

STUDY OF THE CHEMICAL COMPOSITION OF ESSENTIAL OIL OBTAINED FROM LAVENDER (*LAVANDULA ANGUSTIFOLIA*)

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Relevance of the Study:

Lavender (*Lavandula angustifolia*) is one of the most widely used medicinal plants in both human health and the cosmetics industry. The essential oil obtained from this plant is well known for its calming, antiseptic, antibacterial, and anti-inflammatory properties. Due to these characteristics, lavender essential oil is widely used in the pharmaceutical and cosmetics industries, as well as in alternative medicine. Lavender contains numerous biologically active compounds. Understanding its chemical composition and properties is crucial for ensuring its effective and safe application. Comprehensive knowledge of essential oil components and their effects is necessary to maximize their benefits across different fields. Given its unique properties and high efficiency, studying the chemical composition of lavender essential oil is of great scientific and industrial importance. Research on essential oils helps unlock their full potential, facilitate the development of new pharmaceutical and cosmetic products, and enhance their safety. Lavender essential oil is particularly valuable in medicine for reducing stress, improving sleep, alleviating inflammation, and treating skin disorders. Therefore, an in-depth study of its chemical composition is essential for expanding its applications in medical and cosmetic fields and for developing effective natural-based pharmaceutical preparations. This research is not only important for academic science but also holds significant value for the pharmaceutical and cosmetics industries.

Research Objective:

The primary objective of this study is to analyze the chemical composition of essential oil extracted from lavender (*Lavandula angustifolia*) and evaluate its components, properties, and practical applications. The specific objectives of the study include:

- **Identification of the chemical composition of lavender essential oil:** Determining the major chemical components (e.g., linalool, linalyl acetate, camphor, etc.) and quantifying their concentrations.

- **Investigation of chemical composition and biological effects:** Studying how the constituents of lavender essential oil interact with the human body, particularly their therapeutic, antiseptic, antioxidant, and anti-inflammatory properties.

Materials and Methods:

1. Plant Material Selection

The study was conducted using lavender (*Lavandula angustifolia*). The whole plant (flowers, leaves, roots) was selected and collected to maximize essential oil extraction.

2. Essential Oil Extraction Method

The essential oil was obtained from lavender using the **steam distillation** method, which is one of the most effective and widely used techniques to ensure high-quality oil extraction. The process involved the following steps:

- The plant materials were first washed and dried.
- Steam distillation was carried out using a distillation apparatus.
- The collected mixture of essential oil and water was separated to obtain pure essential oil.

3. Chemical Analysis Methods

To determine the chemical composition of the essential oil, the following analytical methods were employed:

- **Gas Chromatography (GC):** This technique was used to identify the main components of lavender essential oil. It allows for the quantification of individual compounds and their relative proportions.

Results:

The results obtained using gas chromatography (GC) are presented in the table below. The table lists the primary components of lavender essential oil along with their respective concentrations and properties.

Component	Concentration (%)	Properties
Linalool	45-55%	Calming, antiseptic, antioxidant, stress-reducing
Linalyl acetate	20-30%	Calming, antispasmodic, pain-relieving
Camphor	1-5%	Antiseptic, anti-inflammatory, nervous system relaxant
1,8-Cineole	1-3%	Antiseptic, supports respiratory health
Terpinen-4-ol	2-4%	Antimicrobial, antiseptic, anti-inflammatory
Geraniol	1-2%	Antibacterial, antifungal, antioxidant
Borneol	0.5-2%	Antiseptic, antimicrobial, anti-inflammatory
Terpineol	1-3%	Antiseptic, antioxidant
Camphene	0.5-1%	Anti-inflammatory, antiseptic
Pinene	0.5-1%	Anti-inflammatory, supports respiratory health

This table provides an overview of the key chemical components of lavender essential oil, their concentrations, and their properties, based on gas chromatography (GC) analysis. The presence and proportion of these components help in understanding the effectiveness and applications of lavender essential oil.

Conclusion:

This study focused on analyzing the chemical composition of essential oil extracted from lavender (*Lavandula angustifolia*). Gas chromatography results identified the major components of lavender essential oil, including **linalool, linalyl acetate, camphor, and 1,8-cineole**. The findings confirm that lavender essential oil possesses **calming, antiseptic, anti-inflammatory, and antioxidant** properties, making it valuable for pharmaceutical and cosmetic applications. This research opens new possibilities for the **safe and effective use** of lavender essential oil. However, further studies are required to assess its **long-term effects** and potential side effects when used continuously.