

“Green Glow: Formulation of Cucumber-Infused Scrub Soap for Natural Skincare”

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ABSTRACT: This study confidently explores formulating and evaluating an innovative herbal scrub soap that prominently features cucumber (*Cucumis sativus*) as its key active ingredient. The primary goal is to fully harness cucumber's remarkable hydrating, anti-inflammatory, and antioxidant properties, while seamlessly integrating a natural exfoliant to create a truly multifunctional product. Utilizing a cold-process method, the soap is expertly crafted by combining high-quality natural oils, sodium hydroxide, and ground cucumber pulp, enhanced with finely milled herbal exfoliants such as oatmeal and walnut shell powder.

Quality parameters, including pH, lathering ability, and stability, were assessed. Results showed that cucumber improves skin hydration, while exfoliants provide gentle cleansing without irritation. The soap demonstrated desirable sensory qualities and compatibility with various skin types. This project highlights the potential of natural ingredients for sustainable skincare. Future studies may optimize formulations and explore long-term skin benefits.

Key Words: cucumber (*Cucumis sativus*), rice water, sodium lauryl sulfate, Lavender Oil, Glycerin Base, Vitamin E, Poppy Seeds

and they contain lignans that help reduce inflammation. Overall, cucumbers are a natural and beneficial addition to skincare routines. [4]

Cucumbers offer various benefits for the skin, serving as effective treatments for wrinkles and sunburns. They are also known for their moisturizing properties and ability to brighten the skin by inhibiting the enzyme tyrosinase. Beyond topical applications, extensive research has highlighted additional advantages of consuming cucumbers, showcasing their positive effects on overall health. [1]



Figure: Cucumber

I. INTRODUCTION

1.1 INTRODUCTION TO CUCUMBERS:

Cucumbers, which are actually fruits rather than vegetables, have long been linked to spa treatments and skincare. If you browse through beauty magazines, you'll likely find numerous images of models relaxing with cucumber slices over their eyes. These visuals are not just about conveying a sense of luxurious relaxation; they also highlight the real benefits cucumbers provide for the skin and eye area. Cucumber slices have a cooling effect and are highly hydrating, which helps combat dehydration. They are rich in vitamin K, which can diminish dark circles under the eyes,

1.2 INTRODUCTION TO RICE WATER:

Rice (*Oryza sativa*) is a key food for nearly half of the world's population, providing the most daily calories, especially in Asia. Many people drink rice water that is left after soaking or boiling rice, but in many places, this water is usually thrown away during cooking. [2]

Rice bran oil is renowned for its antioxidant-rich components, including ferulic acid, gamma-oryzanol, and phytic acid. It has applications in the cosmetic industry and is also used for managing skin diseases. Both rice bran oil and rice bran extracts can be utilized in their free form or in nano-encapsulated forms to provide

protection against UVB radiation injuries and to treat various skin conditions..[2]



Figure: Rice Water

1.3 INTRODUCTION TO TOCOPHEROL (VITAMINE):

Vitamin E is a vital nutrient that is garnering increasing interest in the field of dermatology, primarily due to its powerful antioxidant properties. Unlike some antioxidants, such as glutathione or ubiquinol 10, which the human body can naturally produce, vitamin E must be obtained through dietary sources. [8] This essential nutrient plays a crucial role in protecting skin cells from oxidative stress and damage caused by free radicals, making it a key player in maintaining healthy skin. As researchers continue to explore its benefits, vitamin E is becoming recognized not only for its nutritional value but also for its potential in skincare formulations and treatments. [6]

Vitamin E is primarily sourced from fresh vegetables, vegetable oils, cereals, and nuts. A recent study that examined dietary data from nearly 10,000 individuals indicates that a significant portion of both men and women in the United States do not meet the recommended intake levels for vitamin E.[7] Vitamin E is predominantly sourced from natural items such as fresh vegetables, various vegetable oils, cereals, and nuts. A recently published study, which analyzed dietary data from approximately 10,000 individuals, reveals that a substantial proportion of men and women in the United States do not meet the established recommendations for vitamin E intake.[6]

Rice bran bioactive compounds have been shown to have anti-aging properties and may be effective in treating alopecia. However, the skin benefits of rice water are supported by limited scientific studies, and there is a lack of literature that validates the skin effects often claimed by cosmetic manufacturers. The use of rice water as a bath component has become a tradition, particularly among Asian women, but it is largely based on anecdotal evidence rather than scientific proof.[3]

This study used paddy rice with peel to produce rice water, preserving all its components. The most potent antioxidant rice water was incorporated into a simple hydrogel formulation, comprising nearly 96% rice water. The hydrogel was characterized, and its biological, sensory effects and safety were evaluated in human volunteers.[5]



Figure: Vitamin E Capsules

1.4 INTRODUCTION TO POPPY SEEDS:

In this study, I have chosen to investigate the phytochemical and antimicrobial activity of Khus-Khus, scientifically known as *Papaver somniferum* L. This plant belongs to the Papaveraceae family and is commonly referred to as the "opium poppy." The fruit of the poppy contains small seeds known as poppy seeds. *Papaver somniferum* L. is a herbaceous plant that is harvested for latex 5 to 10 days after the flowering petals have fallen from the plant (Schiff, 2002). [9]

The dried latex from the opium poppy plant is known as opium, from which morphine and various alkaloids can be extracted. If the plant is allowed to mature completely, it produces poppy seeds within its capsule. These seeds can be harvested mechanically and collected through a sieving process, as noted in sources from Kapoor (1995) and Schiff (2002). [9]

Poppy seeds, commonly referred to as postbeej, khaskhas, mohansaaf, postdana, and khaskhashsafed, are a nutrient-rich ingredient. They are an excellent source of thiamin and various essential minerals and vitamins, including omega-6 fatty acids, calcium, iron, magnesium, manganese, phosphorus, and zinc. Known for their strong anti-inflammatory properties, poppy seeds are frequently utilized in Ayurvedic remedies to address inflammation. Additionally, these seeds can help in managing sleep disorders, such as insomnia. Cultivated in many regions around the world, poppy seeds vary in color, typically appearing white or black. The oil content of the seeds ranges from 40 to 60 percent, making them useful in food preparation. They are often incorporated into sweets and frostings. It is important to note that poppy seeds do not contain narcotics.[10]



Figure: Poppy Seeds

1.5 INTRODUCTION TO LAVENDER OIL:

Lavender (*L. angustifolia*) flowers, buds, and leaves are edible and can flavor broths and jellies, though they are not eaten raw. The scent of lavender keeps moths and flies away, so people often place it in closets and drawers. Studies by Perrucci et al. have confirmed this ability to repel insects. [11]

Infusions and tinctures of lavender flowers have sedative and analgesic properties. Lavender tincture is thought to alleviate depression, headaches, and anxiety, which has been confirmed by the study of Akhondzadeh et al. Lavender extract administered to rats prevented dementia caused by Alzheimer's disease, and a cytotoxic study of the effects of the extract on lung cancer showed the inhibition of carcinogenic cell growth.[11]

Lavender essential oil is widely utilized in the formulation of perfumes, cosmetics, and various household cleaning products. This oil is

commonly found in products such as toilet water, eau de cologne, lotions, and aftershaves, where it serves to provide prominent top notes. Additionally, lavender essential oil contributes a scent of freshness and purity to household cleaning preparations. Many prominent cosmetic companies, including Avon, Procter and Gamble, and Aloe Vera, offer a range of products that feature a lavender fragrance.[12]



Figure: Lavender Oil

Lavender essential oil is a clear liquid, either colorless or slightly yellowish, derived from the aerial parts of the plant. It boasts a fresh, herbal aroma with a subtle camphorous note. The oil's chemical composition has been thoroughly studied, revealing over 300 distinct components, many of which exhibit significant biological activity. From a chemical perspective, essential oils are complex mixtures primarily made up of terpene compounds, along with derivatives of phenyl propane, and additional substances that include sulfur and nitrogen compounds, as well as acetylene derivatives. These components can have characteristics of hydrocarbons, alcohols, aldehydes, ketones, esters, and ethers.[13] The primary components of lavender essential oil are linalyl acetate, which makes up an impressive 45.6% to 60%, and linalool, accounting for 30.8%.[12]

1.6 INTRODUCTION TO SODIUM LAURYL SULPHATE:

Surfactants, or surface-active agents, play a crucial role in reducing the tension between two surfaces, which helps provide stability. They are widely used in emulsions and foaming agents to maintain structural integrity. Surfactants have an amphiphilic nature, meaning they possess both hydrophobic (water-repelling) and hydrophilic

(water-attracting) regions that function accordingly in different environments.[14]



Figure: Sodium Lauryl Sulphate

Surfactants can be classified into four groups based on the charge of their hydrophilic head: anionic (negative), cationic (positive), amphoteric (both), and non-ionic (neutral). Anionic surfactants, like sodium dodecyl sulfate (SDS) and linear alkyl benzene sulfonate (LAS), are effective in laundry detergents and cleaning products. Cationic surfactants are used in detergents, fabric softeners, and hair conditioners, although they are less effective as conditioners. Traditionally, surfactants were made from renewable resources, using plant or animal oils.[15]

II. NEED OF THE STUDY

A herbal scrub soap aims to exfoliate and rejuvenate the skin using natural ingredients.

The objectives of using a herbal scrub include:

1. **Exfoliation:** Removing dead skin cells and impurities from the skin's surface, promoting a smoother and brighter complexion.
2. **Skin Renewal:** Stimulating cell regeneration and promoting healthier skin by unclogging pores and improving blood circulation.
3. **Nourishment:** Providing essential nutrients to the skin through natural ingredients like Tulsi, turmeric, and almond oil, which can help moisturize and revitalize the skin.
4. **Gentle Cleansing:** Cleansing the skin without harsh chemicals, making it suitable for sensitive skin types.
5. **Aromatherapy:** Some herbal scrubs, like those containing sandalwood powder, offer aromatherapeutic benefits, promoting relaxation and stress relief during the skincare routine.

III. MATERIALS & METHODS

Natural products can be utilized to treat a wide range of diseases and skin issues due to their high medicinal value. Herbal products are known for their cost-effectiveness, availability, and compatibility with various formulations. The active ingredients that contribute to these medicinal properties are extracted and used in creams, soaps, and ointments to address skin-related conditions.

3.1 MATERIALS

3.1.1 Content of the soap

1. Cucumber: These green gems possess a bounty of skin-nourishing properties that have been cherished for ages. When applied topically, cucumbers work wonders in soothing and reducing skin irritation, making them a gentle and effective remedy for calming redness and inflammation.



Figure: Cucumber

2. Rice Water: It can help reduce redness, itching, and swelling, making it suitable for sensitive skin or conditions like eczema. Additionally, rice water is known for its brightening effects.



Figure: Rice Water

3. Vitamin E: Vitamin E is an essential part of skin health both as a small molecular weight antioxidant and as a critical factor for collagen synthesis. Vitamin E contributes to Rejuvenates and restores dehydrated skin, Reverses premature skin aging & Acts as a cleansing agent.



Figure: Vitamin E Capsules

4. Poppy Seeds: The high amount of linoleic acid in poppy makes it extremely effective in treating eczema, burns and itching. Applying poppy seed paste as a mask on the face helps in treating acne and pimples and provides a clear, glowing complexion, to make you beautiful.



Figure: Poppy Seeds

5. Lavender Oil: Lavender oil can benefit the skin in numerous ways. It has the ability to lessen acne, help even skin tone, and reduce wrinkles.



Figure: Lavender Oil

7. Soap Base: Soap bases can be divided into solid and liquid. Solid bases are used for classic bar soap, and liquid ones are suitable for making hand soap, shower gels, shampoos, and other liquid soap products. Soft (creamy) soap bases are also used for making scrubs.



Figure: Soap Base

3.2 METHODS

3.2.1 Formulation of Soap Base

Sr. No.	Ingredient	Quantity (g)	Use
1	Dilute Water	40 gm	Aqueous Vehicle
2	Sodium hydroxide	10 gm	Lye
3	Coconut oil	70 gm	Antiageingmoisturiser
4	Steric acid	30 gm	Hardening agent
5	Glycerine	17 gm	Humectant
6	Alcohol	70 gm	Thickening agent
7	Propylene glycol	90 gm	Moisture retention

Table: Formulation Of Soap Base

Step 1.:

About 40 g of distilled water was taken in a beaker, and 10 g of acoustic soda was added into

it, mixed it properly and left for half an hour. (Solution-A).

Step 2.:

Steel pot was put on a gas burner, 70 g of coconut oil and 30 g of stearic acid were added into the pot, and it was properly mixed with continuous heating. (Solution-B).

Step 3.:

Solution A was added into solution B, and mixed slowly by continuous stirring and cooked for 10 minutes.

About 17 g of glycerine was added to it by heating and stirring continuously, and 70 g of alcohol was added to it.

It was properly mixed and the pot was covered for 5 minutes. After that, 90 g of propylene

glycol was added into it, mixed and cooked for 2 minutes.

The above solution was settled for 5 minutes. An electric blender blended the solution. Then it was cooked again for 5 minutes.

After that, the solution was removed into a suitable mold or container. Leave it for one day, suitable soap base is obtained.

3.2.2 Formulation of Herbal Scrub Soap

1. Cucumber Extraction:

1. Wash and clean the Cucumber properly.
2. Then slice into smaller pieces.
3. Now Blended the whole Cucumber Pieces.
4. Then juice was extracted using a piece of clean cheesecloth.
5. Squeeze the extract of Cucumber (water of cucumber) in a vessel.

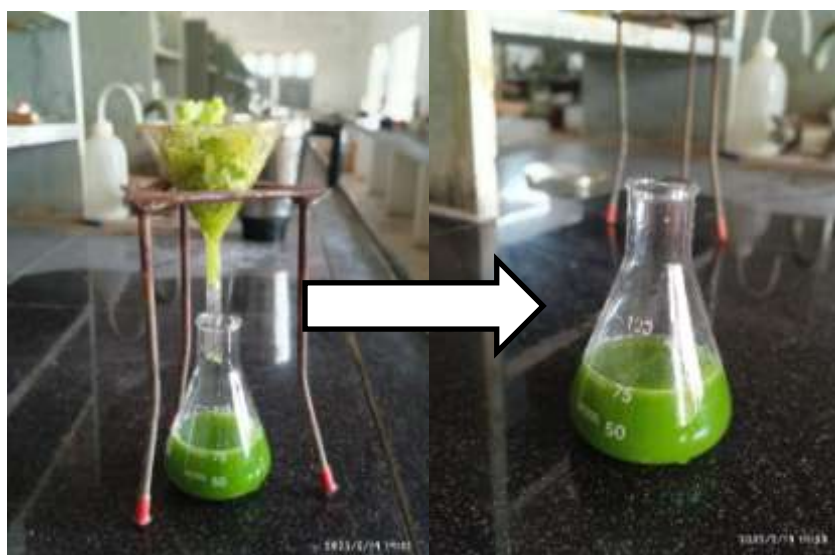


Figure: Extraction Process of Cucumber

Sr. No.	Ingredient	Pictures	Quantity (g)	Category
1	Cucumber		10 gm	Main Ingredient
2	Rice Water		5 ml	Vehicle

3	Vitamin E		2 Capsule	Prevent wrinkles
4	Poppy Seeds		2 gm	Exfoliant
5	Lavender Oil		2 ml	Fragrance
6	Sodium Lauryl Sulphate		4 gm	Foaming agent
7	Soap Base		50 gm	as a potent moisturizer

Table: Formulation of Herbal Scrub Soap

2. Collection and measuring raw material:

Collect and weigh all ingredients like Cucumber Extract, Vitamin C, Poppy seeds, Rice Water, Reetha powder, Rose water, lavender essential oil & Sodium Lauryl Sulphate.

3. Preparing the base:



Figure: Preparing the Base

1. The Soap base (50 gm) was cut into small pieces.
2. Then put into the beaker for double boiling method.
3. The Soap Base cubes were until it was completely melted.

4. Adding of raw material:

1. After the Soap Base cubes are completely melted then add the ingredients one by one and stir the solution.
2. Ensure that the Poppy Seeds are eventually distributed throughout the Solution.

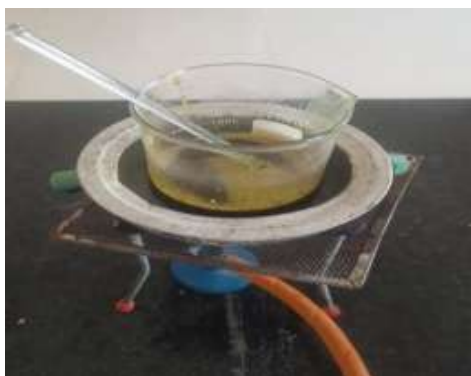


Figure: Adding of Raw Material

5. Consistency:

Once desired consistency is acquired turn off the flame then add lavender essential oil for fragrance and wait for 1-2 minutes at room temperature.



Figure: Formulation

6. Pouring:

1. Once the desired consistency is removed the solution is poured into the molds.
2. Transfer the scrub into a clean, airtight container for storage.



Figure: Pouring into Molds

7. Cooling:

1. The molds are kept at room temperature for 30 minutes then remove soap from mould.
2. Soaps Are Ready to Use.



Figure: Cooling of Molds

IV. EVALUATION

4.1 PHYSICAL EVALUATION:

1. The color and odor of the prepared soap were observed. with the naked eye keeping it on a white background.
2. The order of the soap was smelled.
3. Consistency Check by pressing Soap.

Sr. No.	Physical Parameter	Result
1	Color	Light Green
2	Odor	Pleasant
3	Shape	Oval
4	Consistency	Solid

Table: Physical Evaluation

4.2. PHYSIOCHEMICAL EVALUATION:

4.2.1 pH Determination:

The pH of the prepared soap was assessed by touching a pH strip to the freshly formulated soap and or by dissolving 1 gram in 10 ml water with the help of digital pH meter.



Figure: pH Determination test

4.2.2 Foam Height:

0.5 grams of the sample of soap was taken and dispersed in 25 ml distilled water. Then, transferred it into a 100ml measuring cylinder; then volume was make up to 50 ml with water. 25 strokes were given and stood till the aqueous volume measured up to 50 ml and measured the foam height, above the aqueous volume was measured.



Figure: Foam Height

4.2.3 Foam Retention:

25 ml of the 1% soap solution was taken into a 100 ml graduated measuring cylinder. The cylinder was covered with hand and shaken 10 times. The volume of foam at 1-minute intervals for 4 minutes was recorded.



Figure: Foam Retention

4.2.4 Foam forming ability:

The Cylinder Shake Method was utilized to determine Foaming ability. First, in a 100 ml

measuring cylinder, we put 50 ml of a 1 % sample solution and shaken vigorously 10 times. After shaking for 1 minute, we measured the height of the foam that had formed and recorded the total volume of foam.



Figure: Foamability

4.2.5 Washability:

A small quantity of Scrub Soap was applied over the skin and was washed with water and it was easily washable.



Figure: Washability Testing

4.2.6 Irritability:

It is carried out by applying soap on the skin for 10 minutes. If no irritation then it is considered as non-irritant product.



Figure: Irritability Testing

4.2.7 Determination of Total Fatty Matter:

The total fatty matter test is carried out by reacting the soap with acid in the presence of hot water and measuring the fatty acids obtained. About 10 g of the finished soap was weighed and 150 ml distilled water was added and heated. The soap was dissolved in 20 ml of 15 % Sulphuric acid while heating until a clear solution was obtained. Fatty acids on the surface of the resulting solution were solidified by adding 7g of bee wax and reheating. The setup was allowed to cool to form a cake. The cake was removed and blotted to dry and weighed to obtain the total fatty matter using a formula: %TFM = $(A - X)/W \times 100$

Where;

A= weight of wax+oil,

X= weight of wax, W= weight of soap.



Figure: Weight of wax + oil

4.2.8 Determination of Moisture Content

About 10g of the sample under study were accurately weighed and transferred to a tarred china dish of known weight and kept in a hot air oven at 100 – 105°C for an hour. Then, the sample was weighed along with the china dish to deduct the actual weight of tarred china dish. The weight of the content was noted to calculate the percentage moisture content.

Moisture content = $(\text{Difference in weight}/\text{initial weight}) \times 100$



Figure: Tarred China Dish

V. RESULT

Sr. No.	Parameters	Standards	Result
1.	Color	-	Light Green
2.	Odour	-	Pleasant Smell
3.	Shape	-	Oval
4.	Consistency	Solid	Solid
5.	pH	7 - 10	7
6.	Stability	Stable at room temperature	Stable at room temperature
7.	Grittiness	Small gritty Particles Present	Small gritty particles present
8.	Foamability	5 – 10 cm	5 cm
9.	Foam Height	5 – 10 cm	7 cm
10.	Foam Retention (cm per min)	2 – 6 min	4 min (3 cm)
11.	Washability	Easily Washable	Easily Washable
12.	Irritability	Non-irritant	Non-Irritant
13.	Removal	Easily Removable	Easily removable
14.	Moisture Content	30 – 60 %	51.1%
15.	Total Fatty Matter	39 – 82 %	72.1 %

Table: Result

VI. CONCLUSION

We prepared and tested the scrubbing soap. Its main goal is to remove pigmentation and dead skin cells, helping the skin to glow. The tests show that this scrubbing soap does not cause irritation and contains gritty particles that effectively remove dead skin. The ingredients in these scrubbing soaps contribute to healthy, glowing skin. This soap is particularly effective in preventing premature aging because it uses cucumber as an active ingredient, which also promotes skin glow.[16]

Herbal therapy has shown promise in healing a variety of skin conditions. In India, nearly 80% of the population relies on traditional medicine and plant-based treatments for managing skin issues. Ayurvedic remedies, in particular, are often more affordable than modern allopathic

pharmaceuticals, making them accessible to many, especially those from economically disadvantaged backgrounds. These herbal medications typically contain a high concentration of active ingredients, offering a potentially safer and cost-effective alternative for treating skin infections, including conditions ranging from rashes to more serious issues like skin cancer. [17]

Herbal soaps offer a significant positive impact on the skin, promoting a soft, smooth, and supple texture. Unlike chemical soaps, which are often laden with harsh and damaging substances that can adversely affect both skin health and overall well-being, herbal soaps present a natural alternative that prioritizes skin care.

The advantages of herbal soaps extend beyond their gentle cleansing properties; they encompass a range of benefits that make them an ideal choice for those seeking optimal skin health. Enriched with natural ingredients such as essential oils, herbs, and botanical extracts, these soaps provide not only delightful fragrances but also therapeutic values that contribute to skin rejuvenation.

The aromatic benefits of herbal soaps can enhance the bathing experience, while their medicinal properties work to heal, soothe, and nurture the skin. Many herbal soaps are formulated with ingredients known for their specific skin benefits, such as lavender for relaxation, tea tree oil for its antibacterial properties, or oatmeal for gentle exfoliation, making them versatile for various skin types and concerns.

Ultimately, choosing herbal soaps can lead to improved skin appearance and texture, while

also supporting better health outcomes through the use of natural, nourishing ingredients. [18]

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