

Formulation and Development of Facecream using Borassus Flabellifer and Acalpha Indica

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ABSTRACT: This study aimed to develop a face cream using natural extracts from *Borassus flabellifer* (palmyra palm) and *Acalypha indica* (Indian nettle) due to their skin benefits. *Borassus flabellifer* is rich in vitamins, minerals, and antioxidants that aid in skin nourishment, hydration, and protection against oxidative stress, while *Acalypha indica* has anti-inflammatory, antimicrobial, and wound-healing properties beneficial for treating acne and irritation. Active compounds were extracted from both plants using solvent extraction techniques and incorporated into a cream base. Various formulations were created by adjusting extract concentrations to find the optimal combination for efficacy and stability, with physicochemical properties such as pH, viscosity, spreadability, and stability evaluated to ensure quality and safety. Preliminary tests showed good stability and maintained beneficial properties, and in vitro studies indicated potential for enhancing skin hydration, reducing inflammation, and providing antimicrobial effects. Future in vivo testing and consumer trials are planned to validate the formulation's efficacy and safety. In conclusion, the face cream with *Borassus flabellifer* and *Acalypha indica* extracts shows promise as a natural and effective skincare product, highlighting the potential of traditional medicinal plants in modern cosmetics.

Keywords: Face cream, Natural extracts, Active compounds, Skin care, Skin pathogens, Effective skin care product, Medicinal plants.

I. INTRODUCTION

The skin is the largest organ of our body, comprising three main layers: the epidermis, dermis, and subcutis. Our general health is reflected in the skin's condition. As the largest organ of the human body, the skin is remarkably soft yet resilient. Its texture and thickness vary

across different body parts, such as the thin skin on lips and eyelids and the thicker skin on foot soles. The skin's appearance often indicates overall health, revealing signs of illness. The dermis contains a rich network of blood vessels that expand in hot weather or after exercise, releasing heat through sweat evaporation. In cold temperatures, these blood vessels constrict, reducing heat loss. The dermis also contains sebaceous glands that secrete sebum to moisturize the skin. With its multiple functions, the skin is an incredibly versatile organ, serving as a waterproof barrier, defense against pathogens, cooling system, and sense organ. Dehydrated skin lacks water, but can be easily treated with lifestyle changes. Dehydration treatment focuses on replenishing hydration from the inside out. Dehydrated skin may appear dry, but differs from dry skin type. Severe dehydration and dry skin require medical attention. Skin infections, caused by bacteria, viruses, fungi, or parasites, vary in severity and treatment. Infections can spread and worsen in people with weakened immune systems due to health conditions, medication, age, or obesity. Different germs cause various skin infections, including bacterial, viral, fungal, and parasitic infections. Individuals with poor circulation are more prone to developing skin infections. Additionally, those with diabetes are also at a higher risk due to their compromised immune system. Advanced age is another factor that increases susceptibility to skin infections, as the skin's natural barrier function declines with age. Furthermore, individuals with immune system diseases, such as HIV, are more likely to experience skin infections due to their weakened immune response. Immune suppression resulting from chemotherapy or other medications also increases the risk of skin infections. Prolonged immobility, such as bed rest or paralysis, can also lead to skin infections, as it can cause skin

breakdown and impair the body's natural defense mechanisms. Malnutrition is another risk factor, as a diet lacking essential nutrients can impair skin health. Finally, excessive skin folds, often associated with obesity, can also increase the risk of skin infections. In today's health-conscious era, individuals are increasingly prioritizing their well-being, including the implementation of a consistent skincare routine. A well-structured skincare regimen is essential for maintaining a clear and fresh complexion, despite exposure to pollutants and other damaging elements. Regular skincare practices, such as cleansing and moisturizing, remove excess oil and dirt from pores, prevent acne, reduce sunspots, and leave skin appearing bright and plump. By prioritizing skincare, individuals can protect their skin from damage and maintain optimal skin health. In today's health-conscious era, individuals are increasingly prioritizing their well-being, and a crucial aspect of this is implementing a consistent skincare routine. A well-structured skincare regimen is essential for maintaining a clear and fresh complexion, despite exposure to pollutants, UV radiation, and other damaging elements that can cause harm to the skin. Regular skincare practices, such as cleansing and moisturizing, play a vital role in removing excess oil and dirt from pores, preventing acne, reducing sunspots, and leaving skin appearing bright, plump, and radiant. By prioritizing skincare, individuals can protect their skin from damage caused by environmental stressors, support the skin's natural barrier function, and maintain optimal skin health. Effective skincare routines also have a profound impact on self-confidence, enhancing overall quality of life and supporting long-term skin health. Furthermore, a reliable skincare regimen can address specific skin concerns, such as dryness, oiliness, or sensitivity, and provide personalized benefits for each individual's unique skin type and needs. In addition, a well-structured skincare routine can help mitigate the visible signs of aging, reduce the appearance of fine lines and wrinkles, and promote a more even-toned and youthful complexion. By investing time and effort into a consistent skincare routine, individuals can reap the rewards of healthy, glowing skin that not only looks great but also feels great. Maintaining healthy skin is crucial for overall well-being, as it plays a vital role in protecting the body from external factors, regulating body temperature, and aiding in the senses of touch and feel. Proper skincare routines, healthy lifestyle choices, and specific ingredients are essential for achieving and maintaining healthy skin, and work together to

promote skin health and address various skin concerns. Antioxidants, such as vitamins A, C, and E, selenium, zinc, carotenoids, flavonoids, and glutathione, play a vital role in preventing or slowing aging and cell damage, reducing DNA damage, improving hydration, stimulating collagen production, and reducing the appearance of wrinkles and pigmentation. Skin-soothing ingredients, including aloe vera, green tea extract, chamomile, and colloidal oatmeal, help calm signs of irritation, reduce redness and blotchiness, and promote skin comfort, making them beneficial for sensitive and sensitized skin, including eczema-, acne-, and rosacea-prone skin. Skin elasticity, which refers to the skin's ability to stretch and return to its original shape, is maintained through proper skincare routines, hydration, and sun protection, and is crucial for preventing wrinkles, sagging, and other visible signs of aging. Anti-inflammatory agents, such as niacinamide, aloe vera, green tea extract, chamomile, and colloidal oatmeal, reduce skin inflammation, soothe irritated skin, and promote skin health, addressing concerns such as redness, irritation, and skin sensitivity. Antimicrobial activity, which involves using substances to combat harmful microorganisms on the skin, is essential for preventing infections, promoting skin health, and managing conditions such as acne. The healing effect, which enhances the skin's natural ability to repair and regenerate, is promoted by ingredients such as aloe vera, honey, vitamins C and E, Centella Asiatica, and peptides, and is crucial for maintaining healthy, radiant skin. By understanding and addressing these factors, individuals can maintain healthy, radiant skin, address various skin concerns, and improve their overall quality of life. *Borassus flabellifer*, commonly known as the palmyra palm, is a versatile plant with a multitude of benefits for skin health. The sap, known as "toddy," is rich in antioxidants and has deep hydrating properties, making it an excellent ingredient for skin care products. It helps maintain skin moisture, prevents dryness, and combats free radicals, minimizing signs of aging such as wrinkles and fine lines. The plant's extracts exhibit anti-inflammatory effects, soothing irritated skin and reducing redness. The fibrous husk of the palmyra fruit serves as a natural exfoliant, promoting skin texture and radiance. Additionally, the plant supports skin repair, firmness, and elasticity, contributing to a more youthful appearance. It also helps balance skin tone, reduces hyperpigmentation, and offers antimicrobial and detoxifying properties, making it a valuable ingredient for overall skin health.

The skin of *Borassus flabellifer* has several beneficial properties in skincare. Its coarse, fibrous texture makes it an effective natural exfoliant, removing dead skin cells and revealing a smoother complexion. Traditionally, the skin has been used to protect minor wounds and abrasions, offering a natural barrier against external contaminants and supporting the healing process. The palm skin may also possess antimicrobial properties, reducing infection risks and promoting overall skin health. Its use as a physical exfoliant represents an eco-friendly alternative to synthetic options, aligning with sustainable skincare practices. Furthermore, the gentle, fibrous texture can provide soothing massage benefits, enhancing circulation and relaxation. In addition to its individual benefits, *Borassus flabellifer* can be combined with other natural ingredients to enhance its effects. For example, pairing it with antioxidants like vitamins C and E can amplify its anti-aging properties. Combining it with soothing ingredients like aloe vera or green tea extract can enhance its calming effects. By harnessing the power of *Borassus flabellifer* and other natural ingredients, individuals can create effective skincare routines that promote healthy, radiant skin. Moreover, the plant's versatility and sustainability make it an excellent choice for those seeking eco-friendly skincare solutions. Its natural properties and benefits make it an ideal ingredient for a variety of skincare products, from moisturizers and exfoliants to masks and serums.

Acalypha indica, commonly known as Indian acalypha, is a plant renowned for its remarkable skin care benefits, which have been utilized for centuries in traditional medicine. Its strong anti-inflammatory properties make it an effective ingredient in reducing redness, swelling, and irritation associated with various skin conditions, such as acne, rosacea, eczema, and dermatitis. The plant's antimicrobial activity helps combat bacterial and fungal infections, supporting overall skin health and preventing the growth of harmful microorganisms that can lead to breakouts and other skin issues. Traditionally, *Acalypha indica* has been used to accelerate wound healing and repair minor injuries due to its ability to promote tissue regeneration, reduce inflammation, and enhance the skin's natural barrier function. This makes it an excellent ingredient for post-surgical care, minor cuts and scrapes, and skin irritations. Additionally, the plant's soothing effects provide relief for irritated or sensitive skin, making it an excellent ingredient for conditions like eczema, dermatitis, psoriasis, and rosacea. In antioxidants,

Acalypha indica combats oxidative stress, protects the skin from premature aging, and reduces the appearance of fine lines and wrinkles. Its anti-acne benefits stem from its ability to reduce inflammation, inhibit microbial growth, and prevent clogged pores, making it an effective ingredient for acne-prone skin. The plant's toning properties help achieve a smoother, more even complexion, reducing the appearance of pores and promoting a radiant glow. Furthermore, *Acalypha indica* aids in maintaining skin hydration, preventing dryness, and supporting overall skin moisture. Its ability to balance the skin's natural moisture barrier makes it an excellent ingredient for dry, sensitive, or mature skin. The plant's diverse properties make it a valuable component in both traditional and contemporary skincare routines, offering a natural and effective solution for various skin concerns. By harnessing the power of *Acalypha indica*, individuals can create effective skincare routines that promote healthy, radiant skin and address specific skin concerns, such as acne, aging, and hyperpigmentation.

Rosemary extract, vitamin E capsules, and grape seed extract are increasingly being used as natural preservatives in skincare products due to their antioxidant and antimicrobial properties. Rosemary extract, derived from the herb *Rosmarinus officinalis*, contains carnosic acid, a potent antioxidant that inhibits microbial growth and prevents oxidation. This makes it an excellent alternative to synthetic preservatives, ensuring product stability and safety while also providing benefits to the skin. Vitamin E, a lipid-soluble antioxidant, protects products from oxidative degradation and spoilage. Its capsules can be incorporated into skincare formulations to prevent rancidity and extend shelf life. Vitamin E's antioxidant properties also benefit the skin, neutralizing free radicals and promoting collagen production, which can help reduce the appearance of fine lines and wrinkles. Grape seed extract, rich in polyphenols, exhibits antimicrobial and antioxidant activities, making it an effective natural preservative. Its ability to inhibit microbial growth and prevent oxidation ensures product stability and safety, while its antioxidant properties benefit the skin, reducing inflammation and promoting healthy aging. Grape seed extract also has anti-inflammatory properties, which can help soothe and calm irritated skin. The use of these natural preservatives offers several benefits, including improved product safety, extended shelf life, and enhanced skin benefits. They provide a safe and effective solution for skincare manufacturers

looking to move away from synthetic preservatives and meet consumer demand for natural and organic products. As the skincare industry continues to evolve, rosemary extract, vitamin E capsules, and grape seed extract are likely to play an increasingly important role in product formulation.

The skincare industry has witnessed a significant shift towards natural and organic products in recent years, driven by growing consumer demand for safe, effective, and sustainable ingredients. In response, manufacturers are seeking alternative preservatives that can ensure product stability and safety while meeting these consumer expectations. Rosemary extract, vitamin E capsules, and grape seed extract have emerged as promising natural preservatives, offering antioxidant and antimicrobial properties that can extend product shelf life and benefit the skin. This manuscript reviews the current state of knowledge on these natural preservatives, including their mechanisms of action, efficacy, and applications in skincare product formulation. By exploring the potential of these natural preservatives, we aim to contribute to the development of safer, more effective, and more sustainable skincare products that meet the evolving needs of consumers.

II. MATERIALS AND METHODOLOGY:

Sample Collection and Preparation

Plant materials (grape seeds and rosemary leaves) were collected from a local source. The plant materials were dried at room temperature (25°C) for 7 days to remove excess moisture. The dried plant materials were then powdered using a grinder to increase the surface area for extraction. The powdered plant materials were stored in airtight containers to prevent contamination.

Extraction

Soxhlet extraction was used to extract the bioactive compounds from the powdered plant materials using two different solvents. Petroleum ether (60-80°C) was used as the first solvent to extract the non-polar compounds. Ethanol (95%) was used as the second solvent to extract the polar compounds. The extraction process was carried out for 6 hours for each solvent. The solvent-to-sample ratio was 3:1 (v/w) for both solvents.

Rotary Evaporation

The extracted solvents were then subjected to rotary evaporation to remove the solvents and

obtain the crude extracts. The temperature and pressure conditions for rotary evaporation were optimized to prevent degradation of the bioactive compounds. The rotary evaporation process was carried out until the solvent was completely removed.

Preparation of Preservatives

The crude grape seed extract, rosemary extract, and vitamin E were mixed in different ratios to prepare the preservative formulations:

Formulation 1: Grape seed extract (50%) + Rosemary extract (30%) + Vitamin E (20%)

Formulation 2: Grape seed extract (30%) + Rosemary extract (50%) + Vitamin E (20%)

The formulations were then evaluated for their antioxidant and antimicrobial activities.

III. RESULT AND DISCUSSION:

The Soxhlet extraction and rotary evaporation process were effective in extracting the bioactive compounds from grape seeds and rosemary leaves, yielding a significant amount of crude extract. The resulting preservative formulations unveiled high antioxidant activity. The combination of grape seed extract, rosemary extract, and vitamin E appeared to have a synergistic effect, resulting in enhanced antioxidant and antimicrobial activity. This suggests that the preservative formulations have potential to protect against oxidative stress and prevent spoilage in skincare products, while also thwarting microbial growth and contamination. Overall, the results indicate that the preservative formulations have potential to be used as natural preservatives in skincare products, offering a safe and effective alternative to synthetic preservatives. The antioxidant and antimicrobial properties of the formulations make them suitable for use in a variety of skincare products, including creams, lotions, and serums.