial, antifungal, and antiviral properties. This is largely due to the presence of hydrogen peroxide, low pH, and high osmolarity. Additionally, certain types of honey, like Manuka honey, contain unique compounds like methylglyoxal that enhance its antimicrobial efficacy.
2. Anti-inflammatory Effects
   - Honey has significant anti-inflammatory properties. It can reduce inflammation and promote healing, making it beneficial for conditions like wounds, ulcers, and inflammatory diseases.
3. Antioxidant Properties
   - Rich in antioxidants, honey helps neutralize free radicals in the body, reducing oxidative stress and preventing chronic diseases. The antioxidants in honey, such as flavonoids and phenolic acids, contribute to its protective effects.
4. Cough Suppressant
   - Honey is a well-known natural remedy for coughs. It soothes the throat, reduces irritation, and acts as a demulcent, coating the mucous membranes and providing relief from cough.
5. Wound Healing
   - Due to its antibacterial and anti-inflammatory properties, honey is effective in wound healing. It promotes tissue regeneration, reduces infection, and accelerates the healing process.
6. Digestive Health
   - Honey aids in digestion and can help alleviate gastrointestinal issues such as ulcers and gastritis. It acts as a prebiotic, promoting the growth of beneficial gut bacteria.
7. Immunomodulatory Effects
   - Regular consumption of honey can boost the immune system, enhancing the body's ability to fight infections.

Method of Preparation

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

Formulation for Bottle A & B

Ingredients	Quantity Taken (gm)		Category
	A	B	
Anacyclus pyrethrum (flower)extract	5 gm	5 gm	Antimicrobial
Clove	2 gm	2 gm	Antimicrobial
Cinnanmon	2 gm	1 gm	Antibacterial, antifungal
Ginger	3 gm	2 gm	Anti-viral
Tulsi leaves	8 gm	9 gm	Antibacterial
Spearmint leaves	9 gm	9 gm	Aromatic
Honey	10 ml	8 ml	Sweetening agent
Sodium benzoate	3:1	2:1	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:

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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.

Formulation (A) cough syrup

Formulation (B) cough syrup

Results & Discussion

Table 1:

Formulation	Colour	Odour	Taste
A	Light-green	Aromatic	Slightly pungent
B	Light-green	Aromatic	Slightly pungent

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Table 2: PH observation

Formulation	PH
A B	6.2 6.9

Antimicrobial activity of formulated herbal cough syrup was observed.

Formulation A and B are evaluated for its in vitro antimicrobial activity by using standard ciprofloxacin. From the zone of inhibition, the Formulation of B was found more superficial towards, antimicrobial activity as compared to Formulation A.

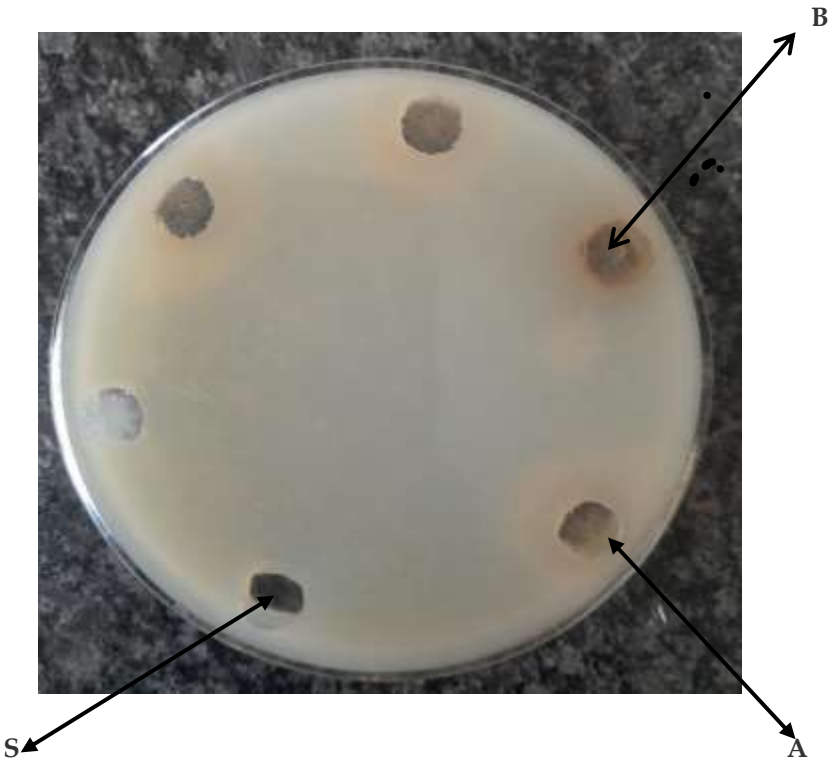

Fig: Antimicrobial Activity of Herbal cough syrup

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.Two formulations were prepared and evaluation test such as colour, odor, taste and pH were performed.

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