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RESEARCH ARTICLE

FORMULATION AND EVALUATION OF TAN REMOVAL SCRUB CONTAINING CHENOPODIUM QUINOA

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ABSTRACT

Due to long-term sun exposure, concerns about skin tanning have resulted in the development of various tan removal solutions. In recent years, there has been a lot of interest in herbal tan removal products due to their alleged benefits. This review will focus on the ingredients, mechanisms, and potential adverse effects of these new-age herbal tan removal products. Our goal is to provide an in-depth look at the market for herbal tan removal products by looking at recent research findings. While we look at the nuances of these products, we also look ahead to the future of this skincare category with creative formulations and innovative delivery methods. In conclusion, we hope this review will serve as a beacon of information, enlightening the developing field of herbal tan removal products and add to the ongoing conversation within the skincare industry.

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INTRODUCTION

As the largest organ in the body, the skin functions as a barrier to prevent microorganisms from entering the body. The epidermis, dermis, and hypodermis are the three layers that make up the skin. The skin's complex network structure acts as the body's first line of defence against viruses, UV radiation, chemicals, and mechanical trauma. Flavonoids found in plants have the ability to halt the cell cycle, trigger apoptosis, reduce the growth of cancer cells, and inhibit invasion processes¹. Excessive exposure to ultraviolet (UV) radiation causes skin to get tanned and accumulates melanin, a pigment found naturally in the skin. Even though tanning is a natural defensive mechanism, many people want to lessen or get rid of their browned skin for aesthetic reasons. Herbal tan removal scrubs are becoming a well-liked option for people seeking a safe and natural way to reverse tan. Natural and devoid of any synthetic chemicals that could be damaging to the skin, herbal cosmetics are safe for skin use. People enjoy and utilize a variety of herbal products for their appearance. The herbal paste known as "MukhaLepa" in Ayurveda is applied as a face treatment.^{1,2}

Unusual medicine flows have long been crucial in supplying the world's healthcare requirements, as is widely documented. "Health practices, approaches, knowledge and beliefs in herbal, animal and mineral medicines, spiritual therapies, manual techniques and expertise, used singly or in combination to treat is how the World Health Organization (WHO) categorized these streams as traditional medicine."³

Ideal properties of a scrub

- It should be Non- sticky and mild abrasive.
- It should be Non-toxic.
- It must remove dirt and dead skin.
- It should Non-irritant.
- It must contain small gritty particles⁷

Merits of scrub

To maintain pristine skin: To expose clean skin, scrub away dirt, sweat to reveal clean skin. Unfortunately, the containers of cleaning milk, face wash, and facial cleansers can't get rid

of all the dust that builds up in your skin's pores. This is effectively accomplished via scrubbing.

Eliminates skin flakes: Patches of dry skin result from flaky skin. It permits the accumulation of dead cells over time. One can easily treat flaky skin by exfoliating it.

Enhances skin shine: Skin may even appear more radiant after exfoliation.

Helps to remove dead cell: Skin looks drab and weary because of dead cells. With a soft scrub, remove them.

Get rid of acne scars: Exfoliation aids in the removal of acne scars.

For smooth skin: Being more attractive starts with having smooth skin. A skin will become soft and well-nourished in addition to appearing completely smooth after the scrub.

Improving skin's texture: Skin will be cleaner, smoother, and have a better texture after a good scrub.¹⁰

Demerits of scrub

- Skin irritation, including redness and inflammation, can be brought on by harsh rubbing movements and chemicals. A person with sensitive skin may potentially experience allergic responses to the chemicals found in synthetic scrubs.
- Over scrubbing can leave pores open, exposing the skin to both UV radiation and pollution. A skin may become more vulnerable to infections and tanning as a result.¹²

Herbal Ingredients are used in Tan Removal Scrub: Scrubs for removing tan lines made of herbs frequently combine plant-based substances that brighten and exfoliate the skin. Typical components consist of:

Turmeric: The key ingredient in turmeric, curcumin, has been researched for its ability to brighten skin and reduce inflammation. Many cosmetic products contain turmeric. In India, on the eve of the wedding, brides and grooms alike are covered in turmeric. By decreasing inflammation, smoothing the skin, and treating and preventing skin conditions including pimples, rashes, acne, blackheads, and blemishes, it not only gives the skin a golden shine but also maintains its health and beauty. Turmeric is also present in a wide variety of creams, lotions, face packs, etc. This powder, which is bright yellow to orange in color, helps mice have fewer UVB-induced sunburn cells.⁶

Chenopodium quinoa: Quinoa seed extracts include squalene and myositol, which can inhibit melanin production in vitro even more than regular arbutin, it has been demonstrated that they may have skin-whitening qualities. It is well known that UVA (ultraviolet A) inhibits skin fibroblasts' ability to synthesize collagen. As a result, it can be utilized as a natural sun protection factor (SPF) component and in cosmetic formulations of anti-aging lotions⁷. Oil derived from *A. cruentus* seeds was found to give pre- and post-UVA protection in skin fibroblasts.⁸

Licorice: Licorice extract helps the skin by increasing even skin tone, lowering redness, and relieving inflammation. Its antioxidant and anti-inflammatory qualities aid in the treatment of psoriasis and eczema. Glabridin, a compound found in licorice, reduces the synthesis of melanin, improving complexion tone and treating hyperpigmentation. Moreover, its antibacterial properties confer efficacy against acne. Generally speaking, licorice is a useful addition to skincare regimes for a more radiant and healthy complexion because of its relaxing, brightening, and healing qualities.^{9,10}

Green Tea Extract: Rich in antioxidants like polyphenols that fight free radicals, delay the onset of aging, and shield the skin from UV rays, green tea extract is a superpower for skin health. Green tea's high catechin content has strong anti-inflammatory qualities that soothe inflamed skin and lessen redness. One of the main ingredients, epigallocatechin gallate (EGCG), regulates the production of sebum, which is good for oily and acne-prone skin.^{11,12}

Additionally, green tea extract increases the production of collagen, improving skin suppleness and lessening the visibility of wrinkles and fine lines. Green tea's antibacterial and anti-inflammatory properties help treat acne, and the tannins in the tea assist reduce oil production and decrease pores. Furthermore, it is appropriate for sensitive skin because to its anti-allergenic qualities¹³. Green tea extract is a well-liked and useful component in many skincare products since it helps protect, revitalize, and encourage a better complexion when added to skincare routines¹⁴.

Cucumber Juice: *Cucumis sativus* yields cucumber juice, which is high in water content, vitamins A, C, and K, and minerals such as magnesium and potassium. Flavonoids, tannins, and cucurbitacins are some of its biological constituents. The skin is hydrated and rejuvenated by the high water content, and its suppleness is enhanced by the creation of collagen by silica¹⁵. Because of their anti-inflammatory qualities, cucumbers help to soothe sensitive skin and reduce puffiness. By scavenging free radicals, antioxidants stop aging prematurely. The natural astringency of cucumbers tightens pores and relieves sunburn. Applying cucumber juice on a regular basis nourishes, revitalizes, and supports a healthy complexion; therefore, it is an invaluable supplement to skincare regimens for a bright, natural glow.^{16,17}

Jjoba Beads: The seeds of the *Simmondsia chinensis* jjoba plant are used to make jjoba beads. The primary component is made up of esters, which are quite similar to human sebum. By eliminating dead skin cells without creating microtears, these biodegradable beads function as mild exfoliants. Jjoba beads, which are high in vitamin E, have antioxidant qualities that shield the skin from free radical damage and give it a more youthful appearance. They assist to clear clogged pores and prevent acne because they are non-abrasive, making them appropriate for sensitive skin types. Since of its inherent nourishing and exfoliating properties, jjoba beads are highly valued in skincare products since they leave skin feeling softer, smoother, and more refreshed.^{18,19}

Aloe Vera Gel: Aloe vera gel, which is made from the succulent leaves of the aloe vera plant, is well-liked for its chemical composition, which helps with skin renewal and tan

removal. In addition to its other bioactive ingredients that aid in erasing tan lines, the gel's high water content instantly hydrates the skin.²⁰

Polysaccharides with anti-inflammatory qualities, like acemannan, are important chemical components of aloe vera gel. Aloe Vera is a useful treatment for sunburns and tanned skin since these ingredients help to soothe and calm sensitive skin. Aloe vera gel also contains a lot of enzymes, such as catalase, which aids in the breakdown of melanin, the pigment that causes skin to darken.²¹ This enzymatic action helps to promote a more uniform skin tone by gradually reducing tan. In addition, vitamins C and E, which both have antioxidant qualities, are present in the gel. Antioxidants are essential for scavenging free radicals generated by sun exposure, so averting more harm and bolstering the skin's inherent restorative processes. Additionally, elements found in aloe vera gel, such zinc, promote the growth of new skin cells and aid in the elimination of damaged and tanned skin layers.²² Aloe vera gel's capacity to relieve sunburn-related dryness and peeling is facilitated by its hydrating and moisturizing properties. Aloe vera gel aids in the entire tan removal process by encouraging skin regeneration and lowering inflammation, leaving the skin feeling renewed and energized. Aloe vera gel is a mild yet potent natural cure that can help those who want to lessen tanning and bring back their skin's natural brightness²³⁻²⁸

Rose water :Cleanses and brightens the skin. Soothes irritated skin. Balances natural oils. Clears skin pores. Tightens the skin. Moisturizes the skin. Slows down many signs of aging. Reduces puffiness and dark circles under the eyes.²⁹

Formula of Tan Removal Scrub: The preparation of a scrub base is carried out according to the scrub position of the formula shown in Table 1.

Table 1. Formula of Tan Removal scrub

Sr. No.	Ingredients	Formulation 1 Qty.(50g)	Formulation 2 Qty.(50g)	Formulation 3 Qty. (50g)
1	Chenopodium quinoa	1.5gm	1.5gm	1.5gm
2	Licorice extract	2gm	1.5 gm	1gm
3	Green tea extract	2 gm	0.5gm	1gm
4	Turmeric	0.5gm	0.5gm	0.5 gm
5	Aloe vera	1.7gm	2gm	1.5gm
6	carbopol	1gm	0.50gm	0.25gm
7	Preservatives	0.5gm	0.2gm	0.3gm
8	Jojoba beads	1gm	2gm	1.5gm
9	Cucumber juice	1ml	2ml	1.5ml
10	Rose water	q.s	q.s	q.s

Method of Preparation for a Tan Removal Scrub: In a mixing dish, combine Chenopodium Quinoa, Aloe Vera, Turmeric, Green Tea Extract, and Cucumber Juice. For the components to be distributed evenly, thoroughly stir or combine. Stir or combine thoroughly to achieve even dispersion of components. To prevent clumping, slowly sprinkle the Carbopol into the mixture while swirling continually. Continue stirring until the Carbopol is completely integrated and the mixture reaches the appropriate consistency.

Adjust the amount of Carbopol as needed to reach the appropriate thickness. When the mixture has reached the proper consistency, add the preservatives and mix thoroughly to ensure equitable distribution. Finally, carefully fold in the Jojoba Beads until evenly distributed throughout the mixture. Place the prepared scrub in a clean, airtight container to store.

To use, scoop out a small amount of the scrub and apply it to damp skin, massaging gently in circular motions. Rinse thoroughly with warm water and pat dry. Use 2-3 times per week for best results.

EVALUATION AND CHARACTERIZATION OF TOPICAL SCRUB FORMULATION: Physical appearance The prepared gel scrub formulations were inspected visually for their color, homogeneity, and consistency.

Appearance: The prepared scrub was evaluated for its odour and colour. The colour was found to be pale yellow in colour and odour was found to be characteristic.

Determination of pH: 2.5 g of gel were accurately weighed and dispersed in 25 ml of distilled water. The pH of the dispersion was measured by using a digital pH meter.



Fig. 2. pH meter

Grittiness: Gel was evaluated for gritty particles.

Washability: The product was applied on hand/glass slide and was observed under running water.



Fig 3. Photographs of Before and After Tan Removal Scrub Application

Foamability: Small amount of gel was taken in a beaker containing water. Initial volume was noted, beaker was shaken for 10 times and the final volume was noted. Foamability was also analyzed by applying onto skin with contact with water.

Irritability: A small amount of the preparation was applied to the dorsal area of the hand, left on for a short time, and was discovered to be nonirritating. There is no oedema or redness occurs.

Spreadability: The spreadability is very important in the behavior of gel that comes out from the tube. It is used to identify the extend of spreadability by the gel on the skin. A small quantity of sample was placed on a glass slide and another slide was placed above them. The time taken for the gel to spread on the slide was noted and measured which was found to be 4 cm in 40 sec.

Texture and Homogeneity: To see the uniform, a less amount of the prepared scrub was rubbed between the thumb and index finger.

RESULT AND DISCUSSION

Colors: The formulation's colors was carefully assessed and observed.

Table 2. Washability

S.No	Parameter	Result
1	Washability	Easily washable

Table 3. pH parameter

S.No.	Parameter	Result
1	pH	6

Table 4. Spreadability parameter

S.No.	Parameter	Result
1	Spreadability	Easily spread

Table 5. Skin Irritation Parameter

S.No.	Parameter	Result
1	Irritation	No
2	Redness	No
3	Swelling	No

Odour: The fragrance of the product was tested when it was spread on the palm and smelling the perfume

Consistency: The consistency of the formulation and particles were used to evaluate the texture and homogeneity of the preparation on the skin, such as grittiness, greasiness and stiffness effect. Nature provided a semi-solid preparation.

Homogeneity and Texture: To see the uniform, a less amount of the prepared scrub was rubbed between the thumb and index finger.

Washability This evaluation was done directly on the skin, with the preparation being applied to the skin and then washed away with plain water and now skin is free from impurities.

pH: A pH paper was used to determine the pH of a 1% aqueous formulation solution, and the result was 6.

Spreadability: The spreadability of the formulations was evaluated by placing 1 g of material between two parallel glass plates (40 cm) and measuring the spreading diameter.

A standard weight of 20 gm was placed on the upper glass plate. Visual examination was used to check the spreading quality.

Skin Irritation: A less amount of the mixture was applied to the dorsal area of the hand for some times and found to be edema, non-irritating, with no redness or other adverse effects.

CONCLUSION

The herbal tan removal scrub, made with strong ingredients such as turmeric, aloe vera, and citrus extracts, provides a diverse approach to skincare. It successfully reduces skin tan by gently exfoliating and having anti-inflammatory effects, revealing a brighter complexion. The combination of natural components not only solves cosmetic difficulties, but also nourishes the skin by giving soothing moisture and reducing inflammation. Regular application claims to revive and renew skin texture.

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