

Development and Evaluation of Herbal-Based Moisturising Cream

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ABSTRACT

This study presents the formulation and evaluation of an herbal-based moisturizing cream using ginger (*Zingiber officinale*), honey (Madhu), and pomegranate (*Punica granatum*), chosen for their antioxidant, anti-inflammatory, humectant, and skin-rejuvenating properties. The cream was prepared by the fusion method and developed into seven formulations (F1–F7), evaluated for appearance, pH, viscosity, spreadability, washability, stability, and irritation. Among them, F5 showed the most suitable characteristics, with a pH of 5.3, viscosity of 108.3 mPa·s, excellent spreadability (2.5 cm²/sec), and easy washability without irritation. The results suggest herbal creams are safe, effective, and sustainable alternatives to synthetic moisturizers.

Key Words:

Moisturizing cream; Ginger (*Zingiber officinale*); Honey (Madhu); Pomegranate (*Punica granatum*); Antioxidant

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1. INTRODUCTION

1.1 Skin

The skin's appearance and functionality are sustained by a delicate balance between the water content in the *stratum corneum* and the lipids present on the skin's surface. As the outermost layer of the body, the skin is constantly subjected to various environmental influences. Both external and internal factors can disturb this balance. Regular exposure to soaps, detergents, alcohol-based products, and hot water can strip away the protective lipids from the skin surface [1]. This disruption of the skin barrier often results in various skin issues, the most common being dehydration, which manifests as dryness, roughness, flaking, cracking, redness, and an uncomfortable sensation of tightness, sometimes accompanied by itching or stinging. The primary goal of moisturizers is to preserve the skin's health and integrity, contributing to a smooth and

healthy appearance. Although many moisturizers are marketed as natural, organic, or herbal, they generally rely on the common mechanisms of humectancy, occlusivity, and emolliency. However, most commercial formulations still incorporate synthetic components like adhesives, emulsifiers, fragrances, colorants, surfactants, and thickeners. There is a significant need to replace these potentially harmful synthetic ingredients with safer, natural alternatives in moisturizer formulations^[2].

1.2 Physiology of Human Skin^[07]

The skin comprises three primary layers: epidermis, dermis, and subcutaneous layer. The dermis, beneath the epidermis, contains collagen and elastic fibers, blood vessels, nerve endings, hair follicles, and glands, providing strength, elasticity, and cushioning via underlying connective and adipose tissue. The epidermis, the outer protective layer, consists mainly of keratinocytes, lacks blood vessels, and receives nutrients via diffusion. The subcutaneous layer (hypodermis), composed of adipocytes, stores energy, insulates the body, and protects internal organs. In certain areas, sebaceous glands secrete sebum to maintain moisture, lubricate, and form a protective barrier, supporting overall skin health and function.

1.3 Dry skin^[08]

Dry skin is characterized by rough, scaly, or flaky texture, often with redness, cracking, or itching. Caused by reduced natural oils and environmental factors, it can lead to conditions like eczema, dermatitis, or psoriasis. Prevalence is high, particularly in the elderly and females, with ichthyosis vulgaris affecting 1 in 300 individuals.

1.4 Moisturizers^[06]

Moisturizers protect, hydrate, and soften the skin by increasing water content and reducing moisture loss, improving texture and appearance. With concerns over synthetic ingredients in commercial products, there is growing interest in herbal alternatives. Creams, semisolid emulsions, vary in consistency and are widely used for skin care and cosmetic purposes.

1.4.1 What are Moisturizers?

Draelos provides a detailed explanation of moisturizers, describing them as topical formulations composed of various components, primarily occlusives and humectants. Occlusives are oily substances, often in water-in-oil emulsions, that form a protective film on the skin surface, thereby reducing water loss. Among them, petrolatum is considered the most effective, followed by mineral oil, paraffin, squalene, cocoa butter, lanolin, stearic acid, cetyl alcohol, and silicones. While mineral oil is widely used for its smooth feel, it only reduces transepidermal water loss (TEWL) by about 30%. Petrolatum, although greasy, is often blended with other agents, whereas lanolin use is limited due to cost, odor, and allergenic potential. Silicones, being noncomedogenic and hypoallergenic, are favored in oil-free products for their light, non-greasy feel. On the other hand, humectants such as glycerin, propylene glycol, urea, honey, sorbitol, sodium lactate, and PCA attract water from the dermis into the stratum corneum. However, when used alone,

humectants may increase TEWL, making their combination with occlusives essential for effective skin hydration.

1.5 Herbal creams^[05]

Herbal creams are semisolid preparations combining bioactive plant compounds and excipients for therapeutic and cosmetic benefits. This study develops a multipurpose moisturizer with Ginger, Honey, and Pomegranate for skin healing and protection.

1.5.1 Types of Multipurpose Herbal Creams:

Herbal creams are formulated considering skin type, moisture needs, and climatic conditions. Based on emulsion type, they are classified as oil-in-water (O/W) and water-in-oil (W/O) creams. O/W creams have water as the continuous phase, producing a lightweight, non-greasy texture ideal for normal to oily skin, quick absorption, and daily use in warmer climates. Conversely, W/O creams have oil as the continuous phase, providing a richer, more emollient and occlusive effect that locks in moisture. They are particularly effective for dry and sensitive skin, offering intense hydration and nourishment through the incorporation of herbal extracts and oils.

1.6 Therapeutic Benefits:

The herbal-based moisturizing cream with Ginger, Honey, and Pomegranate offers antioxidant, anti-inflammatory, and hydrating benefits. It reduces redness, promotes collagen, prevents dryness and irritation, supports healing, enhances elasticity, and rejuvenates skin, providing smoothness, radiance, and overall therapeutic effects for healthy, youthful, and resilient skin.

1.7 Ideal Characteristics of a Moisturizing Cream^[11]

- It should be safe, non-toxic, and non-irritating to the skin.
- It must not cause inflammation or allergic reactions.
- The formulation should allow for smooth and even application on the skin.
- It should leave the skin soft and smooth, without a sticky or greasy feel.
- The cream should be user-friendly and convenient to use.

1.8 Benefits^[11]

- Helps in reducing the appearance of fine lines and wrinkles.
- Keeps the skin hydrated and maintains a youthful appearance.
- Gentle and non-irritating when applied.
- Can be easily removed with water.
- Lighter and less oily compared to ointments.

1.9 Limitations^[06]

- Moisturizing creams are generally less stable than ointments.
- They may have a strong taste or odor, which can be hard to mask.
- Many herbal ingredients used in formulations are not readily available.

2. PLANT PROFILE

2.1 Ginger (*Zingiber officinale*)^[04]

Family Name: – Zingiberaceae

Chemical formula: - $C_{17}H_{26}O_4$

Chemical constituents: - zingiberene (30–70%), β -sesquiphellandrene (15–20%), β -bisabolene (10–15%), and α farnesene

Useful part:- root

pH:- 5 and 7.5



Fig 1: Ginger

Properties:- Ginger, rich in antioxidants and anti-inflammatory compounds, helps reduce redness, irritation, and fine lines, improves skin tone, and offers antimicrobial protection, promoting skin healing and overall health.

Use:

- Help to moisturize the skin and keep it hydrated.
- Helping to prevent dryness and flaking.
- Leave the skin feeling soft and smooth.

- Reduce the appearance of wrinkles and fine lines
- Fade scars
- Keep your hair and scalp healthy
- Make cellulite less noticeable

2.2 Honey (Madhu)^[05]

Family Name :- Apidea

Chemical formula :- C₆H₁₂O₆

Chemical constituents: - it is fructose which is present in the highest quantity in honey so the main constituent of honey is fructose.

pH:- 3.9



Fig 2 Honey

Properties: - Honey is a great natural ingredient for moisturizers due to its humectant and antibacterial properties. It draws moisture from the air and into the skin, keeping it hydrated and soft. Additionally, honey's antibacterial qualities can help with acne and promote a clearer complexion Honey.

Use

- Natural Humectant
- Deep Moisturization
- Antibacterial and Antiseptic
- Rich in Antioxidants
- Skin Soothing and Healing
- Improves Skin Texture and Glow
- Anti-Aging Effects

2.3 Pomegranate (*Punica granatum*)^[06]

Chemical formula: - $C_{34}H_{24}O_{23}$

Family Name :- Punicaceae

Chemical constituents: - Rils contain 85% water, 10% total sugars, mainly fructose and glucose, and 1.5% pectin, organic acid, such as ascorbic acid, citric acid, and malic acid, and bioactive compounds such as phenolics and flavonoids, principally anthocyanins

pH:- 2.9



Fig 3: Pomegranate

Properties: Pomegranate offers several beneficial properties when included in moisturizer creams, primarily due to its rich antioxidant content and hydrating capabilities. It helps in anti-aging, skin hydration, and protection against environmental damage, making it a valuable addition to skincare products

Uses

- Packed with nutrients
- Rich in antioxidants
- anticancer properties
- heart health benefits
- antimicrobial properties
- Good for your brain
- May improve exercise endurance
- Support urinary health.

3. MATERIALS AND METHODS

3.1 Materials

Collection of Materials:

Dried ginger, pomegranate seeds, and honey were procured, cleaned, and ground into fine powder using a mechanical grinder. The powder was sieved for uniformity, collected, and stored in airtight containers, ensuring consistency, homogeneity, and protection from moisture or microbial contamination for use in herbal-based formulations.

Table.1: List of Ingredients

S. No.	Ingredient	Properties	Source
1.	Ginger	Antimicrobial, sclap stimulant	Dasrat Masala Shop,Bhilai
2.	Honey	Anti-Inflammatory	Gulab chand shop, Durg
3.	Pomegranate	Anti-Aging	Dasrat Masala Shop,Bhilai

Table 2: List of Chemicals

S. No.	Ingredient	Properties	Source
1.	Beeswax	Skin hydration	Loba chemie Mumbai, India
2.	Liquid paraffin	Emollient	Loba chemie Mumbai, India
3.	Borax	Buffering Agent, Emulsifier, and Preservative	Loba chemie Mumbai, India
4.	Methyl Paraben	Antimicrobial	Loba chemie Mumbai, India
5.	Distilled Water	Solvent and vehicle	Loba chemie Mumbai, India
6.	Rose Oil	Soothe itchinness	Loba chemie Mumbai, India

3.2 Methods for Preparation of Moisturizer Cream

Fusion (Heating and Mixing) Method:

Both oil and water phases are heated separately to the same temperature (usually 70–75°C). The aqueous phase is then slowly added to the oil phase (or vice versa) with continuous stirring until a uniform emulsion forms. On cooling, perfumes, extracts, and heat-sensitive ingredients are added ^[01].

Formulation of Herbal Moisturizing Cream:

The herbal moisturizing cream was formulated using key herbal ingredients such as ginger, honey, and pomegranate, combined with a surfactant base, natural gelling agents, and other supportive excipients. The preparation followed a stepwise procedure to ensure proper blending of

components and the development of a stable, effective formulation. The procedure was carried out in the following steps:

i) Grinding of Herbal Ingredients

First, thoroughly grind ginger and pomegranate seeds into a fine mixture. After grinding, use a sieve to separate the coarse particles from the fine powder. This ensures a smooth, consistent texture suitable for further formulation or application, enhancing the quality and effectiveness of the herbal preparation or cosmetic product.

ii) Preparation of Oil Phase

Liquid paraffin and beeswax were accurately weighed and heated to 75°C in a borosilicate glass beaker to obtain a homogeneous oil phase.

iii) Preparation of Aqueous Phase

In a separate beaker, borax and methyl paraben were dissolved in distilled water and heated to 75°C using a water bath. The solution was stirred until all solid particles completely dissolved, forming a clear aqueous phase.

iv) Emulsification

The heated aqueous phase was gradually added to the oil phase with continuous stirring. Additional distilled water was added drop wise into the oily portion while stirring vigorously to facilitate proper emulsification. The mixture was then allowed to cool until a desired creamy consistency was achieved.

v) Incorporation of Herbal Ingredients

Accurately weighed ginger powder, honey, and pomegranate powder were promptly incorporated into the emulsion with continuous stirring to ensure uniform dispersion and a smooth cream texture.

vi) Addition of Fragrance

Rose water was added to the cream for fragrance, ensuring thorough mixing to achieve a homogenous formulation.

vii) Cooling and Packaging

The cream was allowed to cool to room temperature with intermittent stirring to prevent phase separation. Once cooled, it was transferred into sterile containers and stored in a refrigerator at 5°C for further evaluation.

3.3 Evaluation ^[01]

Visual assessment: The visual assessment test was conducted to examine parameters such as color, odor and foam formation, ensuring the formulation's overall appearance, fragrance quality, and foaming ability were evaluated effectively.

pH Determination: A 10% solution of the herbal-based moisturizing cream was prepared in distilled water, and its pH was measured at 25 °C using a digital pH meter. This assessment ensured the formulation's stability, safety, and skin compatibility, confirming it remained within the desired pH range for cosmetic use.

Viscosity: The herbal-based moisturizing cream's viscosity was measured using a Brookfield Viscometer LVDV Prime-I at 30 ± 2 °C, employing spindle speeds of 0.3–10 rpm. This evaluation

assessed consistency, Spreadability, and stability, providing insight into texture and flow properties, ensuring smooth application and effective moisturizing performance.

Spreadability Test: Spreadability, indicating ease of application and uniform distribution of the herbal-based moisturizing cream, was evaluated using the slip and drag method. A thin film was formed between two glass slides under a standard weight, and the time for the upper slide to move a set distance was recorded, assessing consistency and usability.

Washability Test: Washability of the herbal-based moisturizing cream was evaluated by applying it on the hand or forearm, rinsing with water, and observing residue. The test, repeated three times, assessed ease of removal, smoothness, and absence of stickiness, ensuring user comfort and consumer acceptability of the formulation.

Stability Studies: Stability studies are essential to determine the shelf life, safety, and performance of herbal-based moisturizing creams under different environmental conditions. These studies ensure that the cream maintains its physical appearance, consistency, pH, odor, and overall effectiveness during storage and use.

Irritation Test: Safety of the herbal-based moisturizing cream was evaluated using a patch test on healthy volunteers. A small amount was applied to the forearm or behind the ear for 24 hours, and then observed for redness, swelling, itching, or rashes. Graded reactions confirmed the cream's safety, non-irritancy, and suitability for regular skin use.

4. RESULTS AND DISCUSSION

The optimized formulation F5 demonstrated an ideal balance between functional efficacy and sensory attributes, confirming the synergistic benefits of combining Ayurvedic ingredients such as ginger, pomegranate seeds, and honey. This formulation showed favorable physicochemical properties, including skin-compatible pH (5.20), suitable viscosity (108.3 mPa·s), smooth texture, and excellent spreadability, comparable to commercial moisturizing creams. Unlike other prototypes, F5 consistently maintained stability and performance without compromising application ease or visual appeal. These results indicate that careful selection of herbal components and formulation design can produce an effective, safe, and environmentally friendly alternative to conventional moisturizing creams.

Table 3: Formulations of herbal beads Moisturizing cream

S. No.	Ingredient	F1	F2	F3	F4	F5	F6	F7
1.	Ginger	1gm	2gm	1gm	4gm	1gm	5gm	6gm
2.	Honey	10 drops						

3.	Pomegranate	0.75gm						
4.	Beeswax	5.2g	5.45g	5.1g	2.4g	2g	2g	2g
5.	Liquid paraffin	18ml	18.1ml	10ml	5ml	2.5ml	4ml	3ml
6.	Borax	0.4g	0.36g	0.45g	5g	0.45g	0.45g	0.45g
7.	Methyl paraben	0.02g	0.03g	0.35g	0.59g	0.35g	0.35g	0.35g
8.	Distilled Water	10ml	9ml	4ml	5ml	5ml	5ml	5ml
9.	Rose Oil	30drops	30drops	30drops	30drops	30drops	30drops	10drops

Table 4: pH measurement test of the prepared cream

S. No	Formulation	pH
1.	F1	3.5
2.	F2	4.0
3.	F3	4.3
4.	F4	4.5
5.	F5	5.2
6.	F6	6.0
7.	F7	7.2

Table 6: Viscosity test of the prepared cream

S. No.	Formulation	RPM	Viscosity (mPa)
1.	F1	60 RPM	172.7mPa
2.	F2	60 RPM	169.3 mPa
3.	F3	60 RPM	951.7 mPa
4.	F4	60 RPM	169.3 mPa
5.	F5	60 RPM	108.3 mPa

6.	F6	60 RPM	236.7 mPa
7.	F7	60 RPM	158.5 mPa

Table 7: Spreadability test of the prepared cream

S. No	Formulation	Consistency	Easy of Spread	Coverage	Residue	Spreadability (cm ² /sec)
1.	F1	Thin	Spread Smoothly	Spread evenly	Small Residue	1.5 cm ² /sec
2.	F2	Thick	Spread Smoothly	Spread evenly	No Residue	1.75 cm ² /sec
3.	F3	Thick	Spread Smoothly	Spread evenly	No Residue	2.0 cm ² /sec
4.	F4	Thick	Spread Smoothly	Spread evenly	No Residue	2.35 cm ² /sec
5.	F5	Thick	Spread Smoothly	Spread evenly	No Residue	2.5 cm ² /sec
6.	F6	Thick	Spread Smoothly	Spread evenly	Small Residue	2.44 cm ² /sec
7.	F7	Thick	Spread Smoothly	Spread evenly	Small Residue	3.0 cm ² /sec

Table 8: Washability test of the prepared cream

S. No	Formulation	Wash Ability
1.	F1	Cream Easily Washed off with water
2.	F2	Cream Easily Not Washed off with water
3.	F3	Cream Easily Not Washed off with water
4.	F4	Cream Easily Not Washed off with water
5.	F5	Cream Easily Washed off with water

6.	F6	Cream Easily Not Washed off with water
7.	F7	Cream Easily Not Washed off with water

Table 9: Irritancy test of the prepared creams

S. No.	Formulation	Irritancy	Edema (swelling)	Erythema (redness)
1.	F1	Irritation	No Irritation	Irritation
2.	F2	No Irritation	Irritation	No Irritation
3.	F3	Irritation	Irritation	Irritation
4.	F4	No Irritation	No Irritation	Irritation
5.	F5	No Irritation	No Irritation	No Irritation
6.	F6	No Irritation	No Irritation	No Irritation
7.	F7	No Irritation	No Irritation	No Irritation

4. Conclusion

The formulation and evaluation of a herbal moisturizing cream represent a blend of traditional herbal knowledge and modern cosmetic advancements. This research aimed to develop a plant-based cream offering therapeutic benefits, skin compatibility, and appealing aesthetics while avoiding synthetic surfactants and harmful additives. The process involved detailed phytochemical analysis, systematic formulation, and comprehensive evaluation to ensure safety and efficacy. Among the seven prototypes prepared, Formulation F5 emerged as the most effective and promising, demonstrating superior qualities compared to others. This study highlights the potential of herbal-based skincare products as safe, efficient, and consumer-acceptable alternatives to conventional creams.

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