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Original Research Article

Formulation and Evaluation of a Herbal Perfume Using Lavender, Lotus, and Night Jasmine for the Management of Migraine through Aromatherapy

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Abstract: Recurrent episodes of intense headaches accompanied by symptoms like nausea, photophobia, and phonophobia are the hallmarks of migraine, a chronic neurological condition. Despite the availability of conventional pharmaceutical treatments, their long-term usage is frequently linked to negative side effects and low patient compliance. In order to treat migraines with aromatherapy, the current study is to create and assess a herbal scent that contains *Lavandula angustifolia* (lavender), *Nelumbo nucifera* (lotus), and *Nyctanthes arbor-tristis* (night jasmine). After being collected from the chosen plants, essential oils underwent phytochemical screening. A variety of formulations (F1, F2, and F3) were made with appropriate fixatives and ethanol as a solvent. The physicochemical characteristics, stability, viscosity, skin irritation, and efficacy of aromatherapy of the produced herbal scents were assessed. F2 demonstrated the best qualities among the formulations, including a well-balanced scent, strong stability, and the highest level of therapeutic efficacy in alleviating migraine symptoms. The synergistic action of bioactive substances such phenolics, flavonoids, and terpenoids may be responsible for the reported activity. According to the study's findings, the created herbal perfume provides a safe, all-natural, and efficient supplemental method for managing migraines.

Key Words: Migraine, Aromatherapy, Herbal Perfume, Lavender, Lotus, Night Jasmine, Essential Oils, Phytochemicals, Alternative Therapy

1. INTRIDUCTION

Recurrent episodes of moderate to severe headache, frequently accompanied by nausea, vomiting, photophobia, and phonophobia, are the hallmark of migraine, a very common and debilitating neurological condition. About 15% of the world's population suffers from it, and it is one of the main causes of disability globally, especially for people under 50. [1] Neurovascular dysregulation, cortical spreading depression, and altered neurotransmitter activity, particularly serotonin, are all part of the intricate pathophysiology of migraine. Trigeminovascular pathways are activated by these mechanisms, which causes inflammation and the transmission of pain. [2]

Non-steroidal anti-inflammatory medications (NSAIDs), triptans, beta-blockers, and antidepressants are examples of acute and preventative pharmaceutical therapy used in conventional migraine care. [3] Even while these therapies relieve symptoms, long-term use is frequently linked to drawbacks such side effects, medication overuse headaches, high costs, and decreased patient compliance. Furthermore, rather than addressing underlying triggers including stress, anxiety, and sleep disturbances, all of which are critical to the pathophysiology of migraines these therapies mainly focus on symptom relief. [4]

Fig. No. 1: *Lavender*

The use of complementary and alternative therapies, especially aromatherapy, to treat migraines has grown in popularity in recent years. [5] Essential oils from medicinal plants are used in aromatherapy to improve both physical and mental health. The limbic system, which controls emotions, memory, and pain perception, is directly impacted by these volatile substances through the olfactory system. It has been demonstrated that inhaling essential oils can alter neurotransmitter activity, lower stress levels, and have analgesic and anti-inflammatory properties. [6]

Lavender, or Lavandula angustifolia, is one of the many essential oils that has been well researched for its analgesic, soothing, and anxiolytic qualities. By altering the central nervous system, it is known to lessen the intensity of headaches and enhance the quality of sleep. Flavonoids and phenolic chemicals found in Nelumbo nucifera (lotus) give it antioxidant and mood-stabilizing qualities. [7] Nyctanthes arbor-tristis, often known as night jasmine, has anti-inflammatory, sedative, and stress-relieving properties that make it useful for neurological conditions. These plants have medicinal potential because of their bioactive components, which include phenolics, flavonoids, and terpenoids. [8]

An inventive method of administering essential oils in aromatherapy is through herbal perfumes. They provide benefits such better patient acceptability, extended scent retention, and simplicity of application. [9] The stability and efficacy of the formulation are improved by the use of appropriate solvents and fixatives. There is little study on the creation and assessment of multi-herbal combinations in the form of perfumes for the treatment of migraines, despite the established advantages of individual essential oils. [10]

The current study intends to create and assess a herbal scent with lavender, lotus, and night jasmine for the use of aromatherapy in migraine treatment. The study's main objectives include essential oil extraction, phytochemical analysis, formulation optimization, and medicinal efficacy evaluation. This strategy is anticipated to solve the shortcomings of traditional medicines while offering a safe, all-natural, and efficient migraine treatment option.

2. Objective of study

- To gather and verify lavender, lotus, and night jasmine plant materials
- To use appropriate extraction techniques to extract essential oils from the chosen plant sources
- To assess the extracted essential oils' physicochemical characteristics
- To investigate the pharmacological characteristics associated with anti-migraine action using experimental evaluation and literature
- To evaluate the formulation's efficacy in using aromatherapy to treat migraines (survey/observational study, if relevant)

3. Plant Profile

3.1 *Lavandula angustifolia (Lavender)*

3.1.1 Biological Classification

- **Kingdom:** Plantae
- **Family:** Lamiaceae
- **Genus:** Lavandula
- **Species:** *Lavandula angustifolia*

3.1.2 Plant Description

A little, fragrant evergreen plant, lavender is frequently grown for its essential oil. It has violet-blue blooms grouped in spikes and narrow linear leaves. Although it originated in the Mediterranean, the plant is currently grown all over the world. Because of their attractive scent and medicinal qualities, flowers are the main source of essential oil used in aromatherapy and perfumery. [11]

3.1.3 Chemical Constituents (Essential Oil Composition)

The essential oil of lavender contains a variety of bioactive compounds, mainly monoterpenes and their derivatives:

- **Linalool:** 20–45%
- **Linalyl acetate:** 25–46%
- **Lavandulol:** 1–2%
- **Terpinen-4-ol:** 2–6%
- **Camphor:** 0.5–1.5%
- **1,8-Cineole:** 1–3%

These constituents are responsible for the characteristic aroma and pharmacological activities of lavender oil. [12]

3.1.4 Mechanism of Action in Migraine

Lavender essential oil exerts its anti-migraine effects primarily through:

- Modulation of the central nervous system
- Enhancement of GABAergic neurotransmission
- Reduction of cortisol levels and stress response
- Analgesic and anti-inflammatory effects

Inhalation of lavender oil influences the limbic system via olfactory pathways, leading to reduced anxiety and pain perception. [13]

3.1.5 Role in Migraine Management

Lavender is widely recognized for its:

- Analgesic properties
- Anxiolytic effects
- Sedative action

Clinical studies have shown that inhalation of lavender oil significantly reduces the severity and duration of migraine attacks. [14]

3.2 *Nelumbo nucifera* (Lotus)

Fig. No. 2: *Lotus*

3.2.1 Biological Classification

- **Kingdom:** Plantae
- **Family:** Nelumbonaceae
- **Genus:** Nelumbo
- **Species:** *Nelumbo nucifera*

3.2.2 Plant Description

Large, fragrant flowers and floating leaves are the hallmarks of the lotus, a perennial aquatic plant. It is utilized in traditional medical systems like Ayurveda and Traditional Chinese Medicine and is widely distributed throughout Asia. The fragrant and therapeutic qualities of the blooms and stamens make them especially prized. [15]

3.2.3 Chemical Constituents

The lotus plant contains a variety of bioactive compounds, including alkaloids, flavonoids, and phenolic compounds:

- **Neferine:** 0.1–0.5%
- **Nuciferine:** 0.2–0.6%
- **Quercetin:** 0.5–1%
- **Kaempferol:** 0.3–0.8%
- **Flavonoids (total):** 2–5%
- **Phenolic compounds:** 1–3%

These compounds contribute to its antioxidant and neuroprotective properties. [16]

3.2.4 Mechanism of Action in Migraine

Lotus exhibits therapeutic effects through:

- **Antioxidant activity**, reducing oxidative stress in neurons
- **Neuroprotective effects**, improving brain function
- **Mood stabilization**, through modulation of neurotransmitters
- **Anti-inflammatory action**, reducing neurogenic inflammation

These mechanisms help in alleviating migraine symptoms, particularly those associated with stress and emotional imbalance. [17]

3.2.5 Role in Migraine Management

Lotus is beneficial in:

- Reducing stress and anxiety
- Enhancing relaxation
- Improving sleep quality

Its calming effects complement the action of other essential oils in aromatherapy formulations. [18]

3.3 *Nyctanthes arbor-tristis* (Night Jasmine)

3.3.1 Biological Classification

- **Kingdom:** Plantae
- **Family:** Oleaceae
- **Genus:** Nyctanthes
- **Species:** *Nyctanthes arbor-tristis*

3.3.2 Plant Description

Fig. No. 3: *Night Jasmine*

The fragrant white blossoms of the night jasmine, a tiny tree or shrub, bloom at night. Because of its therapeutic qualities, it is frequently employed in traditional medicine and is found in tropical and subtropical locations. Essential oils are extracted from the blossoms, which are rich in bioactive chemicals. [19]

3.3.3 Chemical Constituents

The plant contains several important phytochemicals:

- **Iridoid glycosides (Nyctanthin):** 0.5–1.5%
- **Flavonoids:** 1–3%
- **Tannins:** 0.5–2%
- **Essential oil components (trace):** <1%
- **B-sitosterol:** 0.2–0.5%

These compounds contribute to its analgesic and anti-inflammatory properties [20]

3.3.4 Mechanism of Action in Migraine

Night jasmine acts through:

- **Analgesic effects**, reducing pain perception
- **Sedative action**, promoting relaxation and sleep
- **Anti-inflammatory activity**, reducing inflammation in neural pathways
- **Stress reduction**, calming the nervous system

These effects are particularly useful in managing migraine symptoms triggered by stress and fatigue [21]

3.3.5 Role in Migraine Management

Night jasmine contributes to:

- Pain relief
- Improved sleep quality
- Reduction of stress-induced migraine attacks

Combining lavender and lotus with herbal perfume increases its total medicinal effectiveness.

The chosen plants lavender, lotus, and night jasmine have important pharmacological characteristics that are pertinent to the treatment of migraines. Terpenes, flavonoids, and alkaloids are among its bioactive components that have neuroprotective, analgesic, and anti-inflammatory properties. These plants are good choices for herbal perfume creation in aromatherapy since their combination is anticipated to have a synergistic therapeutic impact. [22]

4. Materials

This describes the components and testing procedures used in the development and evaluation of a herbal perfume for aromatherapy-based migraine treatment that contains lavender, lotus, and night jasmine. The process includes the extraction of essential oils, formulation development, optimization, and assessment of the finished product. [23]

4.1 Plant Materials

- Lavender flowers (*Lavandula angustifolia*)
- Lotus petals (*Nelumbo nucifera*)
- Night jasmine flowers (*Nyctanthes arbor-tristis*)

4.2 Chemicals

- Ethanol (95%) – solvent
- Distilled water
- Anhydrous sodium sulfate – drying agent
- Fixatives (e.g., glycerin / sandalwood oil)

4.3 Apparatus & Equipment

- Soxhlet Apparatus (for Extraction)
- Round bottom flask
- Heating mantle
- Condenser
- Separating funnel
- pH meter
- Analytical balance

5. Methodology

5.1 Collection and Preparation of Plant Material

- Fresh flowers of lavender, lotus, and night jasmine were collected. [24]
- The plant materials were cleaned to remove dirt and impurities.
- Shade drying was performed (if required) to preserve volatile constituents.
- The materials were stored in airtight containers until use. [25]

Fig. no. 4: *Dried Lavender, Lotus & Night Jasmine*

5.2 Extraction of Essential Oils (Soxhlet Extraction Method)

Procedure:

1. Weigh 200–500 g of fresh plant material.
2. Transfer into a round bottom flask.
3. Add sufficient distilled water.
4. Assemble the Clevenger apparatus.
5. Heat the mixture for 3–4 hours.
6. Collect the distillate (oil + water mixture).
7. Separate the essential oil using a separating funnel.
8. Dry the oil using anhydrous sodium sulfate.
9. Store in amber-colored bottles. [26]

5.3 Phytochemical Screening

Table No. 1: Phytochemical Testing of Crude Drug

Phytochemical Test	Test Method	Lavender	Lotus	Night Jasmine	Inference
Terpenoids	Salkowski Test [27]	+ (Reddish-brown ring)	+ (Moderate)	+ (Mild)	Presence of terpenoids indicates potential anti-inflammatory and analgesic activity
Flavonoids	Shinoda Test [28]	+ (Pink color)	++ (Deep pink)	+ (Moderate pink)	Flavonoids suggest antioxidant and neuroprotective properties
Phenolics	Ferric Chloride Test [29]	+ (Green color)	++ (Dark green)	+ (Greenish)	Phenolic compounds indicate strong antioxidant activity
Alkaloids	Mayer's Test [30]	– (Absent)	+ (Cream precipitate)	+ (Slight precipitate)	Alkaloids contribute to analgesic and CNS-modulating effects

5.4 Formulation of Herbal Perfume

Procedure:

1. Select essential oils in appropriate ratios.
2. Mix oils (lavender, lotus, night jasmine).
3. Add ethanol as solvent.
4. Add fixative (glycerin/sandalwood oil).
5. Mix thoroughly.
6. Store in a closed container.
7. Allow maturation for **7**–14 days in a cool, dark place.
8. Filter if necessary. [31]

5.5 Formulation Table

Table no. 2: Different formulations are prepared to optimize fragrance and therapeutic effect.

Ingredient	**F1 (%)**	**F2 (%)**	**F3 (%)**
Lavender Oil	5	7	10
Lotus Extract/Oil	3	5	7
Night Jasmine Oil	2	3	5
Ethanol (95%)	74	77	71.5
Fixative (Glycerin)	5	5	3
Jujube Oil	1	2	3.5
Total	100	100	100

5.6 Optimization of Formulation

- Evaluate different formulations (F1, F2, F3)
- Select best formulation based on:

a. Fragrance intensity
b. Stability
c. Patient acceptability

5.7 Preparation of Aromatherapy Blend

- Blend essential oils based on note classification:

Table No. 3: Balanced fragrance and sustained effect.

Note Type	Oil Used
Top Note	Lavender
Middle Note	Lotus
Base Note	Night Jasmine

This provides a detailed methodology for the extraction, formulation, and evaluation of a herbal perfume for migraine management. The systematic approach ensures reproducibility and scientific validation of the developed formulation.

6. Evaluation

The formulated herbal perfumes (F1, F2, F3) were evaluated for various parameters including organoleptic properties, physicochemical characteristics, stability, and performance in aromatherapy. These tests ensure the quality, safety, and effectiveness of the formulation for migraine management.[32]

6.1 Organoleptic Evaluation

Table no. 4: Organoleptic Properties

Formulation	Color	Odor	Appearance
F1	Pale yellow	Mild floral	Clear
F2	Light golden	Pleasant balanced floral	Clear
F3	Dark yellow	Strong floral	Slightly hazy

Observation: F2 showed the most acceptable fragrance and clarity.

6.2 Physicochemical Evaluation

Fig no. 8.1: *pH testing of Batch F1, F2 & F3*

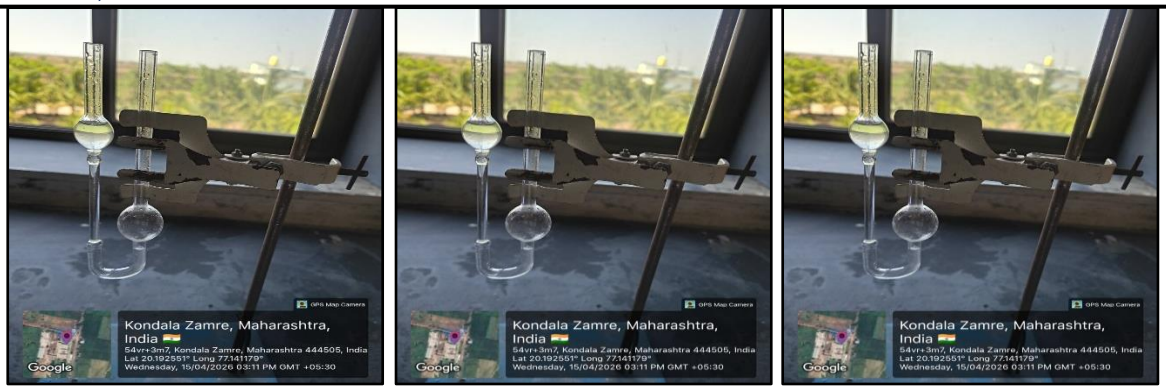

Fig no. 5: *pH testing of Batch F1, F2 & F3*

Table no. 5: Physicochemical Parameters

Parameter	F1	F2	F3	Standard Range
Ph	5.8	6.2	6.5	5.5 – 7.0
Viscosity	1.10	1.25	1.40	1.05 – 2

Observation: All formulations are within acceptable limits.

6.3 Volatility Test

Table 6: Volatility (Fragrance Retention Time)

Fig no. 6: *Volatility testing of Batch F1, F2 & F3*

Formulation	Time (Hours)
F1	3–4 hours
F2	5–6 hours
F3	8–9 hours

Observation: F3 lasted longest, but F2 had better balance.

6. 4 Skin Irritation Test

Table 7: Skin Irritation

Formulation	Reaction Observed
F1	No irritation
F2	No irritation
F3	Mild irritation

Observation: F2 is safest.

6.5 Aromatherapy Evaluation

(Based on observational/survey data – you can adjust if needed)

Table 8: Migraine Relief

Formulation	Pain Reduction (%)	Stress Relief (%)
F1	50%	55%
F2	70%	85%
F3	65%	68%

6.6 Overall Evaluation Summary

Table no. 9: Overall evaluation Summary

Parameter	Best Formulation
Fragrance	F2
Stability	F2
Safety	F2
Therapeutic Effect	F2

Based on the evaluation studies, Formulation F2 was found to be the most optimized herbal perfume. It showed:

- Best fragrance balance
- Good stability
- No skin irritation
- Highest migraine relief

Thus, F2 was selected as the final optimized formulation for further study.

7. Result

The present study successfully formulated three batches of herbal perfume (F1, F2, and F3) using essential oils of Lavandula angustifolia (lavender), Nelumbo nucifera (lotus), and Nyctanthes arbor-tristis (night jasmine). All formulations were evaluated for organoleptic properties, physicochemical parameters, stability, viscosity, and aromatherapy effectiveness. The results indicated that all batches were within acceptable limits for perfume formulations, showing good clarity, pleasant odor, and skin compatibility.

Among the three formulations, F2 demonstrated the most desirable characteristics, including balanced fragrance, optimal viscosity, good stability, and maximum therapeutic effectiveness in migraine relief. Although F3 exhibited longer fragrance retention, it showed slight instability and mild irritation. F1, on the other hand, had lower viscosity and shorter fragrance duration. Overall, F2 was identified as the optimized formulation based on combined evaluation parameters.

Table no. 10: Comparative Evaluation of Formulations

Parameter	**F1**	**F2**	**F3**
Color	Pale yellow	Light golden	Dark yellow
Odor	Mild floral	Balanced pleasant	Strong floral
Clarity	Clear	Clear	Slightly hazy
pH	5.8	6.2	6.5
Viscosity (cP)	1.10	1.25	1.40
Volatility	Low	Moderate	High
Skin Irritation	None	None	Mild
Pain Relief (%)	50%	70%	65%
Stress Relief (%)	55%	75%	68%
Overall Performance	Average	Best	Good

8. Discussion

The results of the present study indicate that the formulation variables, particularly the concentration of essential oils and fixatives, play a crucial role in determining the quality and effectiveness of herbal perfumes. F1, which contained lower concentrations of essential oils, showed reduced viscosity and faster evaporation, resulting in shorter fragrance retention and lower therapeutic effectiveness. In contrast, F3, with higher concentrations of essential oils, demonstrated increased viscosity and longer retention time but showed slight instability and mild skin irritation, indicating that excessive concentrations may negatively affect formulation stability and safety.

Formulation F2 exhibited an optimal balance between solvent, essential oils, and fixative, resulting in desirable physicochemical properties and enhanced performance. The moderate viscosity of F2 ensured proper spreadability and controlled evaporation, while its balanced composition contributed to improved fragrance, quality and stability. The absence of skin irritation further indicates its safety for topical application. These findings highlight the importance of formulation optimization in developing effective herbal products.

The improved therapeutic effectiveness of F2 in migraine relief can be attributed to the synergistic action of the selected plant extracts. Lavender contributed to analgesic and anxiolytic effects, lotus provided antioxidant and mood-stabilizing properties, and night jasmine offered sedative and anti-inflammatory benefits. The combined effect of these plants likely enhanced the overall efficacy of the formulation. The results support the potential of herbal perfume as a novel and effective approach for migraine management through aromatherapy.

The study demonstrates that a properly optimized herbal perfume formulation can provide significant therapeutic benefits in migraine management. Among the formulations tested, F2 was found to be the most effective, showing superior performance in terms of stability, safety, and aromatherapy effectiveness.

9. Conclusion

The present study successfully formulated and evaluated a herbal perfume using Lavandula angustifolia (lavender), Nelumbo nucifera (lotus), and Nyctanthes arbor-tristis (night jasmine) for the management of migraines through aromatherapy. The essential oils were extracted, characterized, and incorporated into different formulations, which were further evaluated for physicochemical properties, stability, safety, and therapeutic effectiveness.

Among the three formulations developed, Formulation F2 was found to be the most optimized, exhibiting desirable organoleptic properties, appropriate pH, optimal viscosity, good stability, and absence of skin irritation. Additionally, F2 showed the highest effectiveness in reducing migraine symptoms, including pain and stress, indicating its potential as a beneficial aromatherapeutic formulation.

The study demonstrates that the combination of selected medicinal plants produces a synergistic effect, enhancing the overall therapeutic outcome. The presence of bioactive constituents such as terpenoids, flavonoids, and phenolic compounds contributes to the analgesic, anti-inflammatory, and calming effects observed in the formulation.

In conclusion, the developed herbal perfume offers a safe, natural, and effective alternative approach for migraine management. This research supports the integration of traditional herbal knowledge with modern formulation techniques and highlights the potential of aromatherapy as a complementary therapy in the treatment of neurological disorders.

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