

FORMULATION AND EVALUATION OF SACCHARUM OFFICINARUM EXFOLIATING FOOT MASK

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1. ABSTRACT

The aim of research was to develop and evaluate a saccharum officinarum exfoliating foot mask as a potential skincare product for effective foot care and rejuvenation. The study focused on formulating a natural and safe exfoliating foot mask using saccharum officinarum extract, which possess inherent exfoliating and moisturizing properties, addressing common issues such as cracked heels, rough skin and other foot related concerns. The research includes collection and extraction of saccharum officinarum and their characterization using various analytical techniques. The study involves glycolic acid extraction from saccharum officinarum using rotary evaporator at temperature of 70°C. In skin care, people use them as exfoliants to remove dead skin cells. The presence of glycolic acid was confirmed by performing TLC analysis. Further the extracted glycolic acid was then incorporated into a suitable formulation, using other ingredients known for their skin-friendly properties. The formulated foot mask was subjected to a comprehensive evaluation and characterization parameters to assess its physical characteristics, stability, irritancy, washability, exfoliating property, moisturizing potential and sensory attributes.

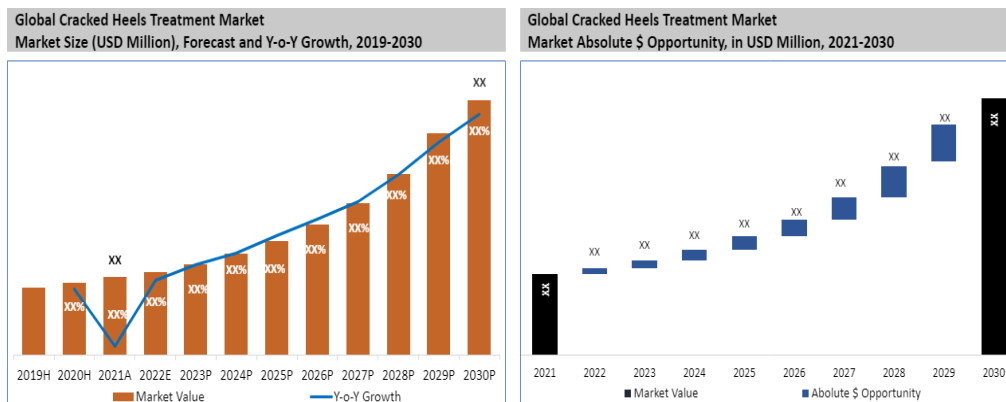
2. INTRODUCTION

In the United States, the Food and Drug Administration (FDA), which regulates cosmetics, defines cosmetics as products "intended to be applied to the human body for cleansing, beautifying, promoting attractiveness, or altering the appearance without affecting the body's structure or functions". Cosmetics are composed of a mixture of naturally occurring or synthetically produced compounds. Cosmetics include skin care creams, lotion, powders, perfumes, lipsticks, nail polish, eye and facial makeup products. Those designed for personal care and skin care can be used to cleanse or protect the body or skin.

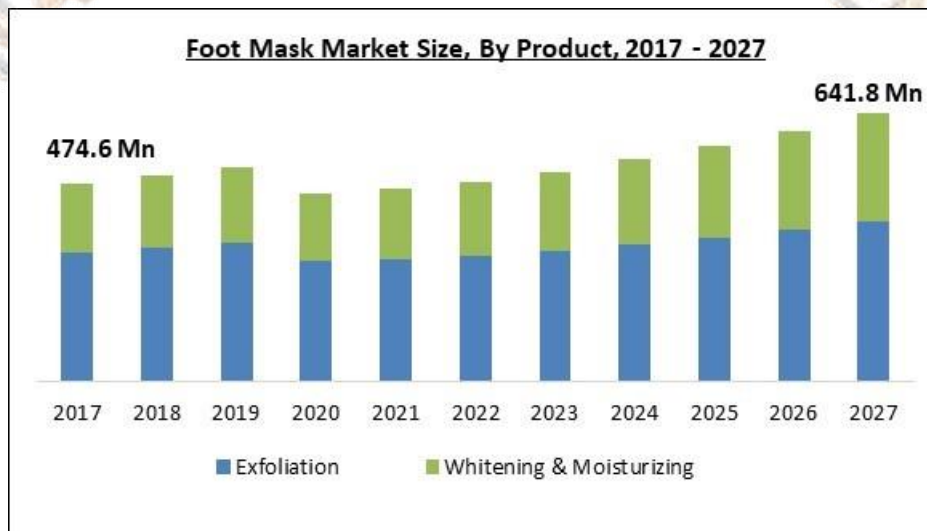
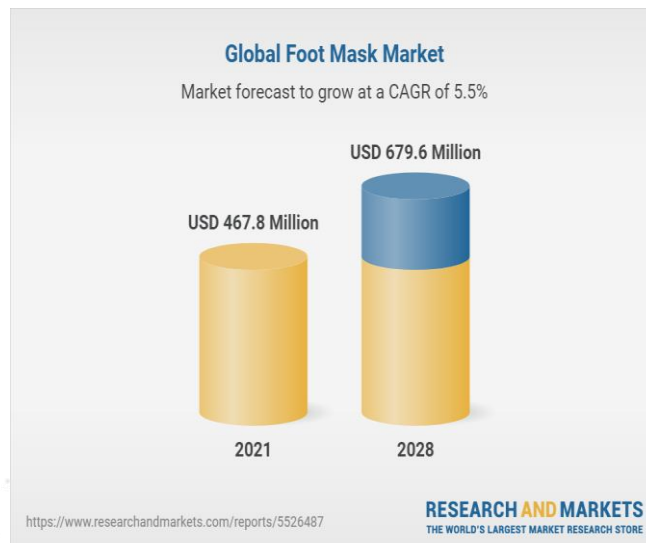
The sole of the foot is covered by a layer of subcutaneous connective tissue up to 2 cm thick. This tissue has a system of pressure chambers that both acts as a shock absorber and stabilizes the sole. Each of these chambers contains fibro fatty tissue covered by a layer of tough connective tissue made of collagen fibers. The sole of the foot is one of the most highly vascularized regions of the body surface, and the dense system of blood vessels further stabilizes the septa.

Cracked heels are foot condition that causes heel fissures, cause discomfort or even pain. The condition appears from dry skin accompanied by thickened skin, sometimes yellow or brown calluses around the heel edge. It is generally caused due to lack of moisture, deficiencies, aging skin, pressure, obesity, exposing footwear, hygiene, water, poorly fitted shoes and genetics. It is also caused by dryness of the foot skin, and accumulation of dead skin. Over time it may cause pain and irritations. Vertical cracking of skin at the edge of the soles is seen in many adults of Sri Lanka. On the survey conducted, it was found that the results of the rural study revealed that there were 46 with cracked skin of feet (overall rate of 61.3%). In the urban study, 58 (58%) of the subjects was

affected by cracked heels. The single reference suggests that walking barefoot results in thickening of skin, which gets cracked from trauma and drying. In USA, one survey found that 20 % of adults experience cracked skin on their feet.



Foot care is essential for maintaining healthy and attractive feet as they are subjected to daily wear and tear. The study focuses on formulation and evaluation of an exfoliating foot mask utilizing *Saccharum officinarum* commonly known as sugarcane, as a key ingredient. The formulation and evaluation of *saccharum officinarum* exfoliating foot mask present a promising avenue for developing a natural and effective product for foot care. Exfoliating foot masks are a convenient and efficient solution for removing dead skin cells, improving skin texture and promoting overall foot care health. They can offer gentle yet effective exfoliation, hydration and nourishment to feet. *Saccharum Officinarum* Extract is an extract of the sugar cane and has been traditionally used for its natural exfoliating properties. It is a natural source of glycolic acid, which belongs to group of alpha hydroxyl acids. It helps to improve Collagen and Hyaluronic Acid synthesis in the skin, which decreases appearance of fine lines and wrinkles. Glycolic works to chemically exfoliate skin by breaking bonds between dead skin cells and by dissolving dead skin cells and oils. It is the smallest hydroxyl acid molecule, so can penetrate the deepest and fastest. It helps to shed dead skin-causing issues, such as calluses, and can help soften and improve skin texture. By using sugarcane, a renewable and plant based resource, the foot mask aligns with growing demand for eco-friendly and environmentally conscious cosmetics. The foot masks are commonly used for cracked heels, rough skin and other foot conditions due to their effectiveness in exfoliation, moisturizing, repair and healing, soothing and preventing them. This exfoliating foot mask also comprises of benefits of aloe Vera and other various ingredients. The foot mask delivers a dose of intense moisturization. They can come in thick creams or in booties, but both have the same effect.



3. MATERIALS AND METHODS

Sl no	Ingredients	Function
1	Glycolic acid	Exfoliating property
2	Aloe Vera	Anti-ageing, anti-inflammatory, moisturizer, reduce acne and pimples.
3	Shea butter	Relieves dry skin, Eases irritation, Prevents cell damage ,Provides sun protection
4	Glycerin	It increase skin hydration, relieve dryness, and refresh the skin's surface

5	Denatured alcohol	It dries quickly, neutralizes oil, and gives your skin a smooth, matte feel.
6	Vitamin e oil	It helps maintain healthy skin and eyes, and strengthen the body's natural defense against illness and infection
7	Kaolin clay	It absorbs sebum and prevents pore clogging. It's used to draw out impurities and toxins from the pores
8	Rose clay	provides gentle exfoliation, helps to draw toxins from the skin, helps to increase circulation, reduces skin irritation, and helps to reduce inflammation
9	Lavender oil	Fragrance
10	Allantoin	Moisturizing, exfoliation, acne. Wrinkles and aging skin scars, hyperpigmentation, sensitive skin, wound healing.
11	Methyl paraben	Preservative

4.

METHODOLOGY

4.1) COLLECTION OF SUGARCANE JUICE:

The sugarcane used for study is collected as sugarcane juice from nearby shop



4.2) EXTRACTION OF GLYCOLIC ACID :

100ml of sugarcane was quantitatively transferred to a separating funnel. Then it was mixed with 100 ml of dilute 6N Hydrochloric acid. This mixture was shaken for 2 minutes with 75ml of ethyl acetate and the organic phase was decanted. The ethyl acetate extraction was repeated two more times on the aqueous phase. The ethyl acetate phases were combined in a beaker and added a sufficient amount of anhydrous magnesium sulfate in it. The organic phase was filtered using a clean cotton cloth and collected in a round bottom flask. It was then evaporated to dryness in a rotary evaporator at 70 °C under vacuum. The residue obtained was analyzed qualitatively and using TLC analysis.



4.3) PREPARATION OF FOOT MASK USING GLYCOLIC ACID EXTRACT:

To prepare the foot mask, melt 8 g of Shea butter in a china dish. Then add 2 ml glycerin and 1 ml of ethanol to the melted Shea butter and stir well. Mix 2g of rose clay and 3 g of kaolin clay in a separate beaker and gradually add it to the Shea butter mixture while stirring constantly. To this mixture add 1.2 ml vitamin E oil and 1g allantoin. Add 1.3ml of extracted glycolic acid and 0.5 g methyl paraben. Triturate the above contents in mortar and add aloe Vera pulp and mix well. Finally 2-3 drops of lavender essential oil is added. The formulated foot mask is transferred in to a container.



5. CHARACTERIZATION

5.1) Determination of physical parameter:

Formulated foot mask was further evaluated by using the following physical parameters: physical appearance, odor of the mask.

- a) Appearance: The color of the mask was observed by visual examination
- b) Odor: The odor of the mask was found to be characteristic

5.2) Determination of pH:

pH is defined as the decimal logarithm of the reciprocal of the hydrogen ion activity, a_{H^+} , in a solution. It is used as a measure of the acidity-alkalinity ratio with a scale ranging from 0-14. In the human organism, pH is regulated by acid-base homeostasis and varies from 1-8, depending on the organ and function. The pH of various formulations was determined by using digital pH meter

5.3) Determination of viscosity:

Viscosity is a measure of fluid's resistance to flow. It is to drive a spindle (which is immersed in the test fluid) through a calibrated spring. The viscous drag of the fluid against the spindle is measured by the spring deflection. Spring deflection is measured with a rotary transducer.

5.4) Determination of Spreadability :

Spread ability is the ease with which a product can be spread. is also an important characteristic of ointments, creams and waxes. It is related to the firmness of a product and more often than not the ease of spreading is associated with a loss in firmness. Formulating masks therefore largely depends upon the required end product consistency influencing the choice of material to use.

5.5) Determination of Irritancy:

The Skin Irritation Test (SIT) is an in vitro, non-animal test designed to identify those chemicals and mixtures capable of inducing moderate skin irritation. Some cosmetic products can cause skin irritation by passing through the outer layer of the skin (called the stratum corneum) and enter the layers beneath causing toxic effects to those cells. This, in turn, causes an immediate immune response that is typically characterized by redness, and itching or pain in the area of contact with the product (47)

5.6) Determination of washability:

Washability test was carried out by applying a small amount of mask on the hand and then washing it with tap water. All three formulations were easily washable

5.7) Phase separation:

Prepared mask was kept in a closed container at a temperature of 25-100°C away from light. Then phase separation was checked for 24 h for 15 days. Any change in the phase separation was observed/checked

6. RESULT & DISCUSSION

6.1) Result of pH:

Discussion: The pH test was performed for the mask formulation using pH meter. The pH of the mask was found to be in range of 5.4 which is good for skin pH. All the formulations of mask were shown pH nearer to skin required. So, the mask is safe to use on skin.



6.2) Result of Spreadability test:

Discussion: The spreadability of formulation was found to be 8.1. It shows desired spreadability.



6.3) Result of Irritancy test:

Discussion: The formulation shows no redness, edema, inflammation and irritation during irritancy studies. The formulations are safe to use for skin.



6.4) Result of washability :

Discussion: All the formulations were easily washable



6.5) Result of phase separation:

Discussion: It is observed that there is no change in phase separation.

7. CONCLUSION

The research on the formulation and evaluation of *Saccharum officinarum* (sugarcane) exfoliating foot mask has provided valuable insights into the development of an effective and safe product for foot care. The study aimed to harness the exfoliating properties of sugarcane and evaluate its efficacy in improving foot skin health. The formulation process involved the extraction of key bioactive compounds from sugarcane and their incorporation into a foot mask formulation. Various parameters, such as viscosity, pH, sensory attributes, spreadability, irritancy, washability were considered to ensure the product's stability and user acceptance. The formulated *Saccharum officinarum* exfoliating foot mask demonstrated significant improvements in foot skin health. It provide valuable insights for cosmetic industry, offering a natural and sustainable solution for improving foot health and enhancing overall wellbeing .The product effectively could serve as a valuable addition to the existing range of foot care products in the market.

REFERENCE

1. Diksha G Ramtekkar, Dr.Nibha D Bajpai, FORMULATION AND EVALUATION OF FOOT CREAM FROM FICUS GLOMERATA EXTRACT, Indo American Journal of Pharmaceutical Research,September 19,2018,8(9):1727
2. <https://www.footfiles.com/subject/foot-mask>
3. Mr. Pathan Shabajsohil, 2Prof. Dr. Hingane .L.D, Formation and characterization of crack heel cream from Aloe vera and bees wax, International Journal for Research Trends and Innovation 2022,7(6):1243.
4. Benjamin.L.Legendre: Varietal Differences In The Chemical Composition Of Sugarcane:Elsevier:1988:9:176-185.
5. Dr. Rajeev Singh:Sugarcane: Uses, Benefits, Side effects :10 jan :2023
6. Marta Sánchez, Elena González-Burgos, Irene Iglesias, and M. Pilar Gómez-Serranillos:Pharmacological Update Properties of Aloe Vera and its Major Active Constituents:national library of medicines; 2020 Mar; 25(6): 1324.
7. Chandrashekhar B. Badwaik, Updesh B. Lade, Tikesh Agarwal, PrachiBarsagade et al, International Journal of Pharmaceutical Research and Applications Volume 7, Formulation and Evaluation of Herbal Face Cream,2022. 958
8. Ravi Shankar,BabithaSarangi, RameshGupta et al, JAASP Research paper,Formulation and characterization of polyherbal cream for skin Manifestations, 2016.
9. <https://images.app.goo.gl/LU2578ezDr3G47oY8>
10. Dr. Amira Bouranen, Determination of the stability of cosmetic formulations with incorporation,institutePolitecnico De Braganca, 2017, 1-22.
11. <https://www.frulabeauty.com/blogs/ingredients/sugar-cane-extract-saccharum-officinaru>
12. <https://www.researchandmarkets.com/reports/5526487/foot-mask-market-size-share-and-trends-analysis>
13. <https://www.kbvresearch.com/foot-mask-market/>