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Formulation and Evaluation of Herbal Cough Syrup Using Myristica Fragrans

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ABSTRACT
Cough has been the most common ailment for millennia around the world.The body uses coughing as a defense mechanism. Coughs are classed further suitably which are relying upon factors such as indications and symptoms, duration, type, character, etc. Syrup is the most widely made, utilized, and favored dose form for treating colds and coughs. This study's primary goal was to remove dangerous synthetic ingredients from herbal cough medication. Formulation and use a natural, safe component in their place. In India, the number of people with asthma is growing daily for a variety of environmental reasons. After a laboratory-scale formulation was completed and tested for a variety of criteria, including PH, viscosity, density, and stability, the formulation was determined to be stable and suitable for use as a cough remedy.It was discovered that the herbal formulation's antitussive activity, even at the lowest dosage, was significantly superior to that of the conventional medication

KEYWORDS: Antimicrobial action; Myristica fragrans, Herbal syrup.

INTRODUCTION

Although there are various synthetic medications available to treat cough, the issue is that any successful treatment for coughing will unavoidably have side effectsCoughing is a common symptom of several respiratory illnesses, including pneumonia, bronchitis, and asthma [1]. The respiratory system uses coughing as a protective mechanism to clean the upper airways, thus it shouldn't be arbitrarily inhibited. It is believed that coughing is a reflex. It happens when a mechano-or chemoreceptor in the pharynx, respiratory passage, or lung stretch receptor is stimulated.The bronchial tree contains the sensitive receptors, especially at the tracheal junction. When these receptors are mechanically or chemically triggered, as occurs when different irritants are inhaled, nerve impulses trigger the brain's cough center. Cough is typically categorized as either nonproductive (dry) or productive (producing mucus, typically with expectoration). Therefore, it would seem logical to employ an effective antitussive medication, like

codeine or dextromethorphan, to suppress the crippling cough that these individuals experience. By inhibiting the action of the stretch receptors found in the lungs, pleura, and respiratory passageways, non-narcotic antitussive drugs anesthetize the cough reflex at its origin. Narcotic antitussive medications depress the cough center that is located in the medulla, hence lowering its threshold for incoming cough. [2]

ADVANTAGES OF HERBAL MEDICINE:

One benefit of herbal medicine is that it is

1. safe to use.2. Reasonably priced 3. No known adverse effects.

DISADVANTAGES OF HERBAL MEDICINE:

One disadvantage of herbal therapy is that it may cause adverse drug reactions (ADRs) with prescription drugs. 1. Regular usage of herbal medications in combination with Antidepressants can result in negative side effects.2. Using herbs as medications carries a minimal danger of self-dosing.[3]

HERBAL COUGH REMEDIES:

Herbal remedies are the most popular way to treat coughs. Herbal remedies are significantly contributing to the advancement of the medical field.Asthma, TB, cough, pneumonia, renal illness, cancer, diabetes, allergies, lung cancer, and Herbal treatments are used to treat a variety of minor to severe medical ailments, including viral infections [4,5].According to WHO estimates, 80% of people even use herbal remedies for their basic medical needs. Historically, medicinal herbs have been employed as primary healthcare agents, particularly in Asian countries [4]. Herbal remedies are primarily used to treat chronic illnesses and promote health rather than life-threatening ones. Many side effects, including vomiting and feeling nauseated, sedation, allergies, respiratory tract infections, changes in appetite, irritability, drowsiness, addiction, and organ or organ-related damage, are caused by the majority of synthetic medication treatments [6].Herbal medications and therapies that have fewer or no side effects during and after treatment have been the primary focus of study in recent years [7].

DIFFERENT KIND OF SYRUPS:

Simple syrup: "Simple syrup" is the term used to describe a solution of sucrose made solely with purified water. Only sucrose (sugar) and purified water are present in simple syrup. For instance:66.7 ml of sucrose 100ml of purified water.

Medicated syrup: Medicated cough syrup is a type of syrup that contains a therapeutic ingredient. For instance, ginger syrup Potent tincture of ginger100 mL of flavoring syrup compared to 5 mL of syrup

Flavoured syrup: Flavoured vehicles are syrups that contain flavoring compounds but no therapeutic ingredients. Including Flavoured and Aromatic Syrups For instance, raspberry and cherry syrup

COUGH TYPES:

Cough is categorized based on its type, character, and duration.

A. Based on the type Depending on the type, cough is divided into two categories: dry cough and wet cough.

Signs and symptoms:

1. **Dry cough**

- Indications of a dry cough

1. A sensitive throat
2. A cough that doesn't produce mucus
3. A short, dry, and frequent cough
4. A persistent cough that is productive and effective

- Medication: antitussive and cough suppressant
- Infectious cough that is ineffective

2. Wet cough:

1. Phlegm coughing
2. Wheezing
3. Tightness in the chest
4. Breathing difficulties Expectorant is the medication. [8,9]

B. Depending on how long Acute, subacute, and chronic coughs can be distinguished based on how long they last.

1. severe cough: Coughs that last fewer than three weeks fall into this category. The common cold, URTI, COPD, environmental pollutants, and infective bronchitis are the causes of acute cough [10,11].

2. A little cough: This form of cough is defined as one that lasts for at least three to eight weeks. GERD and infrequently Tourette's syndrome are non-respiratory causes, while pneumonia and B. pertussis infections are respiratory causes [10,11].

3. persistent cough: Coughs that persist for eight weeks or longer are considered chronic coughs. Pneumoconiosis, lung cancer, COPD, asthma, and tuberculosis are the respiratory causes [10,11].

Pediatric coughs: When a youngster coughs, it means that their body is attempting to expel irritants, toxins, and other foreign objects. One of the most frequently occurring causes families bring their kids to the physician is a cough.

Coughing is frequently caused by:

1. Allergies or sinusitis: These disorders can cause a persistent cough.along with a rash, runny nose, watery eyes, and itchy throat. To determine which allergens are causing the issue and to provide guidance on how to avoid them, allergy tests are performed.

2. Asthma: Since each child's symptoms are unique, diagnosing asthma in youngsters can be somewhat challenging.

One of the many symptoms is a wheezing cough that worsens at night. Playing, exercising, and other physical activities raise the likelihood of the other cough. The real cause of asthma will determine how it is treated.

3. Infection: Colds, the flu, and croup cause youngsters to cough for extended periods of time. Croup has a "barking" cough that usually happens at night with noisy breathing, while the flu can occasionally induce a harsh, dry cough. Colds bring mild to moderate hacking coughs.

Other causes of coughing in children include the habit of coughing after being ill, after inhaling anything foreign, such food or a small object, or after getting in contact with irritants, like cigarettes or pollution. Fire crackers or smoke smoke [12]

HERBAL MATERIALS

1. Tulsi

Synonyms:Tulas and Tulsi

Biological source: The fresh and dried leaves of Ocimum species, such as Ocimum sanctum L. and Ocimumbasilicum L.

Family: Labiateae

Chemical Constituents:According to phytochemical studies, some of Tulsi's primary chemical ingredients include oleanolic acid, ursolic acid, rosmarinic acid, eugenol, carvacrol, linalool, and β-caryophyllene.

Uses : cough syrup, expectorants, nasal decongestants, and asthmatic patients.

2.Honey

Biological source :The honeybee Apismellifera produces honey naturally from the nectar of flowers.

Family: Apidae

Chemical constituents: The B vitamins riboflavin, niacin, folic acid, pantothenic acid, and vitamin B6 are all present in trace amounts in honey. The minerals calcium, iron, zinc, potassium, phosphorus, magnesium, selenium, chromium, and manganese are also present, along with ascorbic acid (vitamin C).

Uses: Expectorants • For those with asthma • Cough syrup • Decongestant for the nose

3.Liquorice

Synonyms:Jethimadh, Mulethi, and Glycrrhiza.
Biological source : GlycyrrhizaglabraLinn.'s peeled and unpeeled roots, stolons, and stem make up liquorice.
Family: Leguminosae
Uses: Both the food and medical industries use liquorice. Since the early 1970s, licorice has been utilized as an antiulcer drug. Ulcers are treated with DGL (deglycyrrhizinated liquorice), which is the extracted glycyrrhizin.
It has also been shown that liquorice possesses anti-proliferative qualities.

4. Cinnamon

Synonyms:Chinese cassia, cinnamon oil, Ceylon cinnamon, Saigon cinnamon, and cinnamon oil aromaticum
Biological source: widespread cultivation of Cinnamomumzeylanicum in Ceylon, Java, Sumatra, the west Indies, Mauritius, Brazil, and India
Family:.Lauraceae
.Chemical components: 50–60% cinnamon aldehyde, 5–10% eugenol, and 10% volatile oil.
Uses: anti-arithmetic, flavorful, carminative, and stomachic properties.

5.Myristica fragrans

Synonyms:Myristicafragrans, Mace, and Nuxmoschata
Biological source:It is made out of dried Myristicafragrans seed kernels from the
Family: Myristicaceae
Chemical constituents: lauric acid, oleoic acid, myristicin, elemicin, and safrole
Uses: Aromatic, stimulant, and carminative A flavoring Ingredients used in the manufacturing of soap

EXRACTION PREPARATION METHODS:

Nutmeg oil extraction: Using a Soxhlet apparatus and ethanol as a solvent, nutmeg oil was extracted. The extracted material was then collected using a Rota evaporator to remove any leftover solvent, and it was kept under particular guidelines. Extraction of Tulsi leaves: Tulsi leaves were gathered, cleaned to get rid of any debris, and then dried in the shade until completely dry and devoid of moisture. They were then ground into a fine powder and macerated using ethanol as a solvent.
Tulsi leaves extraction: Tulsi leaves were collected and cleaned to remove debris and dried under shade until leaves are entirely dried without moisture the leaves are then grinded to fine powder and macerated using ethanol as solvent .
Liquorice root extraction: Powdered liquorice root was taken and macerated for 48 hours using ethanol as a solvent.
Cinnamon bark extraction: : Using ethanol as a solvent, cinnamon bark was ground into a fine powder and macerated.

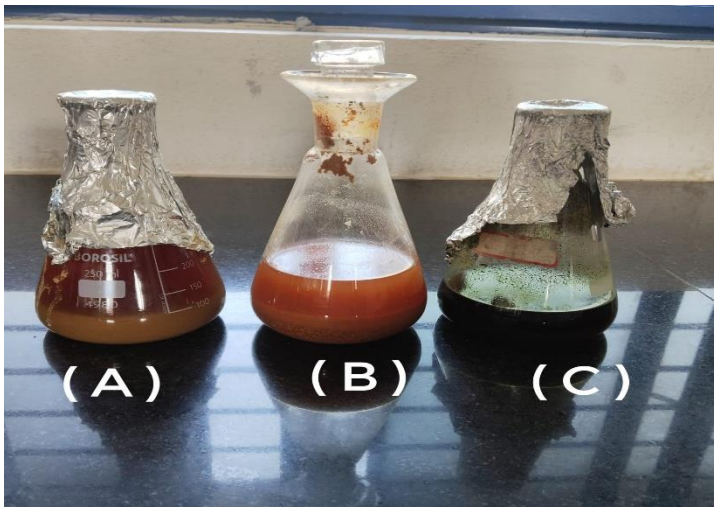


Fig [A]:Liquorice extract [B] Cinnamon extract [C] Tulsi extract

Honey : Bees use blossom nectar to make honey, a natural sweetener and medication.

FORMULATION TABLE FOR 50 ML COUGH SYRUP:

SNO.	INGREDIENT	QUANTITY [50ml]
1	Nutmeg oil	8ml
2	Tulasi	10ml
3	Liquorice	7ml
4	Cinnamon	3ml
5	Honey	Quantity sufficient

METHOD OF PREPARATION:

To prepare final herbal syrup 8 ml of nutmeg oil , 10 ml of tulsi extract ,7ml of liquorice extract and 3ml of cinnamon extract was added to a 100ml volumetric flask.

Makeup with honey upto 50ml with continuous stirring.

The final herbal syrup was prepared and subjected to evaluation tests.

PHYTOCHEMICAL TESTS:

Wagner's test for alkaloids:To 1 milliliter of extract, add 1 milliliter of Wagner's reagent (iodine in potassium iodine). Alkaloids are present when the precipitate is reddish-brown in color.

Check for tannins: Make a 5% ferric chloride solution using distilled water. 100 µl of the sample was mixed with 0.5 ml of this solution. Dark blue or dull green coloring indicated the presence of tannins.

Bromine water test: .Bromine water was added to the test sample. The test is confirmed by the presence of yellow precipitate.

EVALUATION TESTS:

SNO	TEST	PROCEDURE
1	Color analysis	Five milliliters of the prepared syrup were placed in a watch glass. Observe the glass placed in the white tubelight on a white background. Color might be seen with the naked eye.
2	Odor analysis	Two milliliters of prepared syrup were taken, and each person sniffed it 3. Analysis of taste The tongue's taste buds were tested after a pinch of the finished syrup was taken.
3	Analysis of taste	The tongue's taste buds were tested after a pinch of the finished syrup was taken.
4	PH determination	A 100 ml volumetric flask was filled with 10 ml of the produced syrup. Use distilled water to make up to 100 ml, then sonicate for 10 minutes. A digital pH meter was used to measure the pH.
5	Viscocity determination	Ostwald's u-tube viscometer was used to measure the formulation's viscosity.

ANTI MICROBIAL ACTIVITY:

Myristica fragrans is well-known for its antibacterial properties against several ailments. Plant extracts 'antibacterial activities.

Bioactive components include alkaloids, flavonoids, tannins, saponins, and phenolic acids.

The purpose of this study is to assess the antibacterial activity of Myristica fragrans extract against two bacterial pathogens: Escherichia coli [E. coli] as gram negative and Staphylococcus aureus [S. aureus] as a gram positive. The Pour Plate Method and the Spread Plate Method were used to measure antimicrobial activity, which are conventional approaches for determining antimicrobial agent effectiveness.

PROCEDURE:

The nutritional broth medium was developed bydissolving the specified ingredients in 500ml of water, adjusting the pH, autoclaving at 121°C for 20 minutes, and pouring the medium into sterile Petri plates. The test organisms were Escherichia coli and Staphylococcus aureus. Both bacterial strains obtained from a microbiological laboratory. The discs are soaked in Myristica fragrans extract , ethanol as a control and amikacin sulphate solution as a standard.

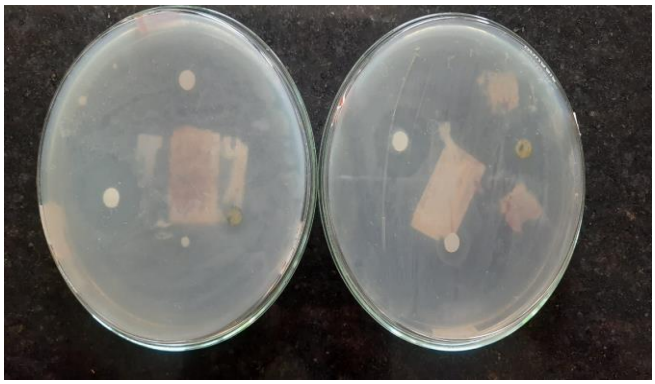
The antimicrobial activity was evaluated using two different methods: Pour Plate Method and Spread Plate Method.

POUR PLATE METHOD:-

Firstly, the test organisms are innoculated in to medium and then the medium is poured in to the sterile petridishes and allow to solidify. After solidification, the discs are placed in different positions [Myristica fragrans as a extract, ethanol as a control, amikacin sulphate solution as a standard]. The plates were incubated at 37 °C for 24 hours. Following incubation, the zones of inhibition around each well were evaluated to determine antimicrobial activity.

SPREAD PLATE METHOD:-

Firstly, the medium is poured in to the sterile petridishes and allow to solidify. After solidification, the few ml of test organisams was spread in the solidified petriplates by using cotton. Then the discs are placed in different positions [Myristica fragrans as a extract, ethanol as a control, amikacin sulphate solution as a standard]. The plates were incubated at 37 °C for 24 hours. Following incubation, the zones of inhibition around each well were evaluated to determine antimicrobial activity.



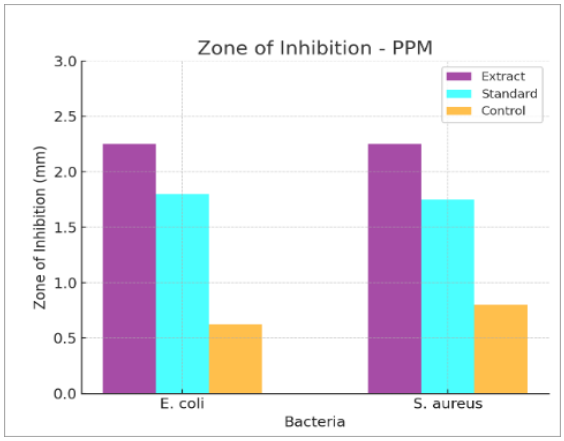
RESULTS AND DISCUSSSION :-

Bacteria	**Extract (PPM)**	**Standard (PPM)**	**Control (PPM)**	**Extract (SPM)**	**Standard (SPM)**	**Control (SPM)**
E. coli	2.25 mm	1.8 mm	0.625 mm	2.35 mm	2.15 mm	0.675 mm
S. aureus	2.25 mm	1.75 mm	0.8 mm	2.35 mm	2.05 mm	0.825 mm

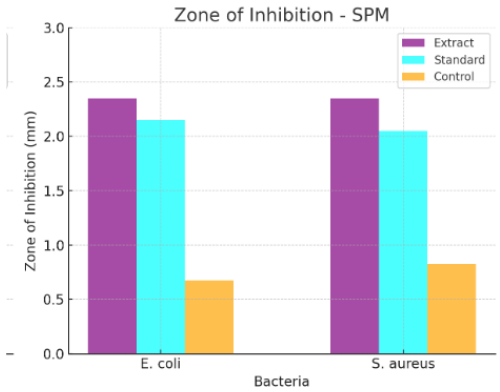
% Inhibition using the formula:

%Inhibition = [Zone of Inhibition−Control]/Zone of Inhibition)×100

Pour Plate Method (PPM)
E. coli :
[2.25−0.625]/2.25×100 =72.22%
S. aureus :
[2.25−0.8]/2.25×100 = 64.44%



Spread Plate Method (SPM)
E. coli :
[2.35−0.675]/2.35×100 = 71.28%
S. aureus :
[2.35−0.825]/2.35×100 = 64.89%



DISCUSSION:-

The Pour Plate Method (PPM) and Spread Plate Method (SPM) are used to assess the antibacterial activity of an extract against E. coli and S. aureus, respectively. The percentage inhibition observations show that the extract has high antibacterial activity, with inhibition rates of 72.22% for E. coli and 64.44% for S. aureus in PPM and 71.28% for E. coli and 64.89% for S. aureus in SPM. The extract consistently demonstrated a wider Zone of inhibition above usual and control, indicating a substantial antibacterial action. Notably, E. coli demonstrated slightly higher inhibition rates, indicating greater vulnerability than S. aureus. Furthermore, the inhibitory zones in SPM were a little larger than those in PPM, revealing bacterial interactions. with the extract may differ between methods.

CONCLUSION:

This project's goal was to create and assess herbal cough syrup. We now have a better understanding of what cough is, its various kinds, and the factors that contribute to it thanks to this study. A small study was conducted on herbal remedies for cough. According to the study, herbal remedies are more advantageous than allopathic ones, which employ conventional medications as Herbal medications have fewer or no adverse effects. Herbal therapies are increasingly preferred widely. Compared to prescription medications, herbal remedies are more readily available. The present study will help us to understand effectiveness of herbal cough syrup compared to chemical- based syrups.

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