

Formulation And Standardization of an Ajwain Herbal Syrup

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ABSTRACT

The present study aimed to formulate and standardize a herbal syrup containing *Trachyspermum ammi* (Ajwain) leaf extract. Fresh Ajwain leaves were collected, shade dried, powdered, and extracted using decoction and maceration methods. The extract was incorporated into a syrup base containing sucrose, Ashwagandha, Amla, Aloe vera, sodium benzoate, and distilled water. Ajwain is a medicinal plant rich in thymol, flavonoids, tannins, phenolic compounds, and essential oils, which are known for their antimicrobial, antioxidant, anti-inflammatory, carminative, and digestive properties. The prepared syrup was evaluated for organoleptic properties, pH, viscosity, phytochemical constituents, homogeneity, and stability under suitable storage conditions.

The formulation showed acceptable colour, odour, taste, viscosity, and pH with good stability during storage. Phytochemical screening confirmed the presence of alkaloids, flavonoids, tannins, phenolic compounds, glycosides, saponins, and essential oils, indicating its therapeutic potential. The developed herbal syrup demonstrated promising potential in the management of indigestion, flatulence, abdominal discomfort, cough, and mild respiratory ailments. The study concludes that Ajwain herbal syrup is a stable, safe, and economical herbal formulation with good patient acceptability. Further pharmacological and clinical studies are recommended to establish its therapeutic efficacy and commercial applicability.

Keywords: Ajwain, *Trachyspermum ammi*, Herbal Syrup, Herbal Formulation, Phytochemical Screening, Standardization, Thymol.

I. INTRODUCTION

Herbal medicines have been used for centuries for the prevention and treatment of various diseases due to their therapeutic efficacy, safety, affordability, and minimal side effects compared to synthetic drugs. In recent years, there has been a growing interest in herbal formulations because of increasing awareness regarding natural products and their medicinal benefits. Among the various herbal

dosage forms, syrups are widely preferred because they are easy to administer, have a pleasant taste, provide better patient compliance, and are suitable for paediatric as well as geriatric patients. Herbal syrups also improve the stability and palatability of plant extracts while ensuring effective delivery of bioactive constituents.



Figure:1.1. *Trachyspermum ammi* (Ajwain)

Trachyspermum ammi (Ajwain), belonging to the family Apiaceae, is an aromatic medicinal plant extensively used in traditional systems of medicine such as Ayurveda and Siddha. Although its seeds are more commonly used, the leaves are also rich in important phytoconstituents including thymol, flavonoids, tannins, phenolic compounds, terpenoids, glycosides, saponins, and essential oils. These bioactive compounds possess antimicrobial, antioxidant, anti-inflammatory, carminative, antispasmodic, bronchodilatory, and digestive properties. Traditionally, Ajwain has been used to treat indigestion, flatulence, abdominal pain, cough, cold, asthma, bronchitis, and various gastrointestinal disorders. The presence of thymol, the major active constituent, contributes significantly to its pharmacological and therapeutic activities.

The present study was undertaken to formulate and standardize an herbal syrup containing Ajwain leaf extract using decoction and maceration methods. The formulation was prepared using suitable herbal ingredients and pharmaceutical excipients to obtain a stable, palatable, and effective

oral dosage form. The prepared syrup was evaluated for various physicochemical parameters such as colour, odour, taste, pH, viscosity, homogeneity, and phytochemical constituents to ensure its quality and stability. The developed herbal syrup may serve as a safe, effective, and economical alternative for the management of digestive and mild respiratory disorders, while promoting the use of medicinal plants in modern pharmaceutical formulations.

II. REVIEW OF LITERATURE

- **Sharma et al. (2014)** conducted a phytochemical investigation of *Trachyspermum ammi* leaves and reported that thymol is the major bioactive constituent responsible for its antimicrobial and antioxidant activities. The study supported the traditional use of Ajwain in the treatment of digestive disorders and respiratory infections.
- **Patel and Patel (2015)** evaluated the bioactive compounds present in Ajwain leaves using different extraction methods. They reported that flavonoids and phenolic compounds possess significant antioxidant and anti-inflammatory properties, suggesting that Ajwain can be effectively utilized in herbal pharmaceutical formulations.
- **Kumar et al. (2015)** investigated the antimicrobial activity of Ajwain leaf extract against pathogenic microorganisms including *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. The extract showed significant antibacterial activity due to the presence of thymol and other volatile constituents.
- **Singh et al. (2016)** formulated and evaluated a herbal cough syrup containing medicinal plant extracts. The prepared formulation exhibited satisfactory physicochemical properties, acceptable pH, viscosity, stability, and improved patient compliance, demonstrating the suitability of herbal syrups as oral dosage forms.
- **Gupta and Verma (2016)** studied the antioxidant potential of Ajwain leaves using various in-vitro antioxidant assays. They concluded that the presence of phenolic compounds and flavonoids provides

excellent free radical scavenging activity, protecting cells against oxidative stress.

- **Reddy et al. (2017)** developed herbal syrup formulations using medicinal plant extracts and optimized the composition by varying sugar concentration and preservative levels. The prepared syrups showed good physical stability, acceptable viscosity, and satisfactory storage characteristics.
- **Choudhary et al. (2021)** emphasized the importance of quality control parameters such as pH, viscosity, density, microbial contamination, and organoleptic evaluation in herbal syrup formulations. The authors concluded that proper standardization ensures the safety, stability, and therapeutic efficacy of herbal products.
- **Patil and Kulkarni (2023)** formulated and evaluated herbal syrups containing medicinal plant extracts. Their study demonstrated that the formulations possessed good appearance, taste, pH, viscosity, microbial stability, and patient acceptability, confirming that herbal syrups are promising dosage forms for delivering plant-based therapeutics.

III. MATERIALS AND METHODS

Fresh and healthy Ajwain (*Trachyspermum ammi*) leaves were collected, thoroughly washed to remove impurities, shade dried for 30 days, and powdered into a coarse powder. The powdered material was extracted using both decoction and maceration methods to obtain the aqueous extract. The decoction was prepared under controlled conditions using distilled water to ensure stability and prevent microbial contamination.

The herbal syrup was formulated by incorporating Ajwain leaf extract with sucrose syrup, Ashwagandha extract, Amla extract, Aloe vera extract, sodium benzoate as a preservative, and distilled water to make the final volume. The prepared formulation was evaluated for organoleptic characteristics such as colour, odour, taste, and appearance, along with physicochemical parameters including pH, viscosity, homogeneity, phytochemical screening, and UV spectrophotometric analysis using standard pharmaceutical evaluation methods to ensure the quality, stability, and suitability of the herbal syrup.

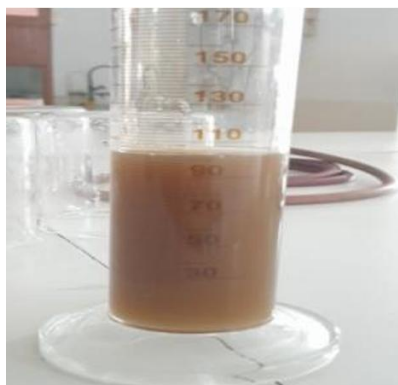


Figure:1.2. Final volume make up



Figure:1.3. Final Ajwain Syrup

IV. RESULTS AND DISCUSSION

The prepared Ajwain herbal syrup exhibited satisfactory physicochemical and organoleptic characteristics. The syrup was dark green in colour with a characteristic aromatic odour and pleasant taste, making it suitable for oral administration. The formulation showed good homogeneity without precipitation or phase separation. Phytochemical screening confirmed the presence of alkaloids, flavonoids, tannins, phenolic compounds, glycosides, saponins, and essential oils, while UV spectrophotometric analysis further verified the presence of bioactive constituents. The pH and viscosity of the syrup were found to be within acceptable pharmaceutical limits, indicating good quality and stability.

The formulation remained stable during storage without any significant changes in colour, odour, taste, pH, or viscosity, and no microbial growth was observed. The incorporation of Ajwain leaf extract along with Ashwagandha, Amla, and Aloe vera enhanced the therapeutic potential of the syrup. Overall, the results indicate that the developed herbal syrup is a stable, safe, and promising herbal formulation for the management of digestive disorders and mild respiratory ailments.

Identification Tests

1.Test for Alkaloids

Process: Add a few drops of Mayer's reagent to 2 mL of extract.

Observation: Slightly white precipitate is obtained, indicating the presence of alkaloids.

2.Test for Flavonoids

Process: Add 1 mL of ammonia solution to 2 mL of extract.

Observation: Yellow coloration is obtained, confirming the presence of flavonoids.

3.Test for Tannins

Process: Add a few drops of lead acetate solution to 2 mL of extract.

Observation: Bulky white precipitate is obtained, indicating the presence of tannins.

4.Test for Phenolic Compounds

Process: Add 2–3 drops of 5% ferric chloride solution to 2 mL of extract.

Observation: Dark green colour is obtained, confirming the presence of phenolic compounds.

5.Test for Thymol

Process: Add 2–3 drops of ferric chloride solution to 2 mL of extract.

Observation: Bluish-green colour is obtained, indicating the presence of thymol.

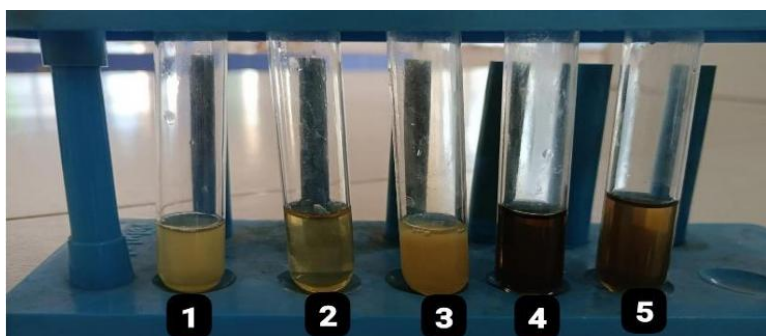


Figure:1.4. Identification Tests

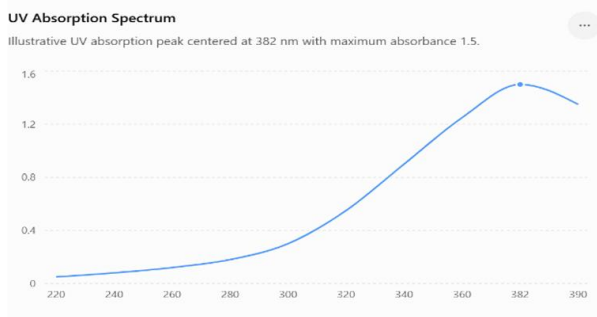


Figure:1.5. Blank sample peak graph

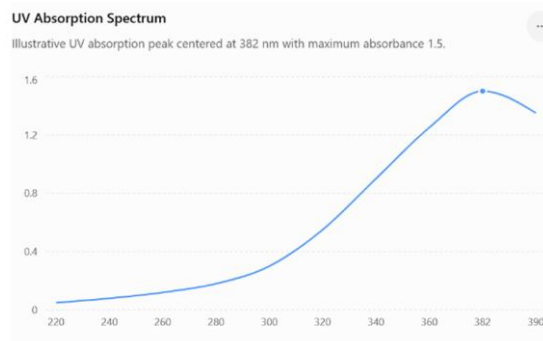


Figure:1.6. Syrup sample peak graph

V. CONCLUSION

The present study successfully formulated and standardized an herbal syrup using aqueous extract of *Trachyspermum ammi* (Ajwain) leaves. The developed formulation exhibited satisfactory organoleptic properties, acceptable physicochemical parameters, and good stability throughout the evaluation period. Phytochemical screening confirmed the presence of important bioactive constituents such as alkaloids, flavonoids, tannins, phenolic compounds, glycosides, saponins, and essential oils, which contribute to the antimicrobial, antioxidant, anti-inflammatory, and digestive properties of the formulation. The syrup also showed good homogeneity, suitable pH, viscosity, and stability, indicating its suitability as an oral herbal dosage form.

The formulated Ajwain herbal syrup may serve as a safe, effective, economical, and patient-friendly alternative for the management of digestive disorders, flatulence, abdominal discomfort, cough, and mild respiratory ailments. The incorporation of herbal ingredients such as Ashwagandha, Amla, and Aloe vera further enhances its therapeutic value. Overall, the study demonstrates the potential of Ajwain as an important medicinal plant for herbal pharmaceutical formulations. However, further pharmacological evaluation, toxicity studies, and clinical trials are recommended to confirm its efficacy, safety, and suitability for large-scale therapeutic use.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this research work.

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