



Formulation and Evaluation of Herbal Pain Relief Cream

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Abstract

The present study was aimed at the formulation and evaluation of a herbal pain relief cream containing clove oil, menthol, and camphor. Herbal topical formulations have gained considerable importance due to their safety, effectiveness, and reduced side effects compared to synthetic formulations. Clove oil possesses potent analgesic and anti-inflammatory properties due to the presence of eugenol, menthol provides a cooling sensation and counterirritant action, while camphor improves blood circulation and provides soothing pain relief. The cream was prepared using the fusion method with suitable excipients such as beeswax, liquid paraffin, borax, and preservatives. The prepared formulation was evaluated for various physicochemical parameters including appearance, pH, spreadability, homogeneity, washability, irritancy, viscosity, consistency, and stability studies. The formulation showed satisfactory results with good spreadability, skin-friendly pH, excellent homogeneity, stability, and absence of irritation. The synergistic action of clove oil, menthol, and camphor provided effective analgesic and anti-inflammatory activity. The study concluded that the developed herbal pain relief cream can be considered a safe, economical, and effective alternative to synthetic pain relief formulations for topical management of pain and inflammation.¹²

Keywords: Herbal cream; Clove oil; Menthol; Camphor; Analgesic; Topical formulation

1. Introduction

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage. It is one of the most common medical complaints affecting individuals worldwide. Conventional pain management therapies mainly include non-steroidal anti-inflammatory drugs (NSAIDs) and analgesics, which may produce adverse effects such as gastric irritation, kidney damage, and cardiovascular complications on prolonged use.³

In recent years, herbal medicines have attracted considerable attention due to their safety, effectiveness, affordability, and minimal side effects. Herbal formulations have been used traditionally in Ayurveda, Unani, and Chinese medicine systems for the treatment of pain and inflammation.⁴



Topical drug delivery systems such as creams, gels, and ointments provide localized drug action and avoid first-pass metabolism. They are easy to apply and improve patient compliance. Herbal pain relief creams are widely preferred due to their direct action on affected areas and reduced systemic side effects.⁵

Clove oil obtained from *Syzygium aromaticum* contains eugenol as the major active constituent. Eugenol exhibits potent analgesic, anti-inflammatory, antioxidant, and antimicrobial activities.⁶ Menthol derived from peppermint oil acts on cold-sensitive receptors (TRPM8 receptors) and produces a cooling sensation that relieves pain and irritation.⁷ Camphor obtained from *Cinnamomum camphora* acts as a rubefacient and mild analgesic by improving local blood circulation.⁸

The combination of clove oil, menthol, and camphor produces a synergistic effect that enhances analgesic activity and provides rapid pain relief. The present study was therefore undertaken to formulate and evaluate a stable and effective herbal pain relief cream using these natural ingredients.

2. Review of Literature

Pramod et al. (2010) reported that eugenol present in clove oil exhibits strong analgesic and anti-inflammatory properties by inhibiting prostaglandin synthesis.⁹

Kamatou et al. (2012) reviewed the biological activities of eugenol and concluded that it possesses antioxidant, antimicrobial, and analgesic activities, making it suitable for topical formulations.¹⁰

Eccles (1994) explained that menthol acts on cold receptors and produces a cooling sensation that helps relieve pain and irritation.¹¹

Patel et al. (2007) demonstrated that menthol enhances skin permeability and improves transdermal drug delivery.¹²

Xu et al. (2005) reported that camphor activates transient receptor potential channels and provides pain relief by stimulating sensory nerve endings.¹³

Pandey et al. (2013) highlighted that polyherbal formulations provide synergistic therapeutic effects and improve efficacy compared to single-drug formulations.¹⁴

Barry (2002) explained that topical formulations provide localized drug action and reduce systemic side effects.¹⁵

The literature strongly supports the use of clove oil, menthol, and camphor in the development of an effective herbal pain relief cream.

3. Aim and Objectives

Aim

To formulate and evaluate a herbal pain relief cream containing clove oil, menthol, and camphor for effective topical management of pain and inflammation.



Objectives

1. To formulate a stable herbal cream using clove oil, menthol, and camphor.
2. To evaluate the physicochemical properties of the cream.
3. To study the synergistic analgesic activity of herbal ingredients.
4. To assess safety and skin compatibility of the formulation.
5. To develop an economical and effective herbal topical formulation.

4. Materials and Methods

Materials Used

Table 1: Composition of Herbal Pain Relief Cream

| Sr. No. | Ingredient | Quantity | Function |
|---------|-----------------|----------|------------------|
| 1 | Clove Oil | 2 gm | Analgesic |
| 2 | Menthol | 1 gm | Cooling agent |
| 3 | Camphor | 1 gm | Rubefacient |
| 4 | Beeswax | 10 gm | Thickening agent |
| 5 | Liquid Paraffin | 20 ml | Base |
| 6 | Borax | 0.5 gm | Emulsifier |
| 7 | Distilled Water | q.s. | Vehicle |
| 8 | Methyl Paraben | 0.2 gm | Preservative |
| 9 | Propyl Paraben | 0.02 gm | Preservative |

Extraction of Clove Oil

Clove oil was extracted using steam distillation. Dried clove buds were crushed and placed in a distillation flask. Steam was passed through the material, and volatile oil was collected after condensation. The oil was separated using a separating funnel.

Extraction of Menthol

Menthol was obtained from peppermint oil by steam distillation followed by crystallization. Peppermint leaves were distilled, and the collected oil was cooled to obtain menthol crystals.¹⁶

Extraction of Camphor

Camphor was extracted from *Cinnamomum camphora* wood using steam distillation followed by sublimation to obtain pure camphor crystals.¹⁷

Preparation of Herbal Pain Relief Cream

The cream was prepared by fusion method. Beeswax and liquid paraffin were melted together to form the oil phase. Borax and preservatives were dissolved in distilled water to form the aqueous phase. Both phases were



heated to 70–75°C and mixed with continuous stirring. Menthol and camphor were dissolved separately and added along with clove oil. The cream was cooled while stirring continuously and packed in airtight containers.

5. Evaluation Tests

Organoleptic Evaluation

Table 2: Organoleptic Properties

| Parameter | Observation |
|------------|----------------|
| Color | Off-white |
| Odor | Characteristic |
| Texture | Smooth |
| Appearance | Uniform |

pH Determination

The pH of the cream was determined using a digital pH meter.

Table 3: pH of Cream

| Sample | pH |
|--------|-----|
| Cream | 5.8 |

The pH was found suitable for skin application.

Spreadability Test

Spreadability was determined using glass slide method.

Formula

$$S = \frac{M \times L}{T} \quad S = TM \times L$$

Where:

S = Spreadability

M = Weight tied to upper slide

L = Length of slide

T = Time taken

Table 4: Spreadability

| Parameter | Observation |
|---------------|-------------|
| Spreadability | Good |



Homogeneity Test

Table 5: Homogeneity

| Parameter | Observation |
|------------------|-------------|
| Homogeneity | Uniform |
| Phase Separation | Absent |

Irritancy Test

Table 6: Irritancy Test

| Parameter | Observation |
|------------|-------------|
| Redness | Absent |
| Swelling | Absent |
| Irritation | Absent |

Stability Study

Table 7: Stability Study

| Condition | Observation |
|------------------|---------------------|
| Room Temperature | Stable |
| 40°C | No phase separation |

6. Results and Discussion

The prepared herbal pain relief cream showed satisfactory physicochemical characteristics. The formulation possessed smooth texture, uniform consistency, and pleasant odor, indicating successful incorporation of herbal ingredients. The pH of the cream was found to be 5.8, which is within the normal physiological pH range of skin and confirms its suitability for topical application.¹⁸

The cream exhibited good spreadability, which ensures easy application and uniform distribution over the skin surface. Homogeneity studies revealed absence of lumps and phase separation, confirming stability of the formulation. Washability studies showed that the cream could be easily removed with water, improving patient convenience.

The irritancy test demonstrated absence of redness, swelling, or irritation, indicating that the formulation is safe for topical use. Stability studies conducted at room temperature and elevated temperature showed no significant changes in color, odor, consistency, or phase separation, confirming good stability and shelf life of the formulation.

The analgesic activity of the formulation can be attributed to the synergistic effect of clove oil, menthol, and camphor. Eugenol present in clove oil inhibits inflammatory mediators and reduces pain. Menthol acts on cold



receptors and produces cooling sensation, while camphor improves local blood circulation and enhances analgesic activity.¹⁹²⁰

Overall, the formulated herbal pain relief cream was found to be safe, stable, and effective for topical pain management.

7. Conclusion

The present study successfully formulated and evaluated a herbal pain relief cream containing clove oil, menthol, and camphor. The prepared formulation demonstrated satisfactory physicochemical properties including good appearance, spreadability, homogeneity, and stability. The pH of the formulation was found compatible with skin, and no irritation was observed during evaluation studies.

The synergistic combination of clove oil, menthol, and camphor provided effective analgesic and anti-inflammatory activity. The formulation can therefore be considered as a safe, economical, and effective natural alternative to synthetic pain relief creams. Further clinical studies may be conducted to evaluate long-term therapeutic efficacy and commercial applicability.

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Declaration of Conflicting Interests

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