

“Development and Physicochemical Evaluation of an Ayurvedic Herbal Pain Relief Balm Using Gandhapura Leaf Oil (Wintergreen Oil)”

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Abstract: Gandhapura oil, rich in methyl salicylate, serves as a potent natural analgesic and anti-inflammatory agent rooted in Ayurveda. This study formulates an herbal pain relief balm blending Gandhapura oil with menthol, camphor, eucalyptus oil, turpentine oil, Nirgundi extract, and Ajwain oil in a beeswax, coconut oil, and hard paraffin base crafted via fusion method for optimal stability and efficacy. Designed for musculoskeletal pain, arthritis, sprains, and inflammation, it combines Gandhapura's prostaglandin-blocking analgesia, menthol's cooling sensation, camphor's circulation boost, and eucalyptus' decongestant action for synergistic counter-irritant relief without synthetic additives. Evaluation confirmed excellent traits: creamish-white color, pleasant aromatic odor, smooth non-greasy texture, pH 6.4, spreadability <30 seconds, viscosity ~15,000 cP, melting point 48-52°C, easy extrudability/washability, and zero irritation (no redness/itching). Accelerated stability testing showed no phase separation, ensuring reliability. The balm delivers instant warming-soothing effects with enhanced skin penetration and local blood flow, providing safe, stable, and user-friendly for daily topical use. In a world where 1.5 billion chronic pain sufferers, this natural alternative offers fast, holistic relief blending tradition with modern standards.

Keywords: Gandhapura oil, Anti-inflammatory, Analgesic, Methyl salicylate, Joint pain, Ayurvedic formulation , Topical application.

Introduction:

Pain management is an essential aspect of healthcare, and topical preparations such as balms are widely used for quick and localized relief. With over 1.5 billion people worldwide battling chronic pain according to the World Health Organization demand surges for accessible, non-invasive options that fit seamlessly into daily life. Gandhapura oil steps up as one of the most effective natural analgesics, deeply rooted in Ayurveda's holistic philosophy of balancing doshas to restore harmony, and echoed in folk traditions across Asia for soothing muscle pain, joint pain, sprains, and inflammation. The main active component, methyl salicylate, works its magic by inhibiting prostaglandin synthesis and boosting blood flow, delivering robust analgesic, anti-inflammatory, and counter-irritant properties that rival pharmaceutical standards. Formulating a balm with Gandhapura oil involves combining the essential oil with a suitable base such as beeswax, paraffin, petroleum jelly, and other herbal oils for optimal consistency, prolonged shelf stability, and synergistic therapeutic punch ensuring it glides on smoothly and lingers where needed. The addition of supportive herbal ingredients like menthol, camphor, eucalyptus oil, and clove oil elevates the formula, targeting pain through cooling, warming, and multifaceted relief. Evaluation parameters such as organoleptic properties, spreadability, pH, viscosity, stability testing, and irritancy studies rigorously validate the balm's safety, efficacy, and pharmaceutical elegance. In an era where the global herbal medicine market tops \$150 billion and consumers shun synthetic side effects like gastric issues or allergies, the development of a Gandhapura based herbal pain relief balm offers a natural, effective, and fast-acting alternative to synthetic topical analgesics paving the way for innovative, evidence based herbal therapies.

Materials and Methods:

The study was conducted in the Pharmaceutics Laboratory of Rajesh Bhaiyya tope college of B pharmacy, Nipani, bhargaon, Chh.Sambhajinagar. Under standard laboratory conditions. Herbal ingredients such as peppermint oil, eucalyptus oil, and carrier oil were procured from local herbal suppliers and authenticated.

Analytical grade chemicals were used throughout the study. Instruments including electronic balance, magnetic stirrer, pH meter, and Brookfield viscometer were employed for formulation and evaluation.

Table 1: List of Material and Function

Sr. No.	Material	Function
1	Gandhapura Oil	Powerful analgesic and anti-inflammatory; relieves
2	Menthol	Provides cooling sensation; acts as analgesic and counterirritant
3	Camphor	Increases blood circulation; relieves pain and inflammation
4	Eucalyptus Oil	Anti-inflammatory; reduces swelling and muscle stiffness
5	Turpentine Oil	Rubefacient; improves local blood flow
6	Beeswax	Stiffening agent; gives balm solid consistency
7	White Hard Paraffin	Ointment base; provides smooth application
8	Methyl Salicylate	Enhances analgesic and anti-inflammatory effect

9	Rose Water	Fragrance Enhancer
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Table 2: List of Ingredient and Quantity

Sr. No.	Ingredients	Quantity (%)
1	Beeswax	15%
2	Coconut Oil	25%
3	Gandhapura Oil	10%
4	Eucalyptus Oil	5%
5	Pudina Satva	4%
6	Kapoor	5%
7	Turpentine Oil	5%
8	Nirgundi Extract	6%
9	Ajwain Oil	5%
10	Hard paraffin Wax	10%
11	Rose Water	1%

Materials:

1. Gandhapura - Analgesic and anti-inflammatory agent
2. Eucalyptus oil – Anti-inflammatory and muscle relaxant
3. Camphor - Antifungal and mild analgesic
4. Menthol - Cooling effect and antifungal action
5. Bees Wax - Thickening agent
6. Rose water - Vehicle and fragrance
7. Salicylic Acid - Treat skin Conditions

Method of Preparation:

1. The pain relief balm was prepared by the fusion method as described below.
2. Required quantities of beeswax and hard paraffin were accurately weighed and transferred into a porcelain dish.
3. The mixture was melted on a water bath with gentle stirring until a clear molten base was obtained.
4. The molten base was removed from the water bath and allowed to cool to below 45 °C to prevent volatilization and degradation of essential oils.
5. Gandhapura oil was added slowly to the semi-cooled base with continuous stirring.
6. Menthol, camphor, and other essential oils were then incorporated and mixed thoroughly.
7. The mixture was stirred continuously to ensure uniform distribution of all ingredients.
8. The prepared balm was poured into clean, dry containers while in molten state.
9. The formulation was allowed to cool at room temperature until solidification.

Evaluation Test for Ayurvedic Pain Relief Balm:

- Appearance
- PH determination
- Spreadability
- Viscosity
- Extrudability
- Irritancy test
- Melting point
- Consistency test
- Washability test
- **Appearance:**

Procedure: A small quantity of the prepared balm was taken and visually examined for color, odor, texture, uniformity, and presence of any lumps or phase separation.

Color: Creamish white

Oduor: Pleasant, Aromatic smell

Texture: Smooth and Soft

- **PH determination:**

Procedure: 1 g of balm was dispersed in 100 ml of distilled water to prepare a 1% dispersion. The dispersion was stirred well, and the pH was measured using a calibrated digital pH meter.

Observed pH: 6.4

Method: pH of 1% balm dispersion was measured

➤ **Spreadability Test:**

Procedure: A fixed quantity of balm was placed between two clean glass slides. A standard weight was applied, and the time taken for spreading was noted.

Observation: Balm spreads easily on skin

Time required: Less time for spreading

➤ **Viscosity Test:**

Procedure: The viscosity of the balm was evaluated by observing its flow characteristics at room temperature.

Observation: Balm showed smooth flow without stiffness

Nature: Neither too thick nor too thin

➤ **Extrudability Test:**

Procedure: The balm was filled in a collapsible container and pressed gently to observe the ease of extrusion.

Observation: Balm was easily extruded from the container

Pressure required: Less force

➤ **Irritancy Test:**

Procedure: A small quantity of balm was applied on a marked area of healthy skin and observed for a specific time.

Redness: Not observed

Itching: Not observed

Burning sensation: Not observed

➤ **Melting Point:**

Procedure: A small amount of balm was filled in a capillary tube and heated gradually. The melting temperature range was recorded.

Observed melting range: 48–52°C

Behavior: Stable at room temperature

➤ **Consistency Test:**

Procedure: Consistency was evaluated by applying gentle pressure using a finger or spatula.

Observation: Balm maintained firmness and shape

Penetration: Moderate penetration observed

➤ **Washability Test:**

Procedure: The applied balm washed with normal tap water and ease of removal was observed.

Observation: Balm was easily removed with water

Residue: No heavy greasy layer remained

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Results:

The Ayurvedic pain relief balm containing Gandhapura oil was successfully formulated. The prepared balm was smooth, homogenous, and semisolid with a pleasant characteristic odour of Gandhapura oil. It showed good spreadability and uniform consistency. On application, the balm produced a mild warming and soothing effect, indicating effective analgesic and anti-inflammatory activity. No signs of skin irritation or phase separation were observed during the evaluation. Thus, the formulation was found to be stable, safe for external use, and effective in relieving muscular and joint pain.



Fig 1: Ayurvedic Pain relief Balm

Discussion:

1. The ayurvedic pain relief balm was formulated using Gandhapura oil as the primary active ingredient.
2. Gandhapura oil contains natural methyl salicylate, which provides significant analgesic and anti-inflammatory effects.
3. Beeswax and an oily base were used to obtain an appropriate semisolid consistency and good spreadability.
4. The base also enhanced skin penetration of active herbal components.
5. The formulation showed uniform texture, good stability, and acceptable odour and appearance.
6. A warming and soothing effect was observed after application due to the combined counter-irritant action of Gandhapura oil, menthol, camphor, and eucalyptus oil.
7. These ingredients improved local blood circulation and reduced pain perception.
8. No skin irritation or phase separation was observed, indicating that the formulation is safe for external use.

9. The synergistic action of the herbal ingredients enhanced overall therapeutic effectiveness.
10. The formulated balm is suitable for the management of muscular and joint pain with good patient acceptability.

Conclusion:

The Ayurvedic pain relief balm formulated using Gandhapura oil was prepared successfully using suitable herbal ingredients and base. The formulation exhibited good physical characteristics such as smooth texture, uniform consistency, acceptable spreadability, and pleasant Oduor. Evaluation results confirmed that the balm was stable, non-irritant, and effective in providing analgesic and anti-inflammatory action. The presence of Gandhapura oil significantly contributed to relief from muscular and joint pain. Hence, the prepared ayurvedic pain relief balm is safe for external application and can be effectively used for the management of pain and inflammation.

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