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Research Article

Formulation and Physicochemical Evaluation of Herbal Cold Cream

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Abstract

As the global cosmetic industry shifts toward sustainable and bioactive alternatives, there is a growing demand for products that offer therapeutic benefits without the adverse effects of synthetic chemicals. The primary objective of this research was to develop a stable emollient that provides antimicrobial protection, deep hydration, and skin barrier restoration.

The formulation and evaluation of an herbal cold cream incorporating a synergistic blend of eight natural and medicinal ingredients: Neem oil, Almond oil, Olive oil, Beeswax, Borax, Liquid paraffin, Tulsi extract, and Rose oil.

The formulation utilizes the potent antibacterial and antifungal properties of Neem (*Azadirachta indica*) and Tulsi (*Ocimum tenuiflorum*), which contain active compounds like azadirachtin and eugenol to manage acne and minor skin infections. To ensure intense moisturization, Almond and Olive oils were integrated for their high concentrations of omega-3 fatty acids and antioxidants, which combat oxidative stress and sun damage.

The preparation followed a systematic heating and emulsification process, where the oil phase (wax and paraffin) and the aqueous phase (borax and water) were blended at 75°C. Rose oil was added as a final step to provide a natural fragrance and restore the skin's physiological pH balance. The resulting herbal cold cream offers a comprehensive skincare solution that bridges traditional botanical wisdom with modern dermatological requirements, providing a safe, effective, and nutrient-rich alternative to conventional synthetic creams.The prepared formulation was evaluated for morphological and physiological characteristics, pH, stability, spreadability, and skin irritation. The formulation demonstrated good physical appearance, homogeneity and stability.

Keywords: Phytochemicals, Extraction, Antioxidant, Antibacterial, Polyherbal

INTRODUCTION:

Cold creams are a type of herbal cosmetic that provides a cooling sensation upon application due to the slow evaporation of water within the emulsion. These creams are typically formulated by blending oils with water through an emulsification process. Historically, cold creams were produced using animal fats and vegetable oils. However, with the increasing demand for natural and safe ingredients, there has been a shift towards incorporating natural oils in the formulation of cold creams.

Cosmetics have been used for centuries to enhance beauty and improve skin appearance. The term "cosmetics" is derived from the Greek word "kosmestikos," which means "to adorn". In recent years, there has been a growing interest in herbal cosmetics due to their natural composition, enhanced safety, and potential therapeutic benefits. Herbal ingredients in cosmetic products offer advantages such as antioxidant, anti-inflammatory, antiseptic, and antibacterial properties, and are generally considered to have fewer adverse effects compared to synthetic alternatives.

The efficacy of this herbal cold cream is rooted in the synergistic relationship between its eight core ingredients. Neem oil (Azadirachta indica) and Tulsi extract (Ocimum tenuiflorum) form the antimicrobial backbone of the formulation. Neem oil, containing the active compound azadirachtin, is renowned for its ability to repel pests and eliminate harmful bacteria.

For deep nourishment and cellular repair, the formulation incorporates Almond oil and Olive oil (Olea europaea). Almond oil is a powerhouse of omega-3 fatty acids and vitamins that boost skin immunity and improve memory when absorbed, while its anti-inflammatory properties soothe irritated tissues[1].

The structural integrity and hydrating power of the cream are managed by Beeswax, Liquid paraffin, and Borax. Beeswax is a remarkable natural humectant that attracts water to the skin while creating a breathable, waterproof barrier against extreme weather and irritants. It also acts as a natural exfoliator, sloughing away dead skin cells to reveal a brighter complexion.

Application of herbal cold cream:

Inflammation: It is use in inflammation because in this present Tulsi

Makeup Remover: The thick oils gently melt away makeup and dirt without the need for harsh scrubbing.

Primer: It can smooth the skin before applying foundation, allowing for more even coverage.

Lip Balm: It locks in moisture and hydrates the sensitive skin on the lips.

Body Lotion: It provides intense hydration for the arms, legs, back, and hands.

Shaving Cream: It can be used as an alternative to traditional shaving products[2].

MATERIAL AND METHODS

Formulation table:

1. Liquid Paraffin
2. Bees Wax
3. Neem Oil
4. Almond Oil
5. Olive Oil
6. Rose Oil
7. Borax
8. Tulsi Extract
9. Distilled water

Liquid paraffin:

Liquid paraffin purchase from 'BRM herbals' Dr. Mukerjee Nagar, House No. 324A, Block-A, 110009 New Delhi DL, India. By brmchemicals.com order no. 30999. It forms a thin, waxy, and waterproof protective layer on the skin's surface. This barrier prevents trans epidermal water loss (evaporation of moisture from the skin), which is critical for keeping dry or irritated skin hydrated.

Bees wax:

Bees wax purchase from 'BRM herbals' Dr. Mukerjee Nagar, House No. 324A, Block-A, 110009 New Delhi DL, India. By brmchemicals.com order no. 30999. Ability to Protect from Irritants. Beeswax can also act as a layer of protection when applied to the skin. It's also a humectant, which means that it attracts water. Both qualities can help the skin stay hydrated. Beeswax is also a natural exfoliator, ideal for sloughing away dead skin cell. Beeswax heals and softens skin and is an antibacterial agent. It can help you fight conditions like acne, dry skin, eczema, and stretch marks. Our raw beeswax can help you create your own skin care moisturizers and lotions specially formulated just for you.

Neem oil:

Neem oil purchase from 'BRM herbals' Dr. Mukerjee Nagar, House No. 324A, Block-A, 110009 New Delhi DL, India. By brmchemicals.com order no. 30999. Neem oil is a naturally occurring pesticide found in seeds from the neem tree. Neem oil is a mixture of components. Azadirachtin is the most active component for repelling and killing pests and can be extracted from neem oil. The portion left over is called clarified hydrophobic neem oil[3].

Almond oil:

Almond oil purchase from 'BRM herbals' Dr. Mukerjee Nagar, House No. 324A, Block-A, 110009 New Delhi DL, India. By brmchemicals.com order no. 30999. It's also anti-inflammatory and boosts immunity. Containing omega-3 fatty acids, almond oil might help you maintain healthy cholesterol levels and improve your memory. It may help lower your risk for diseases like cancer and heart disease.

Olive oil:

Olive oil purchase from 'BRM herbals' Dr. Mukerjee Nagar, House No. 324A, Block-A, 110009 New Delhi DL, India. By brmchemicals.com order no. 30999. Olive oil exhibits anti-inflammatory properties and can help treat sun damage and prevent acne-causing bacteria from forming.

Rose oil:

Rose oil purchase from 'BRM herbals' Dr. Mukerjee Nagar, House No. 324A, Block-A, 110009 New Delhi DL, India. By brmchemicals.com order no. 30999. Rose oil is especially hydrating when combined with other moisturizing ingredients, such as ceramides or glycerine. "These help to moisturize the skin, protect the skin barrier and prevent further water loss from the skin," says Allawh. Rose oil has been used as a beauty product for thousands of years, so it's no surprise that it can improve your complexion and reduce skin redness. The antibacterial properties may help reduce acne. The anti-inflammatory properties can reduce skin redness and puffiness. Rose oil provides good fragrance in cosmetic formulation.

Borax:

Borax takes from Pharmaceutics laboratory (Swami Keshvanand institute of pharmacy, Bikaner. Borax, combined with wax, is used in many cosmetic products like creams, gels, and lotions. It is famously used in hand soaps to help wash off the oil or grease from the hands. Borax's alkaline nature makes it a perfect ingredient in cleansers and toners. In cosmetic products, borax is sometimes used as an emulsifier, buffering agent, or preservative for moisturizing products, creams, shampoos, gels, lotions, bath bombs, scrubs, and bath salts. Borax is also an ingredient combined with glue and water to make "slime," a gooey material that many kids enjoy playing with right from creams and body lotions to shampoos, bath gels and even the in-vogue bath bombs, just about every product associated with skincare has Borax as one of its components.

Tulsi extract:

Tulsi liquid extract water soluble purchase from 'BRM herbals' Dr. Mukerjee Nagar, House No. 324A, Block-A,

110009 New Delhi DL, India. By brmchemicals.com order no. 30999. Tulsi contains active compounds like **eugenol** that provide natural antibacterial, antifungal, and antiviral protection. This makes it effective in cold creams designed to manage acne and minor skin infections. It is use in ani-inflammatory, soothing and antioxidants agent[4].

Table 1 Formulation Table

Sr. No.	NAME OF INGREDIENT	SCIENTIFIC NAME	QUANTITY	USES
1	Liquid Paraffin	Petrolatum	50ml	Prevents skin itching and lubricating agent
2	Bees Wax	Apiccerana	15gm	Emulsifying agent, stabilizer
3	Neem Oil	Azadirachtaindica	4ml	Prevent or even kill fungus
4	Almond Oil	Prunusdulcis var dulcis	3ml	Protective layer skin
5	Olive Oil	Olea europaea	3ml	Anti-inflammatory property
6	Rose Oil	Rosa indica	2ml	Perfuming agent
7	Borax	Sodium tetraborate decahydrate	0.25gm	Stability
8	Tulsi Extract	Ocimum tenuiflorum	7ml	Anti-bacterial,anti-fungal and anti-viral protection
9	Distilled water	Distilled water	q.s.	Providing hydration

Preparation of herbal cold cream: -

Preparation of oil phase:

1. Required quantity of Bees wax and Liquid paraffin in porcelain dish.
2. Heat this solution in water bath for about 70 C.
3. After melting add Neem oil.
4. After then mixing add Oliv oil and Almond oil in this solution.
5. Add rose oil for perfume fragrance.

Preparation of water phase:

1. Take Borax and distilled water in beaker. Heat this solution in water bath for about 75 C.
2. Add Tulsi extract after cooling the solution.

Mixing phase:

1. This Borax solution added drop wise in porcelain dish with continuous stirring.
2. Make Herbal cold cream.
3. Pack in clean container.
4. Labelling on the container[5].



Figure 1: Preparation of herbal cold cream

Evolution test for herbal cold cream

1. Morphological test: -

Physical properties: The cream was observed for the colour, odour and appearance.

2. Physiological test: -

1. **pH measurement:** The pH meter was calibrated using standard buffer solution. About 0.5gm of cream was weighed and dissolved in 50ml of distilled water and its pH was measured using digital pH meter.

Testing Methods

There are two primary ways to measure the pH of your formulation:

- **Digital pH Meter (Most Accurate)**:

1. Calibrate the meter using standard buffer solutions (usually pH 4.0 and 7.0).
2. Immerse the electrode into the 1% aqueous dispersion of the cream.
3. Wait for the reading to stabilize and record the value.

- **pH Indicator Paper (DIY/Field Method)**:

1. Dip a high-sensitivity pH strip into the dispersion.
2. Compare the colour change against the provided standard colour chart immediately.
3. *Note:* This is less precise and can be influenced by the colour of herbal extracts like Neem or Tulsi[6].

2. **Dye test:** The scarlet red dye is mixed with the cream. Place a drop of the cream on a

microscopic slide then covers it with a cover slip and examines it under a microscope. If the disperse globules appear red the ground colourless. The cream is o/w type. The reverse condition occurs in w/o type cream i.e. the disperse globules appear colourless[7].

Testing method:

- **Selection**: Choose an oil-soluble dye (like **Sudan III**).
- **Mixing**: Take a small amount of the herbal cold cream on a watch glass and mix it thoroughly with a tiny drop or crystal of the chosen dye.
- **Microscopic Observation**: Place a thin smear of the dyed cream on a glass slide, cover it with a coverslip, and observe it under a microscope[8].

3. **Test for thermal stability:** Thermal stability of the formulation was determined by the humidity chamber controlled at 60-70% RH and 37 ± 1 0 C

Testing method:

- **Short-Term High-Temperature Test**:

1. **Procedure**: The cream is filled into a container and placed in an incubator at 40°C ± 1°C (or 37°C for some studies) for a period ranging from 24 hours to 7 days.
2. **Goal**: To check for immediate signs of phase separation or oil leakage.

- **Cyclic Temperature Test (Freeze-Thaw)**:

1. **Procedure**: The sample is cycled between extreme cold (e.g., -10°C to 4°C) and elevated heat (up to 40°C) for several days.
2. **Goal**: To simulate the thermal stress of transportation and storage in varying climates[9].

4. **After feel:** Emollience, slipperiness and amount of residue left after the application of fixed amount of cream was checked.
5. **Removal:** The case of removal of the cream applied was examined by washing the applied part with tap water.

Testing method:

This test is usually performed on a standardized area of the skin:

- **Application:** A fixed amount of the herbal cold cream (e.g., 1 gram) is applied to a 3 sq. cm area on the forearm or face.
- **Action:** The cream is massaged into the skin for 30–60 seconds to allow the oils (like almond or liquid paraffin) to dissolve surface impurities.
- **Removal:** The area is then wiped with a dry cotton swab or washed with a standard volume of lukewarm water (approx. 25°C)[10, 11].

6. Dilution test: -

Method: Cream mixed with water or oil

- Observed for mixing or separation

Significance: Identifies the type of emulsion (O/W or W/O)

- Determines the stability and compatibility of the cream[12].

7. **Microbial Growth Testing: -**

Method:

- Prepare sterile agar plates (e.g., Nutrient Agar for bacteria, Potato Dextrose Agar for fungi).
- Use the streak plate method to inoculate the herbal cream sample onto the agar surface.
- Prepare a control plate without the cream to compare growth.
- Incubate the plates at 37°C for 24 hours.
- **Result:** The methodology and comparing these counts accepted safety standards for cosmetics[13].

8. Spreadability Test:

Method:

- Apparatus: Glass slides (standard dimensions), weights (100g to 500g), stopwatch, ruler.
- Apply a small, measured amount of the herbal cold cream between two glass slides.

- Apply a weight (commonly 100g) on top of the upper slide for 5 minutes to ensure uniform thickness.
- Remove the weight and add a specific weight (e.g., 50g-100g) to the pan attached to the upper slide. Measure the time (t) it takes for the top slide to slip off or move a fixed distance.
- Calculation: Calculate the spreadability using the formula.

S= m x L/T

Where-

S- Spread ability

m- weight tied to upper glass slide- length moved on a glass slide

t-time take

RESULT AND DISCUSSION:

Organoleptic evolution test:

Table 2 Organoleptic evolution test

Sr. no.	Parameter	Observation
1.	Colour	White yellow
2.	Order	Pleasant
3.	Texture	Smooth

Physiochemical evolution test:

Table 3 Physiochemical evolution test

Sr. No.	TEST	RESULT	OBSERVATION
1	pH Test	6	Pass
2	Microbial Growth Testing	No growth after incubation	Pass
3	Spreadability Test	No phase separation	Pass
4	Dye test	w/o type cream.	Pass
5	Visual Appearance	uniform in colour	Pass
6	Touch/Feel Method	feel smooth, creamy	Pass
7	Thermal stability test	Stable at room temperature	Pass
8	Dilution test	Not miscible with water	Pass

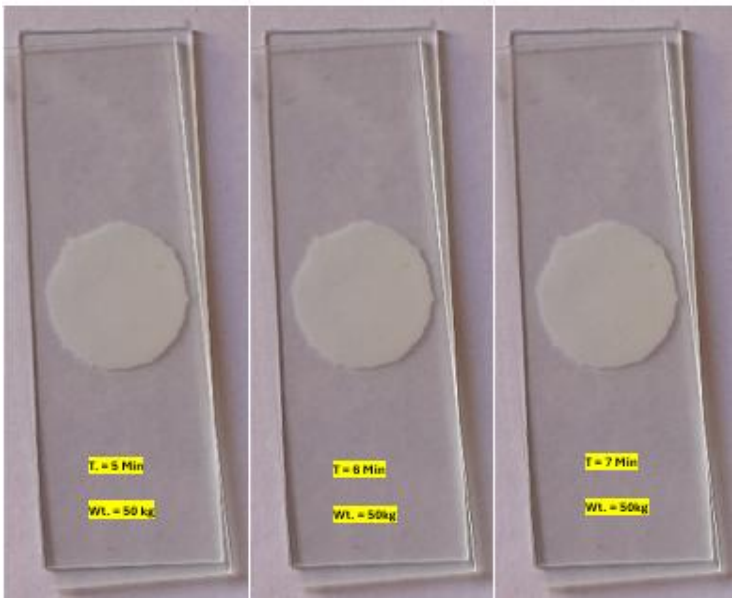


Figure 2: Spreadability Test

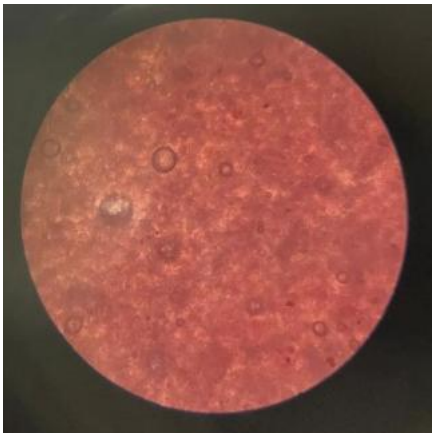


Figure 3: Dye test

CONCLUSION:

This research successfully formulated a stable, bioactive herbal cold cream that bridges the gap between traditional botanical wisdom and modern pharmaceutical standards. By synergizing eight natural ingredients—Neem, Tulsi, Almond, Olive, Rose oils, Beeswax, Liquid paraffin, and Borax—the study developed a multi-functional skincare solution that addresses the rising demand for sustainable, chemical-free alternatives.

The formulation's strength lies in its dual therapeutic and protective action. Neem and Tulsi provide potent antimicrobial properties, while Almond and Olive oils offer deep dermal nourishment and antioxidant protection. Structurally, the cream functions as an elite emollient; the combination of Beeswax and Liquid paraffin creates a breathable barrier that prevents transepidermal water loss, ensuring lasting hydration. Technically, the emulsion demonstrated excellent homogeneity, stability, and a luxurious texture, with Borax acting as an effective emulsifier.

Conflict of Interest: The authors declared no conflict of interest regarding this manuscript.

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