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FORMULATION AND EVALUATION OF HERBAL BODY LOTION USING ALOE BARBADENSIS MILLER

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Abstract
This abstract outlines the development of a herbal body lotion, emphasizing its proposed mechanism of action, which involves the upregulation of aquaporin expression and the modulation of key epidermal lipid synthesis. These biological processes are hypothesized to enhance skin hydration and barrier function. The formulation centers around the hydrating and soothing properties of aloe vera, known for its emollient and anti-inflammatory effects. The lotion is meticulously crafted using a synergistic blend of natural and functional ingredients to deliver deep moisturization, nourishment, and a pleasant sensory experience. Key ingredients include aloe vera gel, almond oil, and rosemary oil, chosen for their rich content of skin-nourishing fatty acids and antioxidant properties. Lotus flower powder and sandalwood powder add a distinctive calming fragrance and potential skin-soothing benefits. Functional excipients such as polysorbate, stearic acid, and glycerin are included to stabilize the emulsion, ensure an appealing texture, and enhance moisture retention. Vitamin E provides antioxidant protection, while benzyl alcohol serves as a preservative to maintain product integrity and shelf life. The final product is a non-greasy, fast-absorbing herbal lotion that leaves the skin feeling soft, supple, and refreshed. This formulation represents a harmonious blend of traditional botanical knowledge and modern cosmetic science, offering a natural and effective solution for daily skincare.

Keywords: Herbal skincare, Aloe vera, Skin hydration, Antioxidants, Emollient formulation, Natural cosmetics

INTRODUCTION

In recent years, the beauty and skincare industry has experienced a significant shift towards natural and plant-based products. Among these, herbal body lotions have gained considerable attention for their soothing, nourishing, and skin-friendly benefits. These lotions, infused with a variety of herbs and botanicals, offer an alternative to chemically-laden skincare products, promising healthier, more radiant skin.the natural alternatives provided by herbal body lotions, offering insight into their ingredients, efficacy, and potential for enhancing overall skin health.

Herbal body lotions, formulated with plant-based ingredients, are a prominent category in the pharmaceutical skincare industry, designed to offer therapeutic benefits along with cosmetic effects. These lotions combine the principles of phytochemistry (the study of plant-derived compounds) and dermato pharmacology (the study of drugs used in skin treatment) to provide safe and effective solutions for various skin conditions [1].

In pharmaceutical formulations, the active ingredients in herbal body lotions are carefully selected based on their efficacy, safety, and compatibility with skin physiology. Many herbal lotions are designed to address specific dermatological concerns, such as dryness, irritation, inflammation, and aging, by providing natural alternatives to conventional pharmaceutical skin treatments. These lotions offer non-toxic, eco-friendly, and biocompatible options for patients seeking more holistic or gentle solutions for skin care [2].

Aloe vera has long been celebrated for its skin-healing properties, and as a main ingredient in herbal body lotions, it brings unparalleled benefits. Aloe vera herbal body lotion combines the natural goodness of aloe with other nourishing ingredients to offer deep hydration, soothing relief, and protection for your skin. Whether it's for sunburned, dry, or irritated skin, aloe vera-infused

lotions have a reputation for cooling and calming the skin, making them a favorite for those seeking natural skincare solutions.Aloe vera's ability to retain moisture and promote skin regeneration makes it an essential part of many body lotions. It not only hydrates but also works to repair and restore damaged skin, providing a soft, smooth, and healthy appearance. Its gentle, non-greasy texture makes it suitable for all skin types, especially sensitive or reactive skin [3,4].

Classification of Herbal Body Lotions

1. By Formulation Type

Emulsion-based Lotions: A mix of water and oils (herbal extracts, essential oils) that creates a smooth lotion for easy spreading on the skin.

Gel-based Lotions: Lightweight and water-based lotions that quickly absorb into the skin, leaving no greasy residue.

Cream-based Lotions: Thicker lotions with more oils and herbal extracts, perfect for moisturizing dry or rough skin.

2. By Functionality

Moisturizing Lotions: Designed to hydrate the skin and keep it soft by locking in moisture (e.g., aloe vera, coconut oil).

Soothing Lotions: Contains calming herbs (like chamomile, lavender) to reduce irritation, redness, or inflammation.

Healing Lotions: Help repair damaged or irritated skin with herbs like calendula or tea tree oil that promote skin regeneration.

Antibacterial Lotions: Lotions that fight bacteria or fungi, often used for acne or skin infections (e.g., tea tree oil, neem).

Anti-aging Lotions: Contain antioxidants (like green tea, rosehip) to protect skin from aging and reduce fine lines and wrinkles.

3.By Active Herbal Ingredient

Aloe Vera Lotions: Soothing and cooling, ideal for sunburns or sensitive.

4. By Pharmacological Action

Anti-inflammatory Lotions: Reduce inflammation, often used for conditions like eczema, psoriasis, or rashes (e.g., turmeric, chamomile).

Antioxidant Lotions: Protect skin from aging and damage due to free radicals (e.g., green tea, vitamin E).

Hydrating Lotions: Provide deep moisture to dry skin, often with glycerin, hyaluronic acid, or aloe vera.

Antiseptic Lotions :Help prevent infections and cleanse the skin (e.g., tea tree oil, neem).

5. By Intended Use

Cosmetic Lotions: Focus on improving skin appearance, texture, and overall health (e.g., brightening or firming lotions).

Therapeutic Lotions: Treat specific skin conditions like eczema, psoriasis, or dry patches with stronger herbal ingredients and medicinal benefits.

6. By Skin Type

For Dry Skin – Extra moisturizing lotions, often with ingredients like shea butter or coconut oil.

For Oily Skin – Light lotions that balance oil and help prevent breakouts (often with tea tree oil).

For Sensitive Skin – Gentle lotions with soothing herbs like chamomile or aloe vera.

For Combination Skin – Balanced formulas for both dry and oily areas of the skin.

7. By Fragrance

Unscented Lotion – No fragrance, good for sensitive skin.

Scented Lotion – Infused with natural fragrances like lavender, rose, or citrus.

8. By Organic vs. Non-Organic

Organic Herbal Lotion – Made with 100% natural and organic ingredients.

Non-organic Herbal Lotion – Contains both natural and synthetic ingredients [5].

Importance and its significance

1. Natural Ingredients: Herbal body lotions are made from plant-based ingredients, providing a safer and more natural alternative to synthetic products.

2. Skin Hydration: These lotions help hydrate the skin, keeping it soft, smooth, and moisturized without the harsh chemicals found in some commercial lotions.

3. Soothing & Calming: Herbal lotions, like those with aloe vera or chamomile, help calm irritated, inflamed, or sunburned skin, providing instant relief.

4. Promotes Skin Health: Many herbal body lotions contain ingredients like tea tree oil or lavender, which can promote skin healing and treat skin conditions like acne, eczema, or dryness.

5. Anti-aging Benefits: Herbal lotions with antioxidants, such as green tea or rosehip oil, help protect against skin damage, reduce wrinkles, and slow down the aging process.

Lotion benefits for skincare:

1. Rehydration: They help rehydrate dry skin, making it smoother and softer.

2. Targeted Treatment: Herbal lotions can replenish extra dry or rough spots on the skin, providing targeted treatment.

3. Pleasant Sensation: They feel and smell good, enhancing the overall sensory experience.

4. Relaxation: Herbal lotions can contribute to relaxation, promoting a sense of well-being during use.

5. Skin Softening: They soften the roughest parts of the body, such as elbows and knees.

6. Enhanced Glow: Herbal lotions can make the skin glow, giving it a healthier appearance.

Advantages

1. Natural & Safe – Made from plant-based ingredients, it's free from harsh chemicals and synthetic fragrances.

2. Soothes & Calms – Helps relieve irritation, sunburn, and inflammation, especially with soothing herbs like aloe vera.

3. Moisturizes Deeply – Provides long-lasting hydration, leaving the skin soft and smooth without being greasy.
4. Gentle for Sensitive Skin – Ideal for sensitive skin as it's less likely to cause irritation or allergic reactions.
5. Skin Healing – Promotes skin repair and regeneration, helping with cuts, scars, and dryness.

Disadvantages

1. Slower Results – Herbal lotions may take longer to show noticeable effects compared to chemical-based alternatives.
2. Allergic Reactions – Some people may be allergic to certain herbal ingredients, leading to irritation or rashes.
3. Shorter Shelf Life – Natural ingredients can have a shorter shelf life and may need to be used up quicker.
4. Not Suitable for Severe Conditions – May not be effective for treating more severe skin issues, requiring medical-grade treatments.
5. Higher Cost – Herbal body lotions can sometimes be more expensive due to the quality of natural ingredients.

Ingredients Used

- Aloe vera gel
- Lotus petals powder
- Sandal wood powder
- Polysorbate 80
- Glycerin
- Benzyl alcohol
- Stearic acid
- Almond oil
- Rosemary oil
- Vitamin E capsules
- Water

Table 01: Formulation Table:

Ingredients	Quantity
Aloe vera gel	150 ml
Water	650 ml
Lotus petals powder	20 g
Sandal wood powder	20 g
Glycerin	30 ml
Polysorbate 80	10 ml
Benzyl alcohol	20 ml
Stearic acid	40 g
Vitamin E capsules	1-2 capsules
Almond oil	50 ml
Rosemary oil	5ml

Materials Used In Herbal Body Lotion

Aloe Vera

Aloe vera, as an herbal body lotion, provides lightweight hydration and soothes irritated skin due to its anti-inflammatory properties. It leaves the skin feeling soft and refreshed without a healthy or greasy feel [6].
Function: Soothing, moisturizing, base of the lotion.

Lotus Powder Extract:

Lotus flower powder in aloe vera herbal body lotion provides skin-brightening and anti-aging benefits with its rich antioxidants. This combination helps to even out skin tone and improve overall texture, leaving the skin with a natural, healthy glow and it produce free radicals [7].
Function: Adds herbal benefits, fragrance, and may help with skin texture.

Sandal Wood Powder

Sandalwood powder in a herbal body lotion soothes and calms irritated skin with its anti-inflammatory properties, while its natural astringent qualities help to tighten pores. It leaves the skin feeling cool, smooth, and with a delicate, lingering fragrance [8].
Function: Ads herbal benefits, a pleasant scent, and has skin-calming properties.

Glycerine

Glycerine, when used in aloe vera herbal body lotion, acts as a powerful humectant, drawing moisture from the air into the skin to provide intense and long-lasting hydration. This combination helps to create a protective barrier, keeping the skin soft, supple, and preventing dryness.9
Function: Humectant, draws moisture to the skin.

Polysorbate 80

Polysorbate functions as an emulsifier in herbal body lotion, effectively blending oil-based ingredients with water-based ones to create a smooth, consistent texture. This helps to prevent separation and ensures the active herbal components are evenly distributed for consistent application and performance .10
Function: Helps to solubilize essential oils and herbal powders into water phase.

Stearic Acid

Stearic acid is a fatty acid that serves as a thickener and emulsifier in aloe vera herbal body lotion. It helps to give the lotion its creamy texture and prevents the oil and water components from separating, ensuring a smooth and consistent product [11].
Function: A fatty acid that acts as an emulsifier to bind the oil and water phases together.

Benzyl Alcohol

Benzyl alcohol in an aloe vera herbal body lotion acts primarily as a preservative, preventing the growth of bacteria, yeast, and mold to extend the product's shelf life. It ensures the lotion remains safe and effective over time, while also having a pleasant, light aroma [12].
Function: A cosmetic-grade preservative to prevent bacterial and fungal growth.

Vitamin E Capsules

Vitamin E capsules, when added to aloe vera herbal body lotion, provide potent antioxidant benefits that protect the skin from damage caused by free radicals. This combination deeply nourishes the skin, helping to reduce

the appearance of scars and promoting a healthy, youthful glow [13].

Function: Antioxidant helps preserve the oils and is beneficial for skin health.

Almond Oil

Almond oil in aloe vera herbal body lotion provides deep hydration and nourishment, while its emollient properties help to lock in moisture. It helps to smooth and soften the skin, making it an excellent combination for combating dryness and improving overall skin texture.14

Function: Emollient moisturizes and nourishes the skin.

ROSEMARY OIL:

Rosemary oil in aloe vera herbal body lotion provides a stimulating and refreshing effect, improving circulation and helping to tone the skin. Its astringent and antioxidant properties assist in balancing oily skin and protecting it from environmental damage [15, 16].

Function: Provides a herbal scent and has antioxidant properties.

Water

Distilled water is commonly used in herbal body lotions as a pure, stable base. It is free of minerals and impurities, which prevents them from reacting with other ingredients and destabilizing the emulsion. Using distilled water ensures the lotion remains consistent in texture and extends its shelf life. This pure form of water also provides essential hydration to the skin without introducing any unwanted substances.

Function: Helps to create the emulsion and thin the lotion to a desired consistency.

Method of Preparation

Herbal body lotion requires careful formulation to ensure stability, preservation, and a good user experience. Here is a general method of preparation using the ingredients.

Steps to be followed:

* Sanitation: All your equipment (bowls, spatulas, containers) must be thoroughly cleaned and sanitized to prevent bacterial growth in the final product. Use isopropyl alcohol (70%) or a sanitizing solution.

* Measurement: Use a digital scale for accurate measurements..

* Heating: A double boiler or a heat-resistant bowl set over a pot of simmering water is the safest way to heat ingredients.

* Preservation: Benzyl alcohol acts as a preservative. It's crucial for preventing mold, yeast, and bacteria growth, especially with the inclusion of water and plant-based ingredients like aloe vera gel.

* Emulsification: Polysorbate 80 and Stearic Acid are the emulsifiers in this formula. They are what allow the oils and water to mix and stay mixed, preventing separation.

* pH Testing: For a stable and safe product, it is recommended to test the pH of the final lotion. A pH range of 5.5 to 6.5 is generally good for skin.

Equipment:

- Two heat-resistant beakers or pots (one for the water phase, one for the oil phase)
- A scale for measuring ingredients accurately
- A stir stick or a hand blender/immersion blender
- A thermometer (to monitor temperature)
- A container for the final product (e.g., a jar or a bottle)
- A fine sieve or cheesecloth (optional, for straining the powders)

Preparation Method

Step 1: Prepare the Aqueous Phase

- In a heat-resistant beaker, add 650 ml of water.
- Add the Lotus Flower Powder and Sandalwood Powder to the water. * Gently heat the mixture to a low simmer (around 70-75°C or 158-167°F).
- Remove from heat and let the mixture cool slightly.
- Once cooled, you can optionally strain the mixture through a fine sieve or cheesecloth to remove the undissolved powder particles for a smoother lotion.
- Add the Glycerine and Aloe Vera Gel to this strained liquid. Stir well and set aside.

Step 2: Prepare the Oil Phase

- In a separate heat-resistant beaker, combine the Stearic Acid, Almond Oil, and Polysorbate 80.* gently heat this mixture using a double boiler method or very low direct heat.
- Stir continuously until the Stearic Acid is completely melted and the mixture is a clear, homogenous liquid

Step 3: Emulsification

- Ensure both the aqueous and oil phases are at a similar temperature (around 70-75°C or 158-167°F). This is crucial for successful emulsification.
- Slowly pour the hot oil phase into the hot aqueous phase while continuously stirring. Using a hand blender or immersion blender at this stage is highly recommended to create a stable emulsion. Blend for 2-3 minutes until the mixture thickens and turns into a milky, creamy lotion.

Step 4: Cool Down and Final Additives

- Stop blending and let the lotion cool. As it cools, it will continue to thicken.
- Once the lotion has cooled to room temperature (below 40°C or 104°F), add the heat-sensitive ingredients.
- Rosemary Oil: Add the essential oil for fragrance and its potential antioxidant properties. Mix well.

Step 5: Final Packaging

- Once all ingredients are thoroughly combined and the lotion has reached its final consistency, transfer it to a clean, sterilized container.
- Check Consistency: The final consistency will depend on the exact temperature control and the mixing process. Using a hand blender or immersion blender is key to creating a smooth, stable emulsion.

* Label the container with the product name and date of preparation.

Storage: Store in a cool, dark place. The lotion is ready to use.

Evaluation Tests for Aloe Vera Herbal Body Lotion

1. Physicochemical Evaluation

- Appearance, Color, and Odor: A visual and olfactory inspection is performed to check for consistency in appearance (lotion-type, smoothness), color, and fragrance. Any changes over time can indicate instability.
- pH Measurement: The pH of the lotion is measured using a pH meter. For skin-friendly products, the pH should be close to the natural pH of the skin (typically between 4.5 and 6.5).
- Viscosity and Rheological Properties: These tests measure the lotion's thickness, flow behavior, and spreadability.
- Homogeneity: This test involves visual inspection and tactile examination to ensure the lotion is uniform and free of lumps, aggregates, or phase separation.
- Spreadability: This test measures how easily the lotion spreads on a surface. It is a key factor in consumer acceptance.
- Removal/Washability Test: This test assesses how easily the lotion can be removed from the skin with water, which is important for user experience.
- Acid Value: This test measures the amount of free fatty acids in the lotion, which can affect its stability.
- Absorption Test: The lotion is applied to the skin and rubbed in to see how quickly and completely it is absorbed.

2. Stability and Shelf-Life Testing

- Accelerated Stability Testing: The product is stored at elevated temperatures (e.g., 40°C or 45°C) for a defined period (e.g., 3 months). It is then inspected for changes in color, odor, pH, product that remains stable under these conditions is likely to have a longer shelf life.
- Temperature Cycle Testing (Freeze-Thaw): The product is subjected to alternating cycles of high and low temperatures .
- Centrifuge Testing: The lotion is heated and then centrifuged at high speed. This test accelerates the effects of gravity and helps predict if the emulsion will separate over time.
- Long-term (Real-time) Stability: The product is stored under normal conditions (room temperature) and monitored over its expected shelf life to confirm the results of the accelerated tests.

3. Safety and Efficacy Testing

These evaluations ensure the product is safe for use .

- Skin Irritancy Test (Patch Test): A small amount of the lotion is applied to a specific area of the skin and monitored for a period (e.g., 24 hours) for signs of irritation, such as redness, itching, or swelling .
- Microbial Stability Testing: This involves checking for the growth of microorganisms to ensure the preservative system is effective.

Results

The formulated herbal body lotion was evaluated based on a series of physicochemical, sensory, and microbiological parameters to determine its quality, stability, and user acceptability. The results are summarized below:

Appearance: The lotion exhibited a creamy and uniform consistency, indicating proper emulsification and ingredient dispersion.

Colour: The product was white in color, consistent with the expected appearance for herbal formulations without added artificial colorants.

Odour: A pleasant herbal aroma was observed, aligning with the presence of essential oils and botanical extracts.

Texture: The formulation was smooth upon tactile examination, confirming good blending and emulsion quality.

pH: The measured pH was 6.2, which falls within the acceptable skin-compatible range of 5.0–7.0, indicating suitability for topical application.

Consistency: The lotion demonstrated a medium consistency, which supports ease of application and adequate skin coverage.

Spreadability: The formulation spread easily on the skin surface, promoting uniform application without excessive effort.

Washability: The lotion showed good washability, leaving minimal residue upon rinsing with water.

Greasiness: Low greasiness was reported, contributing to a non-oily skin feel post-application.

Stickiness: No stickiness was observed, enhancing the overall sensory experience and user comfort.

Viscosity: The product exhibited moderate viscosity, ensuring stability and easy dispensing.

Stability: The formulation remained stable under standard storage conditions, with no phase separation, discoloration, or odor change observed.

Irritation Test: No signs of irritation were detected during dermal testing, suggesting the lotion is safe for regular use.

Microbial Test: The product passed microbial testing, indicating that the preservative system is effective and the product is microbiologically safe.

Homogeneity: The lotion was found to be homogeneous, with consistent distribution of ingredients throughout the batch.

Table: 01 Parameters of formulated herbal body lotions

PARAMETERS	Observation
Appearance	Creamy
Colour	White
Odour	Herbal
Texture	Smooth

pH	5.0-7.0(6.2)
Consistency	Medium
Spreadability	Easy
Washability	Good
Greasiness	Low
Stickiness	None
Viscosity	Moderate
Stability	Stable
Irritation test	None
Microbial test	Passed
Homogeneity	Uniform

Discussion

Herbal body lotions have gained significant popularity in recent years due to the increasing awareness of natural and chemical-free skincare. Unlike conventional lotions that often contain synthetic fragrances, parabens, and preservatives, herbal body lotions are formulated with plant-based ingredients, such as aloe vera, sandal wood powder, vitamin E capsules which offer multiple skin benefits. These ingredients are known for their soothing, moisturizing, and healing properties, making herbal lotions suitable for sensitive and dry skin.

The use of herbal body lotions helps maintain the natural balance of the skin by providing essential nutrients and antioxidants that combat free radical damage and slow down premature aging. Ingredients like almond oil and aloe vera deeply hydrate and improve skin elasticity, while herbs like rosemary oil and lotus extract calm irritation and redness. Moreover, herbal lotions are generally considered eco-friendly and safer for long-term use since they minimize the risk of allergic reactions or chemical-induced skin problems. Despite their benefits, the effectiveness of herbal body lotions can vary depending on the concentration of active ingredients and the formulation. Regular use, combined with a healthy lifestyle, enhances skin health, leaving it soft, supple, and naturally glowing. This trend reflects a growing preference for natural skincare solutions over synthetic alternatives.

Conclusion

This review explores the use of herbal extracts, specifically aloe vera, for cosmetic purposes. The increasing demand for natural personal care products has highlighted the benefits of herbal alternatives, which provide essential nutrients and antioxidants without causing adverse reactions. It is also widely used in cosmetics for its moisturizing and soothing effects. The study prepared a herbal lotion using aloe vera, which was evaluated and found to be effective, stable, and safe for skincare. This lotion, which appeared greenish in color, helps to moisturize and protect the skin. The review concludes that this formulated product is a valuable addition to the herbal cosmetics market and suggests that further studies should be conducted to check its long-term stability and effects on human skin.

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All authors are contributed equally.

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