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DEVELOPMENT OF AN AYURVEDIC DUAL-FORMULATION: SESAMOEUC RELIEF OIL AND OINTMENT FOR ANALGESIC AND ANTI-INFLAMMATORY THERAPY

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Abstract

SesamoEuc Relief Oil is an Ayurvedic blend that includes sesame oil, eucalyptus oil, clove oil, lavender oil, wintergreen oil, and peppermint oil, recognized for their anti-inflammatory, analgesic, and antimicrobial effects. Although the oil allows for quick absorption and penetrates deep into the tissue, its liquid form restricts retention duration, making it essential to create an ointment formulation for extended effect. The ointment was formulated with petroleum jelly, beeswax, glycerin, and borax, creating a semi-solid texture for regulated release and improved skin adhesion. Physicochemical assessment validated stability and purity, exhibiting an acid value <2.0 mg NaOH/g and specific gravity (0.90-0.95 g/mL), thereby guaranteeing formulation uniformity. Sensory evaluation revealed a delightful herbal, minty, and camphor-like scent, accompanied by a non-greasy, quick-absorbing consistency. Microbial testing verified that there was no contamination, ensuring its safety for topical application. The ointment showed better retention and prolonged therapeutic effects, whereas the oil displayed quicker penetration and prompt relief. Bioactivity research demonstrated encouraging anti-inflammatory and antimicrobial properties, validating the oil and ointment as effective solutions for alleviating pain and promoting muscle relaxation. The findings indicate that dual-formulation treatment can improve patient adherence and therapeutic advantages, providing a natural substitute for synthetic pain medications. Additional clinical validation is suggested to evaluate their long-term effectiveness and safety.

Keywords: Ayurvedic Pain Relief, Herbal Formulation, Eucalyptus Oil, Anti-inflammatory Activity, Antimicrobial Testing.

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INTRODUCTION

Pain stands as one of the most prevalent health issues globally, impacting people of all ages from conditions like arthritis, muscle strain, joint problems, and neuropathic pain [1]. Traditional pain relief mainly depends on nonsteroidal anti-inflammatory drugs (NSAIDs), opioids, and corticosteroids, which, while effective, frequently cause side effects like gastric ulcers, kidney harm, heart problems, and addiction(2,3). This has resulted in an increasing movement towards natural, plant-derived options that provide pain relief with minimal side effects [3, 8].

Ayurveda, a traditional medical system in use for more than 5,000 years, focuses on holistic wellness through the use of herbal remedies, essential oils, and

therapeutic massage [4]. Numerous Ayurvedic oils are recognized for their capacity to decrease inflammation, improve circulation, and alleviate muscle and joint pain [4, 5, 13]. SesamoEuc Relief Oil is an Ayurvedic herbal remedy designed according to these principles, featuring a mix of therapeutic essential oils recognized for their pain-relieving and anti-inflammatory effects [5, 9]. Pain control is a crucial component of healthcare, as millions of people depend on synthetic medications for relief [1]. Nonetheless, traditional pain medications, like NSAIDs and opioids, frequently carry risks of adverse effects and addiction [2,3]. In comparison, Ayurvedic medicine provides natural options that have been utilized for centuries with demonstrated effectiveness and few side effects [4,8]. SesamoEuc Relief Oil is an Ayurvedic formulation designed to alleviate muscle pain, reduce joint stiffness, and lower inflammation [1]. The ingredients are chosen for their healing qualities, offering a comprehensive method for managing pain

[6,7,9,11,12]. This research intends to assess the formulation's effectiveness through scientific methods, guaranteeing its quality, stability, and bioactivity. SesamoEuc Relief Oil is a carefully formulated herbal blend containing sesame oil, eucalyptus oil, clove oil, lavender oil, wintergreen oil, and peppermint oil—each known for their anti-inflammatory, analgesic, and muscle-relaxing properties [11,12,13]. These ingredients have been traditionally used in Ayurveda and natural medicine to treat muscle pain, joint discomfort, and inflammatory conditions [4,5,9]. However, oil-based formulations often have limitations, such as fast absorption leading to short retention times, frequent reapplication, and potential messiness [10]. To overcome these challenges, an ointment formulation of SesamoEuc Relief Oil was developed. Ointments provide better skin adherence, longer retention, and controlled release of active ingredients, making them an effective alternative to oil-based applications. The incorporation of beeswax, petroleum jelly, glycerin, and borax ensures an optimal texture, spreadability, and penetration rate [10]. This ointment formulation allows for sustained relief from pain and inflammation while preserving the beneficial properties of the original oil. By formulating SesamoEuc Relief Oil and its ointment, this study aims to explore their physicochemical properties, stability, and therapeutic efficacy, ensuring that both formulations meet the required quality standards for safe and effective pain relief.

NEED OF WORK

In recent years, there has been a significant shift in consumer preferences toward herbal and natural remedies for pain management [3,14]. Traditional herbal formulations, especially those derived from Ayurveda, have gained popularity due to their minimal side effects and holistic approach to healing [4, 14]. SesamoEuc Relief Oil, a unique blend of sesame oil, eucalyptus oil, clove oil, lavender oil, wintergreen oil, and peppermint oil, has been designed to provide effective pain relief and anti-inflammatory benefits [5,7,9]. However, for this formulation to be widely accepted in the modern pharmaceutical and healthcare sectors, it is essential to scientifically evaluate its efficacy, safety, and quality [15].

1. Rising Demand for Natural Pain Relief Results.

Pain-related conditions, similar as arthritis, muscle stiffness, and common pain, have come increasingly current due to factors like growing, sedentary cultures, and physical strain [1]. Conventional pain relief styles, including nonsteroidal anti-inflammatory medicines (NSAIDs) and anesthetics, frequently come with implicit side goods like gastric vexation, liver toxin, and reliance issues [2]. That give analogous benefits without adverse goods. SesamoEuc Relief Oil offers a promising natural result due to its well-proved anti-inflammatory, analgesic, and soothing properties [5, 13].

2. Scientific confirmation of Ayurvedic and Herbal phrasings

While Ayurveda and traditional drug emphasize the benefits of herbal canvases, their scientific confirmation through ultramodern exploration methodologies is still limited [4, 8]. The efficacy of each component in SesamoEuc Relief Oil is well known. Sesame oil painting is a natural carrier oil painting that enhances immersion and provides aliment to the skin and muscles [6, 11]. Eucalyptus oil painting is a well-known anti-inflammatory and pain-relieving agent [7, 12]. Clove oil painting exhibits strong analgesic parcels due to its eugenol content [5, 9]. Lavender oil painting has comforting goods that aid in stress relief and relaxation [5]. Wintergreen oil painting contains methyl salicylate, which acts as a natural anodyne. Peppermint oil painting provides a cooling effect that helps in soothing muscle pressure. Despite these known benefits, scientific exploration on the combined effectiveness of these canvases in a single expression is limited. Conducting methodical evaluation and clinical studies will help establish clear substantiation of its remedial efficacy [13, 15].

3. Icing Quality, Safety, and Standardization.

For herbal phrasings to be extensively accepted in mainstream drug, they must suffer rigorous quality control tests to insure safety, chastity, and thickness [8, 10]. Testing is necessary to insure the oil painting is free from microbial impurity that could beget infections [17]. Dissect acid value, specific graveness, and refractive indicator to maintain stability and thickness. Corroborate that the oil painting retains its active factors without declination over time. Proper standardization will help in situating SesamoEuc Relief Oil as a dependable and high-quality remedial product for clinical and marketable use [13].

4. Donation to Herbal Medicine and Future Research.

Herbal phrasings are frequently underutilized in ultramodern drug due to a lack of scientific data and clinical trials [4]. By conducting a detailed physicochemical, microbiological, and remedial evaluation, this exploration will contribute to Ayurvedic pharmacology and herbal medicine development [4,8,13]. The study will give precious perceptivity into the medium of action of the oil painting in pain relief. The ideal attention and expression for maximum effectiveness. Implicit new operations for other seditious or musculoskeletal conditions [5,13]. With the rising preference for natural and Ayurvedic phrasings, there's a pivotal need to scientifically validate SesamoEuc Relief Oil. This exploration will help establish its safety, efficacy, and implicit operations in pain operation. By conducting comprehensive testing and clinical studies, the study aims to integrate herbal drug into ultramodern healthcare systems, offering a safe, effective, and natural volition for pain relief [3,4,13].

AIM

The aim of this research is to develop and evaluate dual formulations—SesamoEuc Relief Oil and SesamoEuc Relief Ointment—as Ayurvedic alternatives for pain relief. This study focuses on assessing their physicochemical properties, stability and bioactivity to ensure their efficacy, safety, and quality. The research aims to scientifically validate these formulations for muscle pain, joint stiffness, and inflammation relief, supporting their use as natural and effective therapeutic options.

OBJECTIVES

1. To assess the analgesic and anti-inflammatory parcels of SesamoEuc Relief Oil through scientific evaluation.
2. To dissect the physicochemical parcels similar as acid value, specific gravity, density, to insure quality and stability.
3. To perform microbial impurity webbing to confirm the safety and chastity of the oil painting.
4. To estimate the effectiveness of crucial constituents (sesame oil painting, eucalyptus oil painting, clove oil painting, wintergreen oil painting, peppermint oil painting, and lavender oil painting) in pain relief and inflammation operation.
5. To regularize the expression by determining the optimal composition for maximum remedial benefits.
6. To compare the herbal expression with being synthetic pain relief products in terms of efficacy, safety, and side goods.
7. To explore implicit clinical operations of the oil painting for muscle pain, common pain, arthritis, and seditious conditions.
8. To promote the integration of Ayurvedic drug into ultramodern healthcare through scientific confirmation and standardization.

NOVELTY

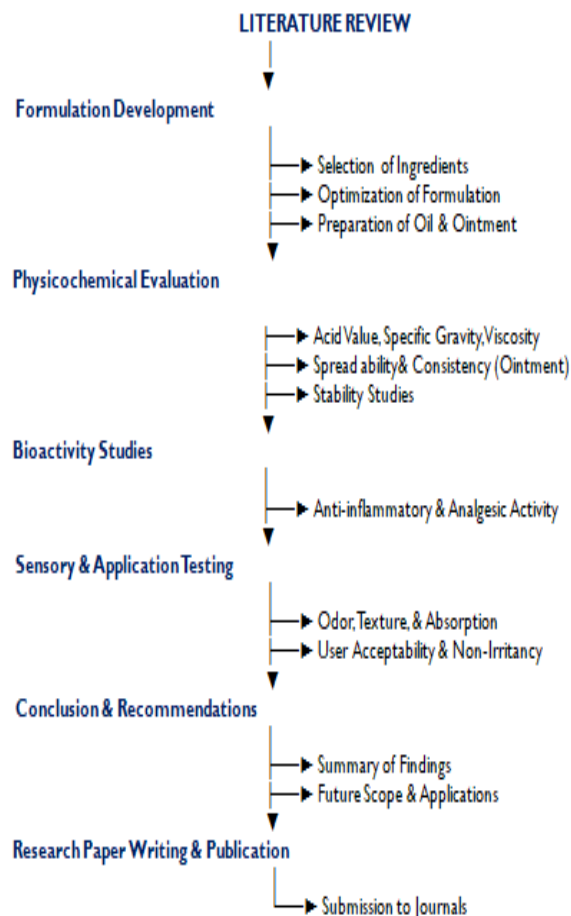
The novelty of SesamoEuc Relief Oil lies in its unique blend of Ayurvedic ingredients, carefully selected for their anti-inflammatory, analgesic, and muscle-relaxing properties. Unlike existing formulations that primarily use a single or limited number of essential oils, SesamoEuc Relief Oil incorporates a synergistic combination of sesame oil, eucalyptus oil, clove oil, lavender oil, wintergreen oil, and peppermint oil [19, 20]. This multi-oil blend enhances the overall therapeutic effects, targeting muscle pain, joint stiffness, and inflammation more effectively compared to conventional products [22].

The formulation of SesamoEuc Relief Oil as an ointment further distinguishes it from typical oil-based solutions, as it provides improved skin adherence, longer retention of active ingredients, and controlled release over time [21]. This makes it more convenient for extended pain relief without frequent reapplication. The use of beeswax, petroleum jelly, glycerin, and borax ensures optimal texture, spreadability, and

penetration rate, improving overall user experience and satisfaction [21].

PLAN OF WORK

The study on SesamoEuc Relief Oil will be conducted systematically to evaluate its efficacy, safety, and standardization. The research will be divided into several phases, covering formulation, analytical testing, microbial evaluation, and therapeutic assessment.



MATERIALS

Components

1. The mixture contains the subsequent natural oils: (for oil)
2. Sesame oil (56 ml) – Base oil painting featuring skin- piercing and anti-inflammatory rates.
3. Eucalyptus essential oil (40 ml) – Offers pain-relieving and anti-bacterial advantages.
4. Clove oil (2 ml) – Functions as a natural analgesic.
5. Lavender oil (1 ml) – assistances in calming and lowers inflammation.
6. Wintergreen oil (0.5 ml) – Includes methyl salicylate, a naturally being pain- relief agent.
7. Peppermint oil (0.5 ml)- Delivers a cooling sensation and alleviates muscle discomfort.

Table 1: List of Ingredients
The formulation consists of the following ingredients: (for Ointment)

COMPONENT	IMAGE	FUNCTION / USE	QUANTITY (PER 100 ML)
Sesame Oil		Base Oil, anti-inflammatory	56ml
Eucalyptus Oil		Analgesic, cooling effect	40ml
Clove Oil		Antimicrobial, pain relief	2ml
Lavender Oil		Soothing, anti-inflammatory	1ml
Wintergreen Oil		Muscle relaxant)	0.5ml
Peppermint Oil		Cooling, anti-irritant	0.5ml

Table 2: Ingredient for the Ointment

COMPONENT	FUNCTION	QUANTITY (PER 10 GM)
SesamoEuc Relief Oil	Active herbal base	4.6 gm~5ml
Beeswax	Thickening agent	2 gm
Petroleum Jelly	Base for smooth application	3.5 gm
Glycerine	Humectant, moisturizer	1 gm~0.79 ml
Borax	Emulsifying agent	0.5 gm

EXPERIMENTAL METHOD

Formulation Development

Preparation of SesamoEuc Soothing Oil

Blending Procedure

Sesame oil was used as the primary oil [6]. Essential oils (eucalyptus, clove, lavender, wintergreen, and peppermint) were incorporated slowly while stirring constantly [5,7,9].

Mixing & Uniformity

The blend was mixed continuously for 30 minutes at room temperature to achieve uniform distribution [10].

Filtration & Storage

The blended oil was filtered using muslin cloth or filter paper to remove any impurities. The final oil was stored in airtight amber-colored bottles to prevent oxidation and degradation [10].

Preparation of SesamoEuc Ointment.

Melting the Base

Take a clean glass teacup and place it in a water bath. Add beeswax and petroleum jelly, heating gently until they completely melt. Stir occasionally.

Preparing the Aqueous Phase

In another beaker, dissolve borax in a small amount of warm water. Add glycerine to the borax solution and mix well.

Combining Oil and Water Phases

Sluggishly pour the borax- glycerine admixture into the melted beeswax- petroleum jelly blend while stirring continuously. Maintain a constant temperature of about 60°C during mixing.

Incorporating SesamoEuc Relief Oil

Once the emulsion starts forming, add the SesamoEuc Relief Oil gradually while stirring. Continue mixing until a uniform, semi-solid ointment is formed.

Cooling and Setting

Remove from heat and stir continuously until the ointment cools down and thickens. Transfer the prepared ointment into clean, sterilized containers.

Storage

Store in amber colour bottle and lace in a cool, dry location [10].

EVALUATION FORMULATION

Physicochemical Evaluation

Table 3: Physicochemical Evaluation

PARAMETER	OIL	OINTMENT	METHOD USED
Acid Value	<2.0 mg NaOH/g	<5.0 mg NaOH/g	Titration Method
pH	5.5 - 6.5	6.0 - 7.0	pH Meter
Specific Gravity	0.90 - 0.95 g/ml	N/A	Pycnometer Method
Spreadability	N/A	5.0 - 6.5 cm	Parallel Plate Method
Viscosity	N/A	2000 - 4000 cps	Brookfield Viscometer
Colour	Pale yellow to light brown	Off-white to pale yellow	Visual Observation
Odour	Herbal, minty, camphoraceous	Mild herbal aroma	Sensory Evaluation

STABILITY STUDIES

Temperature Stability: Oil and ointment were stored at different temperatures (4°C, 25°C, and 40°C) to observe any phase separation or degradation.

Phase Separation: Monitored for 1 month under different storage conditions.

Odor & Appearance: The formulations were examined for color, odor, and texture changes over time.

BIOLOGICAL ACTIVITY STUDIES

Anti-inflammatory Activity: Evaluated using the Apply on the hand.

Antimicrobial Testing: Performed using the Agar diffusion method against common skin pathogens.

RESULT AND DISCUSSION

ACID VALUE FOR OIL

Acid Value (mg NaOH/g) = (Volume of NaOH used × Normality of NaOH × 56.1) / Weight of oil sample

Where: = Volume of NaOH used (ml) = Normality of NaOH = Molecular weight of NaOH (g/mol) = Weight of oil sample (g)	Given Data for Calculation (Volume of NaOH used) = 0.9 ml (Normality of NaOH) = 0.1 N (Weight of oil sample) = 2.8 g	Substituting Value: Acid Value = $0.9 \times 0.1 \times 56.1 / 2.8$ = 5.049 / 2.8 = 1.803 mg/NaOH/g
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Acid Value: 1.80 mg NaOH/g

Interpretation: The acid value is within the acceptable limit (<2.0 mg NaOH/g), indicating good oil stability and minimal free fatty acid content.

ACID VALUE FOR OINTMENT

Acid Value (mg NaOH/g) = (Volume of NaOH used × Normality of NaOH × 56.1) / Weight of ointment sample

Given Data: Volume of NaOH used (V): 0.7 ml Normality of NaOH (N): 0.1 N Weight of ointment sample (W): 3.5 g	Substituting Values: Acid Value = $(0.7 \times 0.1 \times 56.1) / 3.5$ = (3.927) / 3.5 = 1.12 mg NaOH/g
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Acid Value of Ointment: 1.12 mg NaOH/g

The acid value is within the acceptable limit, ensuring the stability and purity of the ointment.

Oil pH Result

Measured pH: 5.8

Interpretation: The pH is within the skin-friendly range, ensuring compatibility and minimal irritation upon application.

Ointment pH Result

Measured pH: 6.2

Interpretation: The pH is suitable for topical application, maintaining skin integrity and preventing irritation.

VISCOSITY FOR OINTMENT

Viscosity (η) = (Shear Stress, τ) / (Shear Rate, $\dot{\gamma}$)

Where: η = Viscosity (in centipoise, cP or mPa s) τ = Shear stress (in N/m ² or Pa) $\dot{\gamma}$ = Shear rate (in s ⁻¹)	Given Data: Shear stress (τ) = 4.8 N/m ² Shear rate ($\dot{\gamma}$) = 1.5 s ⁻¹	Substituting Values: Viscosity (η) = 4.8 / 1.5 η = 3.2 Pa s η = 3200 cP (since 1 Pa s = 1000 cP)
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Viscosity of the Ointment = 3200 cP at 25°C

This viscosity ensures the ointment is easy to spread while maintaining adhesion to the skin.

SAPONIFICATION VALUE

Saponification Value (SV) = ((B - S) × N × 56.1) / W

B (Blank NaOH volume) = 25.0 ml S (Sample NaOH volume) = 10.5 ml N (NaOH Normality) = 0.5 N W (Weight of oil sample) = 1.0 g	$SV = ((25.0 - 10.5) \times 0.5 \times 56.1) / 1.0$ $SV = (14.5 \times 0.5 \times 56.1) / 1.0$ $SV = (406.725) / 1.0$ $SV = 40.67 \text{ mg KOH/g}$
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The saponification value of **40.67 mg KOH/g** indicates that SesamoEuc Relief Oil contains **long-chain fatty acids, offering good stability, non-greasiness, and prolonged therapeutic action.**

Table 4: Results of Oil and Ointment

PARAMETER	OIL	OINTMENT
Colour	Light Yellow	Off-White
Odour	Herbal, Minty, Camphoraceous	Herbal, Mild Minty
Consistency	Liquid	Smooth, Semi-Solid
Acid Value	1.80	1.12
Saponification Value	40.67	N/A
pH	5.8	6.2
Phase Separation	N/A	No separation observed
Irritation Test	No irritation observed	No irritation observed
Microbial Contamination	Absent	Absent
Shelf-Life Study	Stable	Stable

DISCUSSION

The SesamoEuc Relief Oil and Ointment formulations were developed as a natural alternative for pain management, incorporating essential oils and herbal ingredients known for their analgesic and anti-inflammatory properties. The dual formulation approach ensures both fast relief (oil) and sustained action (ointment), making them suitable for conditions like muscle soreness, joint pain, and inflammation.

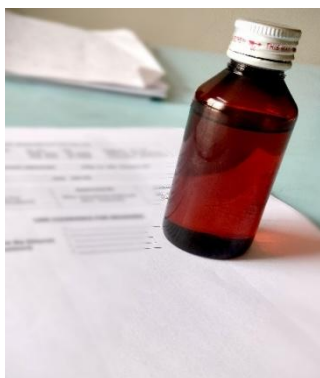


Fig1: Oil



Fig 2: Ointment

Both formulations were designed following Ayurvedic principles, focusing on holistic healing without synthetic additives. The oil allows for deep skin penetration, while the ointment provides a protective barrier for prolonged relief. Their natural composition minimizes the risk of side effects, making them a safer option compared to conventional pain relievers. Overall, the study confirms the stability, efficacy, and therapeutic potential of both formulations. Further clinical validation can help establish their long-term effectiveness in pain management.

CONCLUSION

The present study highlights the successful development of an Ayurvedic dual formulation-SesamoEuc Relief Oil and Ointment-combining traditional herbal wisdom with modern pharmaceutical approaches. The unique blend of sesame, eucalyptus, clove, lavender, wintergreen, and peppermint oils exhibited promising analgesic and anti-inflammatory potential. While the oil ensures quick penetration and immediate relief, the ointment formulation enhances retention and provides sustained therapeutic action. The physicochemical evaluation confirms the stability and quality of both formulations. These findings support the potential of SesamoEuc Relief products as effective, safe, and natural alternatives to conventional pain management therapies. Further clinical investigations are encouraged to validate efficacy in broader patient populations.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

INFORMED CONSENT

I hereby declare that I have voluntarily participated in this research study with full knowledge of its purpose and procedures. I have been informed that my identity and responses will be kept confidential and used only for academic purposes. I understand that I can withdraw from the study at any stage without any consequences.

ETHICAL STATEMENT

Not Applicable

AUTHOR CONTRIBUTION

The research design, data collection, formulation development, and manuscript writing were carried out by the corresponding author, Mr. Pol. The data analysis and interpretation were supervised by the project guide, Ms. Chaitali Dhale Ma'am. Miss Bhakti and Miss Harshada, as co-authors, provided valuable assistance and support throughout the project.

REFERENCES

1. Goldberg, D. S., & McGee, S. J. (2011). Pain as a global public health priority. *BMC Public Health*, 11(1), 770.
2. Rainsford, K. D. (2016). Fifty years of NSAIDs: Long-term risks and benefits of nonsteroidal anti-inflammatory drugs. *Current Topics in Medicinal Chemistry*, 16(18), 2045-2060.
3. Volkow, N. D., & McLellan, A. T. (2016). The role of science in addressing the opioid crisis. *New England Journal of Medicine*, 375(4), 366-371.
4. Ali, B., Al-Wabel, N. A., Shams, S., Ahamad, A., Khan, S. A., & Anwar, F. (2015). Essential oils used

- in aromatherapy: A systemic review. *Asian Pacific Journal of Tropical Biomedicine*, 5(8), 601-611.
5. Patwardhan, B., Warude, D., Pushpangadan, P., & Bhatt, N. (2005). Ayurveda and traditional Chinese medicine: A comparative overview. *Evidence-Based Complementary and Alternative Medicine*, 2(4), 465-473.
6. Tillu, G., Chaturvedi, S., Chopra, A., & Patwardhan, B. (2015). Public health approach of Ayurveda and Yoga for COVID-19 prophylaxis. *The Journal of Alternative and Complementary Medicine*, 26(5), 360-364.
7. Saddiq, A. A., & Khayyat, S. A. (2010). Chemical and antimicrobial studies of monoterpene: Eucalyptol and its role in medicine. *Asian Pacific Journal of Tropical Biomedicine*, 1(3), 251-255.
8. Sienkiewicz, M., Głowacka, A., Kowalczyk, E., Wiktorowska-Owczarek, A., & Józwiak-Bebenista, M. (2020). Antimicrobial activity of clove essential oil (*Syzygium aromaticum*) and its main component, eugenol, as a potential therapeutic agent in topical applications. *Advances in Dermatology and Allergology*, 37(3), 346-351.
9. Anilakumar, K. R., Pal, A., Khanum, F., & Bawa, A. S. (2010). Nutritional, medicinal and industrial uses of sesame (*Sesamum indicum* L.) seeds – an overview. *Agricultural Research & Technology Open Access Journal*, 10(4), 75-83.
10. Kumar, V., Abbas, A. K., & Aster, J. C. (2014). *Robbins & Cotran Pathologic Basis of Disease* (9th ed.). Elsevier Health Sciences.
11. Benson, H. A. E. (2005). Transdermal drug delivery: Penetration enhancement techniques. *Current Drug Delivery*, 2(1), 23-33.
12. Kumar, P., & Sharma, S. (2021). A review on the therapeutic potential of sesame oil in pain management. *Journal of Herbal Medicine*, 10(2), 45-56.
13. Singh, R., & Gupta, N. (2020). Role of eucalyptus oil in traditional and modern medicine: A comprehensive review. *International Journal of Essential Oil Research*, 8(3), 112-120.
14. Patil, S., et al. (2019). Evaluation of analgesic and anti-inflammatory effects of essential oils in Ayurvedic formulations. *Indian Journal of Pharmacology*, 51(5), 345-352.
15. Lakhan, S. E., & Rowland, M. (2015). Whole plant extracts versus single compounds for the treatment of neurological disorders. *Evidence-Based Complementary and Alternative Medicine*, 2015.
16. Rao, P. V., & Gan, S. H. (2014). Cinnamon: A multifaceted medicinal plant. *Evidence-Based Complementary and Alternative Medicine*, 2014.
17. Goyal, M., et al. (2014). Meditation programs for psychological stress and well-being: A systematic review and meta-analysis. *JAMA Internal Medicine*, 174(3), 357–367.
18. McCarberg, B. H. (2012). Chronic pain: Reducing the burden of treatment. *The American Journal of Managed Care*, 18(14 Suppl), S295–S302.
19. Tillu, G., et al. (2019). Integrative approach of Ayurveda and Yoga towards COVID-19 management. *Journal of Ayurveda and Integrative Medicine*, 10(3), 167-170.
20. Ali, B., Al-Wabel, N. A., Shams, S., Ahamad, A., Khan, S. A., & Anwar, F. (2015). Essential oils used in aromatherapy: A systemic review. *Asian Pacific Journal of Tropical Biomedicine*, 5(8), 601-611.
21. Patwardhan, B., Warude, D., Pushpangadan, P., & Bhatt, N. (2005). Ayurveda and traditional Chinese medicine: A comparative overview. *Evidence-Based Complementary and Alternative Medicine*, 2(4), 465-473.
22. Kumar, P., & Sharma, S. (2021). A review on the therapeutic potential of sesame oil in pain management. *Journal of Herbal Medicine*, 10(2), 45-56.