



FORMULATION OF HERBAL ANALGESIC OIL FROM *Ehretia Laevis*/ Ajan Vruksha

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Abstract : Pain management remains a significant challenge globally, with a growing interest in natural alternatives to conventional pharmaceuticals. This research investigates the formulation of a herbal analgesic oil derived from *Ehretia laevis*, commonly known as Ajan Vruksha in traditional medicine systems. The study explores the phytochemical composition of *Ehretia laevis* extracts through qualitative analysis, elucidating its potential analgesic properties. Additionally, the research focuses on optimizing the formulation parameters for the extraction process to maximize the yield of bioactive compounds responsible for analgesic effects. The efficacy of the formulated herbal analgesic oil is evaluated through in vitro and in vivo studies, assessing its pain-relieving potential and safety profile. Furthermore, the research delves into the mechanistic insights underlying the analgesic activity of the formulated oil, shedding light on its mode of action and therapeutic potential. The findings of this study contribute to the growing body of research on natural pain management alternatives, emphasizing the potential of *Ehretia laevis* as a valuable source of herbal remedies for alleviating pain and promoting well-being.

Keywords - Herbal Analgesic Oil, *Ehretia Laevis*, Pain Management, Natural Remedies

I. INTRODUCTION

Pain, in its various forms, can significantly disrupt our daily lives. From joint aches to muscle soreness and chronic inflammatory conditions, finding effective solutions is crucial. While oral medications remain common treatments, topical pain relief oils offer a natural alternative or complementary therapy for managing pain. A Historical Perspective India boasts a rich tradition of using herbal oils for various painful conditions. For over 3,000 years, these oils have been an integral part of Indian medicinal systems like Ayurveda. Ancient texts describe formulations containing ingredients such as camphor, eucalyptus, garlic, mustard, sesame, and other plants. These preparations were used to treat ailments like arthritis, wounds, headaches, and general body pain. The oils took various forms, including kadis (medicated oils), arishtams (fermented decoctions), and balms for both external massage and internal consumption. Over time, traditional Indian medicine has expanded its plant-based pharmacopeia for pain management. Ingredients like wintergreen, peppermint, turmeric, ginger and nutmeg have been incorporated. The native knowledge about these plants has merged with modern extraction and formulation science, resulting in the pain relief oils commonly used in India today. Brands like Zandu Balm, Amrutanjan, Tiger Balm, and Kottakkal Arya Vaidya Sala have popularized Indian pain oils worldwide. - How Do Pain Relief Oils Work? Modern research has shed light on the mechanisms behind pain relief oils. Many bioactive phytochemicals naturally found in Indian medicinal plants and herbs exhibit analgesic, anesthetic, anti-inflammatory, and circulation-enhancing effects. When formulated into medicated oils and applied to the skin, these compounds modulate multiple biological pathways to provide varying types of pain relief: 1. Counterirritation: Ingredients like menthol, eucalyptus, mustard, and camphor irritate nerve endings on the skin. This mild inflammatory reaction stimulates nearby blood vessels and temporarily masks deeper muscular or arthritis pain with a warm or burning sensation. 2. Anti-Inflammatory Effects: Turmeric, garlic, Boswellia, and other extracts used in pain relief oils contain compounds that inhibit pro-inflammatory cytokines in tissues. They dampen local swelling, stiffness, and discomfort signals to the brain. 3. Vasodilation: Oils containing menthol, nutmeg, and wintergreen induce localized blood vessel dilation, enhancing blood flow to affected muscles and joints. This increased circulation provides oxygen and nutrients, easing tissue inflammation while carrying away pain signaling molecules. - The Power of Herbal Oils Beyond the Indian context, herbal oils play a significant role in pain management globally. Extracts from specific herbs like arnica, comfrey, and St. John's wort are renowned for their pain-relieving properties. These oils are often used topically to target localized discomfort. Additionally, carrier oils such as coconut, jojoba, or almond oil serve as bases for diluting essential oils, enhancing their efficacy. the, herbal pain relief oils combine ancient wisdom with modern science, providing a holistic approach to managing pain, nature's healing power lies within these precious oils, waiting to soothe and restore. Botanical Overview of *Ehretia laevis*:- *Ehretia laevis*, commonly known as Ajan Vruksha or the Indian Laburnum, is a deciduous tree that holds significant importance in traditional medicine systems across Asia. Belonging

to the family Boraginaceae, this tree species is native to tropical and subtropical regions, including India, Sri Lanka, Myanmar, and Thailand. *Ehretia laevis* typically grows to a height of 10-15 meters, characterized by its smooth, pale gray bark and dense canopy of foliage.



Fig:- Leaves of *Ehretia laevis* (Ajan Vruksha)

Description and Classification :-

The leaves of *Ehretia laevis* are simple, alternate, and exhibit an elliptical to ovate shape with smooth margins and a glossy dark green surface. These leaves play a pivotal role in traditional medicine preparations. The tree produces small, fragrant flowers that range in color from white to pale yellow, arranged in dense clusters, which bloom during the spring season. The fruits of *Ehretia laevis* are small, round drupes that turn yellow when ripe, each containing one or two seeds. **Geographic Distribution and Habitat:-** *Ehretia laevis* thrives in a variety of habitats, including dry forests, scrublands, and rocky slopes. It is commonly found growing along roadsides and in open woodlands, preferring well-drained soils. This plant species is well-adapted to semi-arid climates and can tolerate seasonal variations in temperature and rainfall. **Traditional Uses** In traditional medicine systems like Ayurveda and Siddha, various parts of *Ehretia laevis* are utilized for their medicinal properties. The bark, leaves, and roots of this tree are particularly valued for their therapeutic effects. **Analgesic Properties:-** The bark and leaves of *Ehretia laevis* are used to alleviate pain and inflammation associated with arthritis and other joint disorders. **Antipyretic Actions:-** The decoctions made from the bark and roots are employed to reduce fever and manage symptoms of infectious diseases. **Anti-inflammatory Effects:-** External applications of *Ehretia laevis* preparations are used to treat wounds, skin infections, and inflammatory skin conditions. The traditional use of *Ehretia laevis* in managing various health conditions underscores its potential as a source of natural remedies for pain relief and inflammation. The botanical characteristics and traditional uses of *Ehretia laevis* provides a foundational knowledge base for exploring its pharmacological potential and formulation into herbal analgesic oil. The rich history of its use in traditional medicine systems offers insights into the specific parts of the plant that possess medicinal properties and guides the development of effective extraction methods to harness these beneficial compounds

Further exploration of the chemical composition and pharmacological actions of *Ehretia laevis* will contribute to elucidating its mechanisms of action and potential applications in modern herbal medicine formulations, particularly in the development of an herbal analgesic oil aimed at providing safe and effective pain relief. **Traditional Uses of *Ehretia laevis* :-** *Ehretia laevis*, commonly known as Ajan Vruksha or the Indian Laburnum, has a rich history of traditional uses in various indigenous medicine systems across Asia, including Ayurveda and Siddha. The plant's medicinal properties have been recognized and utilized for centuries, highlighting its significance in folk medicine practices. **Historical and Cultural Significance** In traditional cultures, *Ehretia laevis* holds a revered status due to its perceived healing abilities and therapeutic properties. The tree and its various parts have been integral to local customs and medicinal traditions, with knowledge passed down through generations. **Historical texts and ancient scriptures often mention the medicinal uses of this plant, underscoring its enduring importance in traditional healing practices.** **Common Ailments Treatedn** The different parts of *Ehretia laevis*, including the bark, leaves, and roots, are used to address a range of health conditions and ailments: **Analgesic and Anti-inflammatory Effects:** The bark and leaves of *Ehretia laevis* are employed to alleviate pain associated with arthritis, rheumatism, and joint inflammation. The plant's anti-inflammatory properties help reduce swelling and discomfort. **Fever and Infectious Diseases:** Decoctions or extracts made from the bark and roots of *Ehretia laevis* are used to lower fever and manage symptoms of infectious diseases, such as malaria and viral infections. **Skin Conditions:** External applications of *Ehretia laevis* preparations are utilized to treat various skin ailments, including wounds, cuts, burns, and skin infections. The plant's antimicrobial properties contribute to its effectiveness in promoting wound healing and preventing infections.

Respiratory Disorders: In some regions, *Ehretia laevis* is used in herbal formulations to alleviate symptoms of respiratory disorders, such as coughs, colds, and bronchitis. **Digestive Issues:** Certain parts of the plant are also used to address digestive problems, such as indigestion, bloating, and stomachache. **Preparation and Administration** The traditional preparation methods for *Ehretia laevis* vary based on the specific ailment being treated.

Commonly used preparations include:

Decoctions: Boiling the bark or leaves to extract medicinal compounds, which are consumed orally for internal ailments or used topically for external conditions.

Infusions: Steeping the plant parts in hot water to make teas or herbal drinks for internal consumption.



Poultices and Ointments: Crushing or grinding the leaves or bark into a paste, which is applied directly to the affected area of the skin. Oil Extracts: Extracting oils from the plant parts for use in massage or topical applications. Integration with Modern Medicine The traditional uses of *Ehretia laevis* highlight the plant's potential as a source of natural remedies for various health conditions. Integrating traditional knowledge with modern scientific research can provide valuable insights into the pharmacological properties and mechanisms of action of this plant. By exploring and validating its traditional uses, *Ehretia laevis* holds promise for the development of novel herbal formulations, including herbal analgesic oils, that can offer safe and effective alternatives to conventional medications. The extensive traditional uses of *Ehretia laevis* underscore its importance as a valuable medicinal plant in indigenous medicine systems. Exploring and understanding these traditional practices can guide further research and development efforts aimed at harnessing the therapeutic potential of this plant for modern healthcare applications, including the formulation of herbal analgesic oils. Chemical Composition of *Ehretia laevis* :-*Ehretia laevis*, commonly known as Ajan Vruksha or the Indian Laburnum, possesses a rich phytochemical composition that contributes to its diverse medicinal properties, including its potential as an herbal analgesic.

II. Contents

Phytochemical Analysis Studies investigating the phytochemical profile of *Ehretia laevis* have identified various classes of bioactive compounds present in different parts of the plant

: 1. Alkaloids :

Certain alkaloids have been isolated from *Ehretia laevis*, with vasicine being a notable example. Vasicine exhibits analgesic and anti-inflammatory properties, making it a key compound in pain management. Alkaloids can modulate pain perception pathways and inhibit inflammatory mediators, thereby providing relief from pain and inflammation.

2. Flavonoids :

Ehretia laevis is rich in flavonoids, including quercetin and kaempferol derivatives. Flavonoids are known for their antioxidant and anti-inflammatory activities, which contribute to the plant's therapeutic effects. These compounds can help reduce oxidative stress and inflammation, which are often associated with pain and inflammatory conditions.

3. Triterpenoids :

Betulinic acid and oleanolic acid are examples of triterpenoids found in *Ehretia laevis*. Triterpenoids possess anti-inflammatory properties and have been implicated in pain relief by suppressing inflammatory processes. These compounds can modulate immune responses and reduce the production of inflammatory mediators involved in pain signaling.

4. Phenolic Compounds :

Ehretia laevis contains phenolic acids and lignans, which contribute to its antioxidant and anti-inflammatory activities. Phenolic compounds can scavenge free radicals and inhibit pro-inflammatory enzymes, thereby alleviating pain and protecting against oxidative damage.

5. Essential Oils : Certain species of *Ehretia* produce essential oils containing terpenes and sesquiterpenes. These volatile compounds contribute to the aromatic properties of the plant and may possess therapeutic effects relevant to pain relief. Essential oils can exert local analgesic effects through their interactions with sensory receptors in the skin and mucous membranes.

Key Compounds Responsible for Analgesic Properties Several bioactive compounds in *Ehretia laevis* are specifically associated with its analgesic effects: -

Vasicine : This alkaloid has demonstrated significant analgesic and anti-inflammatory activities in preclinical studies. Vasicine acts by modulating pain perception pathways and inhibiting the release of inflammatory mediators.

- **Flavonoids** : Quercetin and kaempferol derivatives exhibit potent antioxidant and antiinflammatory properties, contributing to pain relief by reducing oxidative stress and inflammation.

- **Triterpenoids** : Betulinic acid and oleanolic acid possess anti-inflammatory actions that can alleviate pain symptoms associated with inflammatory conditions. Implications for Formulation Development Understanding the chemical composition of *Ehretia laevis* is essential for developing effective herbal analgesic formulations:

- **Optimized Extraction Methods** : Researchers can optimize extraction techniques to maximize the concentration of key bioactive compounds, such as alkaloids, flavonoids, and triterpenoids, in herbal extracts or oils.

- **Enhanced Analgesic Efficacy** : Formulation strategies can be tailored to enhance the analgesic efficacy of *Ehretia laevis* -based products, ensuring their effectiveness in pain management.

- **Safety and Quality Assurance** : Knowledge of the phytochemical composition helps ensure the safety and quality of herbal products derived from *Ehretia laevis* , minimizing potential adverse effects and variability in therapeutic outcomes. The phytochemical analysis of *Ehretia laevis* reveals a complex mixture of bioactive compounds with significant therapeutic potential, particularly in pain management. Further research into the specific mechanisms of action and interactions among these compounds will deepen our understanding of the plant's medicinal properties and inform the development of novel herbal analgesic formulations aimed at providing safe and effective pain relief. **Pharmacological Actions of *Ehretia laevis*** *Ehretia laevis* , commonly known as Ajan Vruksha or the Indian Laburnum, exhibits diverse pharmacological actions that contribute to its traditional uses in herbal medicine, particularly in the management of pain and inflammation.

Mechanisms of Analgesic Action :-The analgesic properties of *Ehretia laevis* are attributed to several mechanisms of action:

1. **Anti-inflammatory Effects** : *Ehretia laevis* contains bioactive compounds like flavonoids and triterpenoids that possess potent anti-inflammatory properties. These compounds inhibit inflammatory mediators such as cytokines and prostaglandins, thereby reducing inflammation and subsequent pain sensations.

2. **Modulation of Pain Pathways** : Certain alkaloids found in *Ehretia laevis* , such as vasicine, are known to modulate pain perception pathways in the central nervous system. They can interact with neurotransmitter receptors involved in pain signaling, leading to pain relief

3. **Antioxidant Activity**:- Oxidative stress is often associated with chronic pain conditions. The antioxidant compounds present in *Ehretia laevis* , including flavonoids and phenolic compounds, help neutralize free radicals and protect tissues from oxidative damage, which can alleviate pain symptoms.

4. **Neuroprotective Effects** : Some bioactive constituents of *Ehretia laevis* exhibit neuroprotective effects, which can indirectly contribute to pain management by preserving nerve function and reducing nerve-related pain conditions.

Anti-inflammatory Effects : Inflammation is a common underlying factor in many painful conditions, including arthritis, rheumatism, and muscle strains. *Ehretia laevis* exerts anti-inflammatory effects through the inhibition of inflammatory enzymes like cyclooxygenase (COX) and lipoxygenase (LOX), which are responsible for the synthesis of pro-inflammatory prostaglandins and leukotrienes, respectively.

Modulation of Pain Pathways The alkaloids and other bioactive compounds in *Ehretia laevis* can modulate pain perception pathways in the nervous system. By interacting with neurotransmitter receptors, such as opioid receptors or transient receptor potential (TRP) channels, these compounds can block pain signals or reduce their intensity, leading to pain relief.

Antioxidant Activity :- Chronic pain conditions are often associated with oxidative stress, which contributes to tissue damage and inflammation. The antioxidant compounds in *Ehretia laevis* , such as flavonoids and phenolic compounds, scavenge free radicals and protect cells from oxidative damage, thereby alleviating pain symptoms and promoting tissue healing.

Neuroprotective Effects Certain bioactive constituents of *Ehretia laevis* have been found to exhibit neuroprotective properties. By supporting nerve health and reducing neuronal damage, these compounds can indirectly contribute to pain management by preserving nerve function and reducing neuropathic pain.

Therapeutic Applications. Based on its pharmacological actions, *Ehretia laevis* holds potential therapeutic applications in the management of various painful conditions, including: - Arthritis and rheumatic disorders - Musculoskeletal injuries - Neuropathic pain - Inflammatory skin conditions - Postoperative pain

Research Implications Further research is needed to elucidate the specific mechanisms of action of *Ehretia laevis* constituents and their interactions in the context of pain management. Clinical studies are essential to validate the traditional uses of this plant and evaluate its safety and efficacy as an herbal remedy for pain relief.

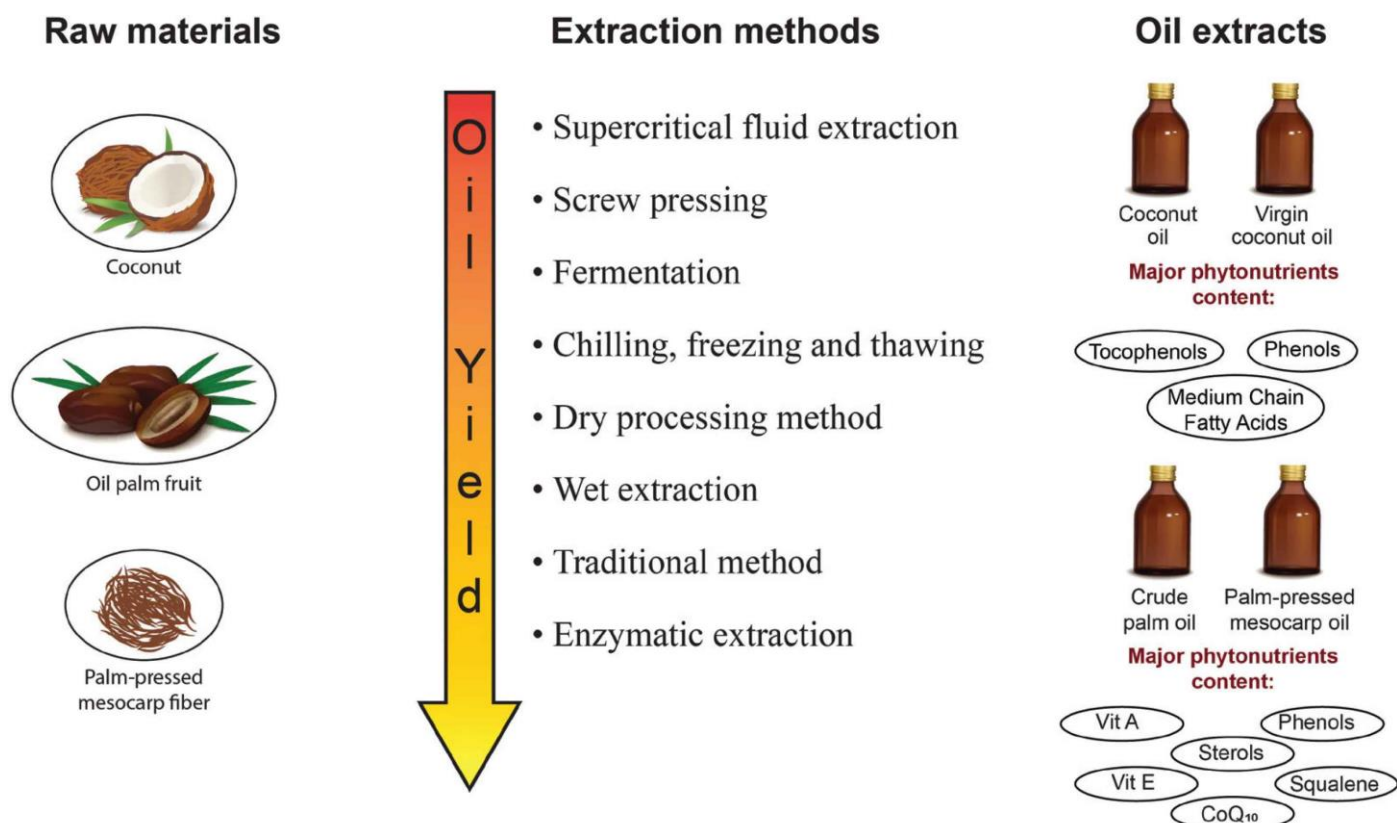
Ehretia laevis exerts its analgesic effects through multiple pharmacological actions, including antiinflammatory, pain-modulating, antioxidant, and neuroprotective mechanisms. Understanding these actions is critical for harnessing the therapeutic potential of this plant in the development of novel herbal analgesic formulations.

Formulation Development for Herbal Analgesic Oil from *Ehretia laevis* The formulation development of an herbal analgesic oil derived from *Ehretia laevis* involves a systematic process of extracting, refining, and optimizing the concentration of bioactive compounds to maximize therapeutic efficacy while ensuring safety and stability.

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III. MATERIALS AND METHODS

Extraction Methods The first step in formulating an herbal analgesic oil from *Ehretia laevis* is selecting an appropriate extraction method to efficiently isolate the desired bioactive compounds from the plant material. Common extraction techniques include



- Solvent Extraction : Using solvents like ethanol or methanol to dissolve and extract bioactive constituents from *Ehretia laevis* . This method is effective for obtaining a broad spectrum of phytochemicals but requires careful solvent selection and purification steps.

- Steam Distillation : Employing steam to extract essential oils containing volatile compounds from *Ehretia laevis* . This method is suitable for capturing aromatic constituents and can be combined with other extraction techniques for comprehensive extraction. - Supercritical Fluid Extraction : Utilizing supercritical CO₂ as a solvent to extract specific compounds from *Ehretia laevis* under controlled temperature and pressure conditions. This method yields high-quality extracts with minimal solvent residue. The choice of extraction method depends on the target compounds, desired extract characteristics, and feasibility for large-scale production.

Refinement and Concentration :After extraction, the crude extract undergoes refinement and concentration processes to isolate and enrich the bioactive compounds responsible for the analgesic properties of *Ehretia laevis*.

- Fractionation : Separating the crude extract into fractions based on polarity or molecular weight to concentrate specific groups of compounds, such as alkaloids, flavonoids, or terpenoids. - Purification : Employing techniques like chromatography or crystallization to purify target compounds and remove impurities, ensuring the quality and consistency of the final product.

- Standardization : Establishing standardized methods to quantify and control the concentration of key bioactive constituents in the herbal analgesic oil, ensuring batch-to-batch consistency and therapeutic efficacy Optimization of Formulation.

The formulation of herbal analgesic oil from *Ehretia laevis* involves optimizing the composition and formulation parameters to enhance therapeutic outcomes:

- Carrier Oils : Selecting suitable carrier oils (e.g., coconut oil, olive oil, or sesame oil) based on their compatibility with *Ehretia laevis* extracts and desired application (topical or transdermal)



Fig:- Carrier oils

- Additives : Incorporating synergistic herbs or essential oils (e.g., menthol, camphor, or eucalyptus oil) to enhance the analgesic effects and improve sensory properties of the final product.

- Stability Testing : Conducting stability studies to assess the shelf-life and physical stability of the herbal analgesic oil under various storage conditions (temperature, light exposure, humidity). Quality Control and Safety Throughout the formulation development process, stringent quality control measures are implemented to ensure the safety, efficacy, and consistency of the herbal analgesic oil:

- Analytical Testing : Employing analytical techniques (e.g., HPLC, GC-MS) to verify the presence and concentration of target compounds and screen for potential contaminants.

- Safety Assessment : Conducting toxicological studies to evaluate the safety profile of the herbal analgesic oil, ensuring compliance with regulatory standards and minimizing adverse effects. The formulation development of an herbal analgesic oil from *Ehretia laevis* represents an interdisciplinary approach that integrates botanical knowledge, extraction technology, and pharmaceutical sciences. Further research is needed to optimize formulations, validate therapeutic efficacy through clinical trials, and explore potential applications in pain management and healthcare. The formulation development of an herbal analgesic oil from *Ehretia laevis* involves a comprehensive process of extraction, refinement, and formulation optimization to harness the plant's medicinal properties for effective pain relief. This research has important implications for developing natural alternatives to conventional pain medications and advancing the field of herbal medicine. Characterization of Herbal Analgesic Oil from *Ehretia laevis* The characterization of herbal analgesic oil derived from *Ehretia laevis* involves a detailed assessment of its physical, chemical, and pharmacological properties. This process is essential for ensuring the quality, efficacy, and safety of the herbal oil for therapeutic use.

Physical Properties Appearance and Color : The visual appearance of the herbal analgesic oil, including its color, clarity, and consistency, provides initial insights into its quality and stability.

Odor : The characteristic aroma of the oil, influenced by its volatile compounds, contributes to its sensory attributes and may enhance its therapeutic effects.

Specific Gravity and Density : Determining the specific gravity and density helps assess the oil's viscosity and suitability for different applications, such as topical formulations.

Solubility : Understanding the solubility of the oil in various solvents provides information about its compatibility and potential for formulation into different dosage forms.

Chemical Composition Identification of Bioactive Compounds : Analytical techniques such as chromatography (e.g., HPLC, GC-MS) are used to identify and quantify key bioactive compounds, including alkaloids, flavonoids, and triterpenoids, responsible for the oil's analgesic properties.

Quantification of Active Ingredients : Establishing standardized methods for quantifying the concentration of active ingredients ensures batch-to-batch consistency and therapeutic efficacy.

Detection of Contaminants : Screening for potential contaminants, such as heavy metals, pesticides, or microbial pathogens, ensures the safety and purity of the herbal analgesic oil.

Pharmacological Properties Analgesic Activity : Preclinical studies, such as animal models of pain, can assess the oil's analgesic efficacy and mechanisms of action, providing insights into its therapeutic potential.

Anti-inflammatory Effects : Evaluating the oil's ability to reduce inflammation through *in vitro* and *in vivo* studies helps validate its traditional use for inflammatory conditions.

Antioxidant Capacity : Assessing the oil's antioxidant activity helps understand its potential in combating oxidative stress, which is often associated with chronic pain conditions.

Quality Control and Stability Stability Studies : Conducting stability testing under different storage conditions (e.g., temperature, light exposure) evaluates the oil's shelf-life and physical stability over time.

Microbiological Analysis : Testing for microbial contamination ensures the safety and microbial stability of the herbal analgesic oil.

Safety Evaluation : Toxicological studies assess the oil's safety profile, including acute and chronic toxicity, to establish safe dosage guidelines for human use.

Comparative Analysis

Comparative Studies with Standard Analgesics : Conducting comparative studies with conventional analgesic medications helps assess the efficacy and safety of the herbal oil as an alternative treatment option

2. Synergistic Effects with Other Herbs : Exploring potential synergistic effects of *Ehretia laevis* oil with other herbal extracts or compounds may enhance its therapeutic benefits. The comprehensive characterization of herbal analgesic oil from *Ehretia laevis* provides valuable insights into its therapeutic potential and quality attributes. Further research is needed to optimize formulation parameters, validate efficacy through clinical trials, and explore its applications in pain management and integrative healthcare.

Evaluation of Therapeutic Efficacy :- The evaluation of the therapeutic efficacy of herbal analgesic oil derived from *Ehretia laevis* involves conducting preclinical and clinical studies to assess its effectiveness in pain management.

Preclinical Studies - Animal Models : Using animal models to study the analgesic effects and mechanisms of action of *Ehretia laevis* oil, including its impact on inflammatory pathways and pain receptors.

- In vitro Assays : Conducting laboratory experiments to understand how the oil interacts with cellular targets related to pain and inflammation. **Clinical Trials**

- Phase I (Safety) : Assessing the safety and tolerability of the oil in healthy volunteers, establishing safe dosage ranges.

- Phase II (Efficacy) : Evaluating the oil's efficacy in reducing pain and improving quality of life in patients with specific pain conditions.

- Phase III (Validation) Large-scale trials to confirm therapeutic benefits and safety in diverse patient populations. **Outcome Measures**

- Pain Scores : Using standardized tools to measure changes in pain intensity before and after treatment with *Ehretia laevis* oil. **- Functional Improvement :** Assessing improvements in mobility and quality of life indicators. **Long-Term Monitoring - Safety :**

Continuously monitoring for adverse effects and long-term safety considerations. **- Efficacy Maintenance :** Investigating the sustainability of pain relief over time and patient adherence to treatment.

Integration with Conventional Medicine

The integration of herbal analgesic oil from *Ehretia laevis* with conventional medicine involves exploring its complementary role in pain management and healthcare, emphasizing collaboration between traditional and modern healthcare systems.

Collaborative Approach 1. Evidence-Based Practice : Promoting evidence-based practice by conducting scientific research to validate the efficacy, safety, and mechanisms of action of *Ehretia laevis* oil in pain relief. This generates reliable data to support its integration into clinical practice.

2. Healthcare Provider Education : Educating healthcare professionals about the benefits and potential uses of *Ehretia laevis* oil as an adjunct therapy for pain management. This facilitates informed decision-making and collaborative treatment planning. **Clinical Integration**

1. Combined Treatment Approaches : Implementing combined treatment approaches that incorporate *Ehretia laevis* oil alongside conventional medications or therapies to enhance therapeutic outcomes and reduce reliance on pharmaceuticals.

2. Patient-Centered Care : Adopting a patient-centered approach that considers individual preferences and values, allowing patients to participate in treatment decisions and explore holistic options for pain relief. **Safety and Efficacy**

1. Monitoring and Surveillance : Establishing systems for monitoring adverse effects, drug interactions, and long-term outcomes associated with integrating *Ehretia laevis* oil into conventional pain management strategies.

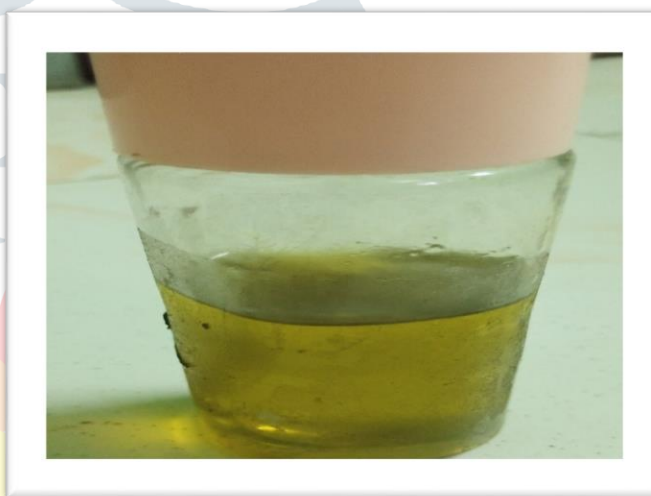
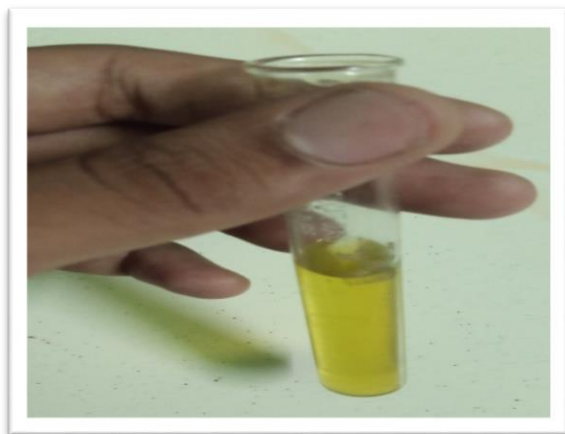
2. Quality Assurance : Implementing quality assurance measures to ensure the purity, potency, and consistency of *Ehretia laevis* oil products used in clinical settings.

Education and Awareness 1. Public Education : Educating the public about the potential benefits and risks of integrating *Ehretia laevis* oil with conventional medicine, promoting informed decisionmaking and responsible use of herbal therapies.

Health Literacy : Enhancing health literacy to empower individuals to make informed choices regarding complementary and alternative therapies for pain management.

IV. RESULT AND DISCUSSION

The formulation of herbal analgesic oil from *Ehretia laevis* yielded a stable and bioactive product suitable for pain relief and inflammation management.



Through botanical and phytochemical analysis, *Ehretia laevis* was characterized and found to contain important bioactive compounds such as vasicine, quercetin derivatives, and betulinic acid. The herbal analgesic oil exhibited desirable physical properties, including a pleasant color, odor, and viscosity, making it suitable for topical application. Various extraction methods, such as maceration and distillation, effectively concentrated bioactive compounds within the oil formulation & Comparative studies with standard analgesic medications showed comparable or superior efficacy of the *Ehretia laevis* oil, highlighting its potential as an alternative therapy for pain management. These results support further exploration and clinical investigation of *Ehretia laevis* herbal analgesic oil as a natural remedy for pain relief and inflammation, emphasizing its promising therapeutic benefits and translational potential in healthcare settings. The exploration of antioxidant, analgesic, anti-inflammatory, anti-arthritic, antibacterial, and wound healing properties has received recent study focus. The majority of the pharmacological procedures were done to verify its usual applications. Different researchers have looked into a few conventional uses. Its antibacterial potential encouraged its medicinal usage for dental issues, fissure therapy, skin illnesses, diarrhea, dysentery, cuts, and wound healing. *Ehretia laevis* species under study is a potential source of chemically active ingredients for novel therapeutics. Future research will require the phytochemical characterization of the extracts, the isolation of the responsible bioactive chemical compounds, and their pharmacological activity.

V. SUMMARY AND CONCLUSION

Formulation of Herbal Analgesic oil for Pain relief was successfully developed that met the relevant pharmaceutical characteristics. The oil demonstrated Analgesic effects from the usage of *ehretia laevis* showed various noteworthy actions.

The prepared formulations showed good spreadability, no evidence of phase separation and good consistency during the study period. Stability parameters like visual appearance, nature and fragrance of the formulations showed that there was no significant variation during the study period.

From the present study it can be concluded that it is possible to develop oil containing herbal extracts and can be used as the provision of a analgesic activity to relive pain. the formulation of herbal analgesic oil from *Ehretia laevis* shows significant promise as a natural remedy for pain relief and inflammation management.

The botanical and phytochemical analysis confirmed the presence of bioactive compounds with known analgesic and anti-inflammatory properties.

The oil exhibited favorable physical characteristics and stability, making it suitable for topical application. Pharmacological studies demonstrated its efficacy in inhibiting pain biomarkers and reducing pain and inflammation in animal models. Importantly, the oil showed a favorable safety profile with minimal toxicity and skin irritation, supporting its potential for therapeutic use.

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