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NATURAL CLEANSE : FORMULATION AND EVALUATION OF HARBAL FACE WASH

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ABSTRACT :

The aim of this study was to develop a herbal face wash formulation using naturally sourced plant-based ingredients known for their antioxidant, antimicrobial, and skin-nourishing properties. Daily exposure to pollutants, dust, and ultraviolet radiation leads to various skin problems such as acne, excess oil production, and skin dullness. Conventional face cleansers often contain synthetic surfactants and chemicals that may irritate or dry the skin with prolonged use. Due to growing consumer preference for safer, eco-friendly, and non-toxic skincare products, herbal formulations have gained significant traction in the cosmetic industry. Medicinal plants offer a rich source of bioactive compounds like flavonoids, alkaloids, terpenoids, and phenolic compounds that exhibit anti-inflammatory, antimicrobial, antioxidant, and soothing effects on the skin. Unlike synthetic agents, these phytochemicals help restore the skin's natural pH, improve hydration, and protect the epidermal barrier without causing adverse reactions. This has led to increased interest in the formulation of herbal face washes that can effectively cleanse while also nourishing and rejuvenating the skin.

Therefore, this research focuses on creating a gel-based herbal face wash incorporating ingredients like neem (Azadirachta indica), aloe vera (Aloe barbadensis Miller), turmeric (Curcuma longa), and lemon juice (Citrus limon)—each known for their anti-inflammatory, antibacterial, and skin-soothing actions.

The objective of this work was to formulate and evaluate a stable, effective, and cosmetically acceptable herbal face wash that can cleanse the skin without disrupting its natural balance. The selected herbal extracts were incorporated into a gel base using Carbopol 940 as a gelling agent, along with preservatives and essential oils. The formulation was subjected to various evaluations including pH determination, spreadability, foaming ability, viscosity, washability, organoleptic properties, and irritancy testing.

The pH of the final formulation was found to be approximately 6.8, which is within the ideal range for facial skincare products (4.5 to 7.0), ensuring compatibility with human skin. The face wash showed good spreadability and lathering, no phase separation, and was easily washable with water, leaving the skin clean and refreshed. The formulation demonstrated no signs of irritation or discomfort when tested for dermal safety. The antioxidant and anti-acne potential of the formulation was attributed primarily to turmeric and neem extracts.

This study suggests that the formulated herbal face wash is a safe and effective alternative to chemical cleansers and can be used for daily skincare to maintain a healthy and blemish-free complexion.

CHAPTER – 1: INTRODUCTION

Face Wash

A face wash is a skin care product specifically designed to cleanse the face by **removing dirt**, **excess oil, dead skin cells, makeup**, and **environmental pollutants**. It plays a vital role in maintaining facial hygiene and preventing skin issues such as acne, clogged pores, dullness, and infections. Unlike soaps that may strip the skin's natural oils and disturb the pH balance, a well-formulated face wash helps cleanse the skin while maintaining its natural moisture and protective barrier.

The face is the most exposed and sensitive part of the body, often affected by factors like pollution, heat, humidity, and stress. These factors increase the risk of various dermatological conditions, particularly **acne vulgaris**. Conventional face washes may contain synthetic detergents and surfactants which, although effective in cleaning, can be harsh and cause irritation, dryness, or allergic reactions in sensitive individuals.

To overcome these limitations, herbal face washes have emerged as a safer and more skin-friendly alternative. Herbal face wash formulations use plant-based ingredients that are rich in antioxidants, antimicrobials, anti-inflammatory agents, and skin-soothing compounds. These formulations not only cleanse but also nourish, heal, and rejuvenate the skin. Commonly used herbs include Neem (**Azadirachta indica**), Turmeric (**Curcuma longa**), Aloe

vera (A**loe barbadensis**), and Lemon (**Citrus limon**)—each offering specific benefits like oil control, antibacterial action, hydration, and natural glow enhancement.

Fig. 1.1: Herbal Cleansing Action on Skin

Types of Face Wash:

Face washes are classified based on consistency and purpose:

- Gel-based face wash: Ideal for oily and acne-prone skin.
- Cream-based face wash: Suitable for dry skin; often moisturizing.
- Foam-based or liquid face wash: Light-weight and refreshing; suitable for combination skin types.

Fig. 1.2: Types of Face Wash by Texture and Use

Mechanism of Cleansing:

Herbal face washes cleanse the skin primarily through mild natural surfactants and bioactive compounds. These compounds gently emulsify and lift dirt and sebum from pores, while ingredients like aloe vera and neem soothe the skin, promote healing, and prevent bacterial growth.

The herbal constituents work as:

- Antibacterial agents – preventing acne and infections.
- Antioxidants – protecting against oxidative stress.
- Skin-soothing agents – calming inflammation and irritation.
- Moisturizers – maintaining hydration and preventing dryness.

Why Use Herbal Face Wash?

- Free from harsh chemicals and synthetic surfactants
- Mild and suitable for daily use
- Ideal for sensitive and acne-prone skin
- Environmentally friendly and biodegradable
- Enriched with vitamins, minerals, and bioflavonoids

Comparison: Synthetic vs. Herbal Face Wash

Feature	Synthetic Face Wash	Herbal Face Wash
Base	Chemical surfactants	Natural extracts
Side Effects	May cause irritation	Generally safe
Skin Types	Limited compatibility	Suitable for all
Environmental Impact	Non-biodegradable	Eco-friendly

Herbal face washes offer a holistic approach to skincare by combining traditional medicinal wisdom with modern formulation techniques. They align with the increasing demand for natural, non-toxic, and effective cosmetic products.

CHAPTER – 2: REVIEW OF LITERATURE

I. (Prajapati & Maurya, 2020)

Herbal face washes are gaining popularity due to their use of plant-derived ingredients such as neem, turmeric, and aloe vera. These ingredients provide cleansing, antibacterial, and soothing effects, making them suitable for a wide range of skin types, especially acne-prone skin.

II. (Khandagale et al., 2021)

Formulations incorporating neem and lemon juice have shown significant antimicrobial activity and oil control, which are essential for managing acne vulgaris and maintaining skin hygiene. The antibacterial compounds in neem and the vitamin C in lemon contribute to the removal of bacteria and dead skin cells from clogged pores.

III. (Shaikh et al., 2019)

Aloe vera and turmeric have demonstrated strong antioxidant and anti-inflammatory properties. Their use in face wash formulations improves skin texture and complexion while reducing irritation, redness, and inflammation caused by environmental stressors and pollutants.

IV. (Vargese et al., 2022)

In a study comparing herbal and synthetic face washes, it was observed that herbal formulations showed better compatibility with sensitive skin, exhibited no signs of irritation, and provided long-lasting freshness. Their mild foaming ability was found effective in gentle cleansing without over-drying the skin.

V. (Mane et al., 2018)

Carbopol 940 used as a gelling agent in herbal gel-based face washes contributes to enhanced spreadability, consistency, and stability of the formulation. The gelling system supports uniform distribution of active ingredients and improves user acceptability.

VI. (Srinivas & Supriya, 2021)

Evaluation of a polyherbal face wash containing neem, turmeric, and aloe vera indicated favorable results in terms of pH (6.5–7.0), viscosity, and organoleptic properties. The product maintained its stability over a period of 30 days under varying storage conditions.

VII. (Martha et al., 2020)

Turmeric extract (Curcuma longa) was found to possess significant skin-brightening and antimicrobial activities due to the presence of curcumin. The study highlighted turmeric's potential in managing acne and post-inflammatory hyperpigmentation when used in face wash formulations.

VIII. (Khade et al., 2019)

The addition of essential oils like rose oil and tea tree oil not only enhanced fragrance but also improved antimicrobial properties and user sensory experience. Such natural fragrances are preferred over synthetic perfumes that often cause skin sensitivity.

IX. (Casian et al., 2017)

Aloe vera gel was found to contain vitamins, enzymes, and amino acids beneficial in improving skin integrity, hydration, and healing of minor abrasions. It acts as a natural humectant in herbal face washes.

X. (Takale et al., 2023)

Herbal face wash formulations are eco-friendly and biodegradable, with reduced environmental impact compared to synthetic face cleansers. The shift toward green formulations is driven by consumer awareness and demand for sustainable skincare.

CHAPTER – 3: MATERIALS & METHODS

Materials or Ingredients Used in Formulation:

The herbal face wash was prepared using the following natural and supportive cosmetic ingredients:

A. **Aloe vera gel**
B. **Neem extract**
C. **Turmeric extract**
D. **Lemon juice**
E. **Rose water**
F. **Gelling agent (Carbopol 940)**
G. **Sodium lauryl sulfate (SLS)**
H. **Preservative (Methyl paraben)**
I. **Essential oil (Rose oil or Lavender oil)**
J. **Distilled water**

Individual Ingredients and Their Details:

➢ **Aloe Vera Gel**

Fig. 1.3: Aloe Vera Gel

- **Synonym:** Aloe barbadensis
- **Biological source:** Leaves of Aloe barbadensis
- **Chemical constituents:** Vitamins (A, C, E), enzymes, amino acids, saponins
- **Uses:**

1. Moisturizes and hydrates the skin
2. Heals acne and soothes inflammation
3. Helps with skin regeneration
4. Rich in antioxidants and enzymes

➢ **Neem Extract**

Fig. 1.4: Neem Leaves

- **Synonym:** Azadirachta indica
- **Biological source:** Leaves of Neem tree
- **Chemical constituents:** Nimbin, Azadirachtin, Flavonoids
- **Uses:**

1. Strong antibacterial and antifungal action
2. Helps in clearing acne and pimples
3. Soothes skin irritations and itching
4. Natural detoxifier and purifier

➢ **Turmeric Extract**

Fig. 1.5: Turmeric

- **Synonym:** Curcuma longa
- **Biological source:** Rhizomes of turmeric plant
- **Chemical constituents:** Curcumin, essential oils, vitamins
- **Uses:**

1. Anti-inflammatory and antimicrobial
2. Enhances skin complexion
3. Reduces acne scars and pigmentation
4. Helps in healing minor skin wounds

➢ **Lemon Juice**

Fig. 1.6: Lemon

- **Synonym:** Citrus limon
- **Biological source:** Fruit juice of lemon
- **Chemical constituents:** Vitamin C, Citric acid
- **Uses:**

1. Natural cleanser and pH balancer
2. Reduces dark spots and blemishes
3. Controls excess oil
4. Mild astringent

➢ **Rose Water**

Fig. 1.7: Rose Water

- **Source:** Distilled extract from rose petals
- **Constituents:** Vitamin B, polyphenols
- **Uses:**

1. Hydrates and soothes the skin
2. Balances pH and tightens pores
3. Provides a refreshing fragrance

4. Acts as an anti-inflammatory agent

➢ **Sodium Lauryl Sulfate (SLS)**

- **Use:** Acts as a foaming and cleansing agent
- **Action:** Helps to remove oil and dirt from skin

➢ **Methyl Paraben (Preservative)**

- **Use:** Prevents microbial growth and increases shelf life
- **Action:** Maintains stability of formulation over time

➢ **Rose Oil / Lavender Oil (Essential Oil)**

Fig. 1.8: Rose Oil

- **Use:** Provides fragrance and additional antimicrobial effect
- **Action:** Soothes the skin and enhances sensory appeal

➢ **Distilled Water**

Fig. 1.9: Distilled Water

- **Use:** Vehicle/solvent to dissolve and mix all components

Formulation Method of Herbal Face Wash:

Preparation of Herbal Extracts:

Neem, Turmeric, and Aloe Vera Extraction:

- Take Neem leaves (dried or fresh), turmeric powder, and aloe vera pulp/gel in separate beakers.
- Add sufficient rose water or distilled water to each and heat mildly (not boiling) for about 15–20 minutes using a water bath.
- Allow the extracts to cool and filter them using a muslin cloth or filter paper.
- Store the filtrates for use in the formulation.

Properties of Main Herbal Extracts (Per 100 ml face wash):

Constituent	Approximate Content (mg)
Neem (Azadirachta indica) – Flavonoids, Nimbin	30–40 mg
Turmeric (Curcuma longa) – Curcumin	20–25 mg
Aloe vera – Vitamins, Saponins, Amino Acids	50–60 mg

(Note: These values are approximations from hydroalcoholic extracts for academic formulation purposes.)

Procedure for Formulation of Herbal Face Wash:

1) Prepare Gel Base:

a) Dissolve Carbopol 940 (0.025 g) in a small quantity of distilled water with continuous slow stirring. Allow it to hydrate fully and swell to form a clear gel.

2) Incorporate Herbal Extracts:

a) Add the Neem, Turmeric, and Aloe vera extracts gradually into the gel base with constant gentle stirring to ensure uniform mixing.

3) Add Functional Ingredients:

a) Add Lemon juice (0.5 ml) and rose water to enhance cleansing, fragrance, and skin toning effect.

4) Incorporate Surfactant and Preservative:

a) Add Sodium Lauryl Sulphate (SLS) slowly to avoid foaming.

b) Add Methyl Paraben (1.0 g) as a preservative to improve shelf life.

5) Add Essential Oil:

a) Mix a few drops of Rose or Lavender essential oil for mild fragrance and added antimicrobial properties.

6) Adjust Final Volume:

a) Make up the total volume to 100 ml with distilled water and stir gently to obtain a smooth and uniform gel.

7) Packaging:

a) Fill the prepared herbal face wash in clean, sterilized plastic or glass bottles or pump tubes and label them appropriately.

List of Ingredients Used in the Formulation:

Ingredient	Quantity Used
Aloe vera gel	0.5 g
Neem extract	1.0 g
Turmeric extract	0.5 g
Lemon juice	0.5 ml
Rose water	q.s.
Carbopol 940	0.025 g
Sodium Lauryl Sulfate	1.0 g
Methyl Paraben	1.0 g
Essential oil	Few drops
Distilled Water	q.s. to 100 ml

Final Product:

The resulting herbal face wash is pale yellow in color, has a pleasant herbal/rose aroma, and possesses smooth, non-irritating, and easily spreadable

consistency. It produces mild foam upon use and can be safely applied for daily cleansing of oily to normal skin types.

Fig. 1.10: End Product

Fig. 1.11: Final Product

CHAPTER – 4: SKIN RELATED PROBLEMS AND THEIR PREVENTION USING HERBAL FACE WASH

Herbal face washes are useful in preventing various skin problems caused by pollution, excess oil, dust, bacteria, and environmental stress. Regular cleansing with a herbal face wash helps maintain a healthy, clean, and glowing complexion.

1. Acne and Pimples

Acne occurs when excess oil, dead skin cells, and bacteria clog the pores. In summer, sweat and pollution worsen the condition. Ingredients like **neem, turmeric, and lemon** have strong **antibacterial and anti-inflammatory** properties which help reduce acne and prevent further breakouts.

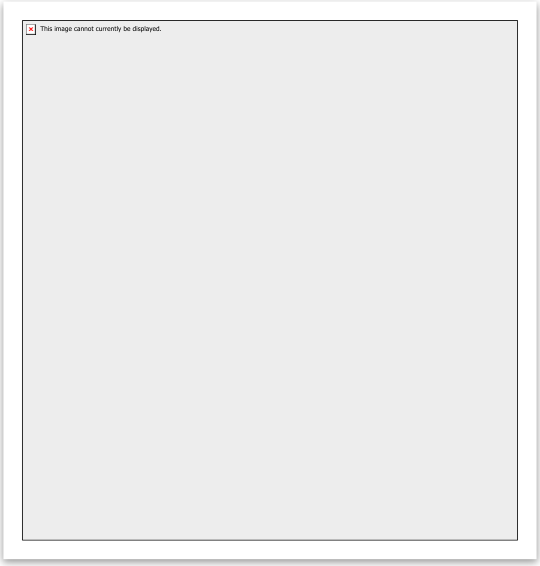

Fig. 1.12: Pimples

2. Oily Skin and Clogged Pores

Hot and humid weather increases sebum (oil) production. This causes greasy skin, clogged pores, and blackheads. Herbal ingredients like **lemon juice** and **aloe vera** in the face wash help **cleanse oil**, tighten pores, and refresh the skin.

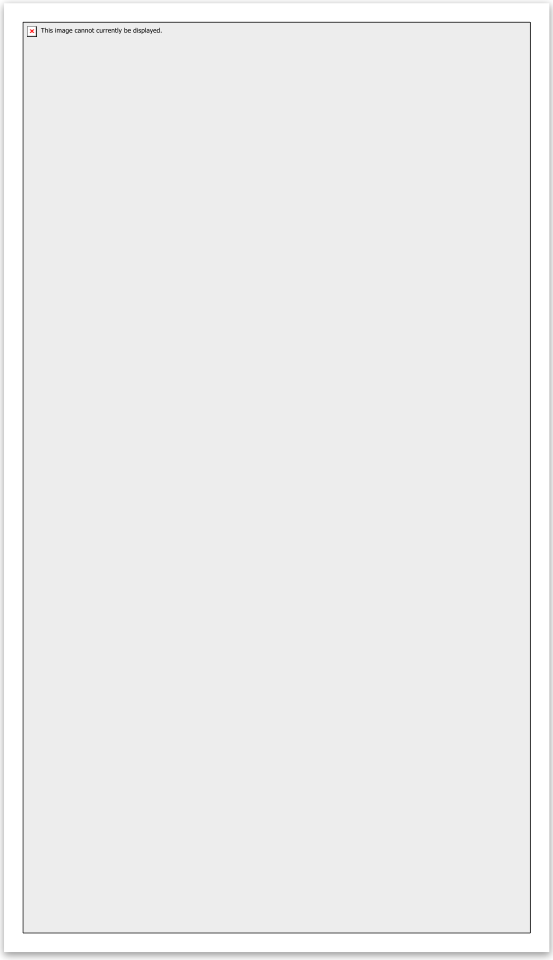

Fig. 1.13: Oily Skin

3. Dullness and Pigmentation

Dust, sweat, and pollution can make the skin appear dull. Pigmentation, tanning, and uneven skin tone are also common issues. **Turmeric and lemon** in herbal face wash help **brighten skin**, reduce melanin overproduction, and **restore natural glow**.

Fig. 1.14: Dullness & Pigmentation

4. Bacterial Infections and Skin Irritations

Unclean skin can harbor bacteria leading to itching, redness, or infections. Herbal face wash ingredients like **neem and rose water** soothe irritation, reduce inflammation, and provide antimicrobial protection.

5. Uneven Skin Texture and Dead Skin Buildup

Without proper cleansing, dead skin cells accumulate and cause rough texture. **Aloe vera** helps exfoliate gently and promote **skin regeneration**, leaving the skin smoother and more even.

CHAPTER – 5: CHARACTERISTICS OF HERBAL FACE WASH

1. Mild and Non-Irritating:

Herbal face washes are gentle on the skin and do not cause irritation, making them suitable for all skin types including sensitive skin.

2. Antibacterial and Antioxidant Activity:

Ingredients like **neem, turmeric, and lemon** offer antibacterial, antifungal, and antioxidant benefits, helping to fight acne, inflammation, and oxidative damage.

3. Maintains Natural pH Balance:

An ideal face wash maintains the skin's natural pH (around 5.5 to 6.5), helping to preserve the acid mantle which protects against pathogens.

4. Hydrating and Moisturizing:

With components like **aloe vera** and **rose water**, herbal face wash helps retain skin moisture and prevent dryness.

5. Free from Harsh Chemicals:

It contains no parabens, sulfates, artificial fragrances, or synthetic dyes, reducing the risk of allergies and long-term skin damage.

6. Removes Dirt, Oil, and Impurities Effectively:

It cleanses the skin deeply by removing accumulated dirt, excess sebum, and environmental pollutants, keeping the pores clear.

7. Enhances Skin Tone and Texture:

Regular use improves complexion, evens out skin tone, and promotes smooth and healthy-looking skin.

8. Environmentally Friendly:

Being plant-based and biodegradable, herbal face washes are safe for the environment and align with green cosmetic principles.

CHAPTER – 6: EVALUATION OF HERBAL FACE WASH

1. Organoleptic Evaluation:
The **organoleptic properties** including **appearance, color, odor, texture, and consistency** were evaluated manually. The formulation was observed to have a **smooth gel-like consistency**, a **natural herbal aroma**, and a **pleasant yellowish tone** due to turmeric.

2. Irritancy Test:
An area of 1 cm² was marked on the **forearm** of a healthy individual. A small quantity of the herbal face wash was applied and monitored for any signs of **irritation, redness (erythema), or swelling (edema)** over 24 hours.

Result: No irritation observed. Safe for use.

3. pH Test:
The pH of a 1% aqueous solution of the face wash was measured using a **calibrated digital pH meter**.

Result: pH = **6.8**, which is within the ideal range for skin (4.5–7.0), ensuring skin compatibility.

4. Viscosity Test:
Viscosity was tested using a **Brookfield or digital viscometer**. The sample showed **moderate viscosity**, suitable for gel-based face wash application.

5. Spreadability:
The spreadability was tested by placing a small amount of gel between two glass slides and measuring the diameter of spread under a standard weight.

Result: Easily spreadable, ensuring smooth application on skin.

6. Washability:
The face wash was applied on the hand and rinsed under running water.

Result: The formulation was **easily washable** and left no sticky or greasy residue.

7. Foamability:
A small amount of the gel was added to water in a test tube and shaken 10 times. The volume of foam was measured.

Result: Moderate and stable foam, suitable for gentle facial cleansing.

8. Stability Test:
The formulation was stored at **room temperature, 4°C, and 40°C** for **15–30 days**. It was observed for changes in **color, odor, phase separation, and consistency**.

Result: Stable under normal conditions; no significant change noticed.

9. Effectiveness Evaluation:
Volunteers used the face wash twice daily for one week. Observations included **reduction in oiliness**, **fewer breakouts**, and **improved skin texture**.

Result: Effective in cleansing and improving facial appearance without drying.

Observation Table Format (Example):

Test Parameter	Observation	Result
pH	6.8	Acceptable
Viscosity	Moderate	Suitable
Spreadability	High	Good
Foamability	Moderate	Acceptable
Washability	Easy	Good
Stability (15 Days)	No change in color/odor	Stable
Skin Irritation	None	Safe

CHAPTER – 7: RESULT & DISCUSSION

The present research work was aimed at developing a **herbal face wash** using natural plant-based active ingredients such as **Neem, Turmeric, Aloe vera, and Lemon**, which are known for their **antibacterial, antioxidant, and cleansing properties**. Herbal ingredients were selected due to their **effectiveness, safety, compatibility with all skin types, affordability**, and **minimal side effects** when compared to chemical-based cosmetic formulations.

The evaluation parameters such as **pH, viscosity, spreadability, foamability, irritancy, and stability** were assessed to determine the **quality and functionality** of the formulation.

The **prepared face wash gel** exhibited a **pleasing appearance**, **natural aroma**, and a **smooth, easily spreadable texture**. It had an ideal **pH of 6.8**, indicating compatibility with the skin's natural acid mantle. The viscosity was found to be appropriate for a gel-type formulation, ensuring **ease of use and good skin contact** during application.

Importantly, the face wash **produced moderate and stable foam**, which is adequate for cleansing without being too harsh or drying. The **washability test** showed that the product could be easily rinsed off with water, leaving the skin feeling **clean, refreshed, and non-greasy**.

No signs of **skin irritation, redness, or allergic reactions** were observed during the patch test, indicating its **dermatological safety**. The stability study showed **no phase separation, discoloration, or change in odor** over the test period, suggesting good shelf life under normal storage conditions.
Overall, the herbal face wash formulation met all the necessary evaluation parameters and demonstrated **effective cleansing, sebum control, and soothing action**, making it a **safe and beneficial option for daily skincare**, especially for individuals with oily or acne-prone skin.

CHAPTER – 8: SUMMARY & CONCLUSION

The present research work focused on the formulation and evaluation of a **herbal face wash** using natural plant-based ingredients such as **Neem (Azadirachta indica)**, **Turmeric (Curcuma longa)**, **Aloe vera (Aloe barbadensis Miller)**, and **Lemon juice (Citrus limon)**, known for their potent **antibacterial, antioxidant, anti-inflammatory, and cleansing properties**.

The objective was to develop a gentle, effective, and safe **gel-based herbal face wash** suitable for daily use on all skin types, particularly targeting **acne-prone and oily skin**. The formulation was evaluated based on various parameters such as **organoleptic characteristics, pH, viscosity, spreadability, foamability, washability, and stability**.

The results indicated that the herbal face wash was **stable, skin-friendly, and free from any irritation** or adverse effects. It effectively removed dirt and excess oil while maintaining the skin's natural moisture and pH balance. The inclusion of aloe vera ensured hydration and soothing effects, while neem and turmeric provided antimicrobial protection.

Overall, the study successfully developed a **polyherbal face wash formulation** that is a safe, cost-effective, and **environmentally friendly alternative to synthetic facial cleansers**, offering a **natural solution for maintaining healthy and clear skin**.

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