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Formulation and Evaluation of Herbal Syrup for Anti-Inflammatory Activity

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Abstract: Herbal syrups are a widely used natural remedy for coughs and colds, formulated with medicinal herbs such as turmeric, ginger, and clove. These syrups are typically prepared using a concentrated herbal decoction mixed with honey or sugar, which enhances palatability and acts as a natural preservative. The efficacy of herbal syrups is evaluated based on parameters such as physical appearance, pH, stability, viscosity, and clarity. Turmeric, ginger, and clove contribute significant therapeutic benefits due to their anti-inflammatory, antioxidant, and antimicrobial properties. Turmeric contains curcumin, known for its ability to reduce inflammation and support digestion. Ginger, rich in gingerol, has anti-inflammatory, immune-boosting, and pain-relieving properties, while clove provides high antioxidant activity and potential blood sugar regulation benefits.

Keywords: Herbal syrup, Turmeric, Ginger, Clove, Antibacterial activity, Natural medicine, Formulation.

I. INTRODUCTION

Herbal syrup:

Herbal syrups are a common and helpful dose type for treating coughs and colds, utilizing natural herbs like turmeric, ginger, and clove. They are administered as a liquid dosage and often use honey as a base. Herbal syrups can relieve cold and cough symptoms, and can also help to release and clear pulmonary mucus Herbal syrups are generally prepared by adding a concentrated decoction of herbs with honey or sugar, and sometimes alcohol, which acts as a preservative and thickener to increase the shelf life of the formulation. Sweeteners can also increase the palatability of some herbs. Evaluation Parameters The quality of the final herbal can be evaluated through various parameters: Physical Appearance: Including colour, odour, and taste. pH Determination: Measuring the pH of the syrup using a digital pH meter. Stability Testing: Assessing the syrup's stability under accelerated temperature conditions. Other Tests: Including density, specific gravity, and organoleptic characteristics. Ash value can also be checked, which involves burning a known amount of the sample and weighing the residue. Viscosity: Viscosity can be determined using specific formulas. Clarity: Clarity can be visually observed to check the solubility of the syrup. What are the main benefits of using turmeric, ginger, and clove in herbal syrup Turmeric, ginger, and clove each contribute unique benefits to herbal syrups: Turmeric: Contains curcumin, known for antioxidant and anti-inflammatory properties, potentially benefiting conditions like arthritis and other inflammatory disorders. It's also considered a herb that cleanses the whole body and supports digestion. Ginger: Has anti-inflammatory and antioxidant properties, and can aid digestion. It may also help relieve pain, decrease nausea, and enhance immune function.

II. I LANT I KOTILE						
Parameter	Information	Information	Information			
Plant Name	Turmeric	Clove	Ginger			
Synonyms	Curcuma	Lavang	Zingiber			

II. PLANT PROFILE

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Image			
Origin	Native to South Asia, Widely used in indian and southeast Asian cuisines. Native to India; used in Ayurveda and traditional medicine	It is originally from the Maluku Island	Originated in southeast asia, used for culinary purpose.
Biological Source	Phizomos of auranna longa	Dried flower buds Syzygium	Rhizomes of Zingiber
Family	Zingiberaceae	Myrtaceae	Zingiberaceae
Chemical Constituents	Curcumin, volatile oils, starch, Proteins	Eugenol, tannis, flavonoids.	Shogaols, volatile oils
Uses	anti-inflammatory, anti-oxidant	antiseptic, analgesic, anti- microbial	anti-inflammatory, cough soothing
Kingdom	Plantae	Plantae	Plantae
Phylum	Magnoliophyta	Magnoliophyta	Magnoliophyta
Genus	Curcuma	Syzygium	Zingiber
Class	Liliopsida	Magnoliopsida	Liliopsida

III. MATERIAL AND METHODS

Selection of Plant Material-

In the present study, I have selected the Turmeric, Clove and Ginger

Collection of plant Material-

The plant material i.e. Dried Turmeric Clove and Ginger were collected from the Pune district, Maharashtra, during January in the year 2025.

Formulation of Herbal Syrup

Quantity	Purpose	
5 ml	Anti-inflammatory	
	Anti-oxidant	
5 ml	Animicrobial, Analgesic.	
5 ml	Anti-inflammatory, cough soothing	
0.15 g	Preservative	
66.7 gm	pH stabilizer	
Up to 100 ml	Vehical	
	Quantity 5 ml 5 ml 5 ml 0.15 g 66.7 gm Up to 100 ml	



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Parameter	Batch 1	Batch 2	Batch 3
Ratio	95 % Sugar, 5% Herbal Extract	90% Sugar, 10% Herbal Extract	85% Sugar, 15% Herbal Extract
Colour	Light Orange	Light Orange	Dark Orange
Odour	Sweet	Sweet	Herbal smell, sweet
Viscosity	350 cP	410 cP	480 cP
Consistency	Thick and free flowing	Moderately thick and smooth	Slightiy viscous,less free
			flowing

Procedure-

Preparation of Herbal Extracts – Dried Turmeric, clove and ginger were cleaned and chopped, then boiled in water to extract active constituents using decoction.

Preparation of Sugar Base - Sugar was dissolved in water based on the desired ratio and heated to form a consistent syrup.

Addition of Herbal Extracts and Flvouring Agents- Filtered herbal extracts and natural flavoring agents were added to the sugar base while stirring continuously.

↓

Final Healing and Mixing- The mixture was gently heated with continuous stirring to ensure uniform blending and microbial safety.

Filling and Cooling- The hot syrup was poured into sterilized amber glass bottles and allowed to cool at room temperature.

↓

Sealing and Labeling-After cooling, the bottles were sealed tightly and labelled for evaluation and storage.



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Evaluation:

Organoleptic Evaluation:

- Colour- Yellow, Orange
- Taste Spicy-sweet, Sweetness
- Odor Aromatic
- Phytochemical Evaluation:

Take the extract and carry out various phytochemical evaluation tests, such as alkaloid test, saponin test, flavonoid test, tannin test and others.





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Physicochemical Evaluation:

pH Determination:

The pH determination of syrup by using Auto pH Meter:

Procedure-

Buffer Preparation: Prepare 30mL of buffer solution for each desired pH by mixing the appropriate volume of stock solutions.

Equilibration: Allow the prepared buffer solutions to stand for 15 minutes to reach equilibrium.

pH Measurement: Measure the pH of each solution using an auto pH meter according to standard operating procedures.



Viscosity:

Measuring viscosity of syrup using a Brookfield viscometer:

Procedure-

Sample Preparation: Pour the sample into the viscometer's sample container, ensuring there are no air bubbles and the volumeissufficienttocoverthespindle immersion depth.

Instrument Setup: Select the appropriate spindle an datta chitto the viscometer.Set the desired speed (RPM) according to the sample type and expected viscosity range.

Temperature Stabilization: Ensure the sample is at the desired and consistent temperature before starting the measurement.

Measurement: Lower the spindle into the sample and start the viscometer. Allow the spindle to rotate until a stable reading is displayed.

Recording Results: Record the viscosity value shown on the digital display in centipoise (cP).

Cleaning: After measurement, carefully clean the spindle and sample container to avoid contamination between samples.



Microbial Stability

Take a syrup sample and inoculate it directly with the test microorganism. Incubate the inoculated sample at 37.5°Cfor48 hours.

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After incubation, observe the sample for any signs of microbial activity. No flocculation was observed in BatchF3, indicating that the syrup remains microbiologically stable



IV. RESULTS

A herbal syrup was prepared using turmeric, clove, and ginger extracts for their natural ability to fight inflammation, germs, and ease cough and cold symptoms. The syrup was made using a traditional decoction method and blended with ingredients like sugar to improve taste and shelf life.

Appearance: Clear, brownish-orange syrup with a Aromatic odour and uniform consistency

pH: Found to be within the acceptable range of 5.0-6.0 suitable for oral administration.

Viscosity: Measured using a Brookfield viscometer, indicating appropriate flow properties for a syrup formulation.

Specific Gravity: Within the range of 1.25-1.35 confirming consistency across batches.

Total Solid Content: Complied with standard values, ensuring proper concentration of actives.

Stability Study: The formulation remained stable when stored at room temperature $(25^{\circ}C \pm 2^{\circ}C)$ and refrigerated conditions(4°C) for 30 days with no significant changes in physical appearance, pH,drug content.

Taste and Palatability: Pleasant and sweet, Found to be acceptable based on sensory evaluation by volunteers.

V. CONCLUSION

The present study successfully formulated and evaluated an herbal syrup containing Turmeric (curcuma), Clove and Ginger for Anti-inflammatory activity. The syrup was found to be pharmaceutically acceptable in terms of appearance, pH, viscosity, specific gravity, and drug content uniformity. Sensory evaluation confirmed good palatability, and preliminary stability studies indicated that the formulation remained stable under accelerated conditions. These findings suggest that the herbal syrup could offer a safe and effective alternative to synthetic formulation However, further pharmacological and clinical studies are recommended to establish its efficacy and safety on a larger scale.

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