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FORMULATION AND EVALUATION OF SOAP BY USING GOAT MILK

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ABSTRACT- *The present study deals with the formulation and evaluation of goat milk soap prepared using natural oils and skin friendly ingredients. The soap was manufactured by the coldprocess method of saponification using coconut oil, olive oil, and castor oil as the base oils, while lavender oil was incorporated for fragrance and therapeutic effect.Goat milk was used instead of water because of its moisturizing, nourishing,and skin-protective properties. Sodium hydroxide pellets were used as the alkaline agent to initiate saponification.And special precautions were taken overheating and degradation of goat milk compound.The prepared soap was evaluated for various physical and chemical parameters such as appearance, pH,foam height,moisture content, and cleansing efficiency.The results shows that the goat milk soap possessed good lathering ability, and mild pH and excellent moisturizing properties. The study concludes that goat milk soap formulated with natural ingredients is a cost-effective, eco-friendly,and skin-compatible alternative to commercial available to synthetic soaps.*

KEY WORDS: **Goat milk soap, saponification, coconut oil, olive oil,castor oil, lavender oil, natural skincare,evaluation of soap**

INTRODUCTION:

In recent years, there has been a significant shift in consumer preference toward natural and herbal cosmetic products, driven by increasing awareness of skin health, environmental sustainability, and the potential adverse effects of synthetic chemicals. Conventional soaps and cosmetic cleansers often contain synthetic surfactants, artificial fragrances, preservatives, and colorants that may cause skin irritation, dryness, allergic reactions, and long-term damage, particularly in individuals with sensitive skin. As a result, natural alternatives derived from plant and animal sources have gained considerable importance in cosmetic science. Among these, goat milk soap has emerged as a popular and effective natural cosmetic preparation due to its mild cleansing action, excellent moisturizing ability, and skin-nourishing properties.

Goat milk soap is a traditional yet scientifically valuable skincare product that combines the benefits of goat milk with natural vegetable oils and essential oils. Its formulation is designed to cleanse the skin gently while maintaining its natural moisture balance. Unlike synthetic soaps, which often strip the skin of its natural oils, goat milk soap works in harmony with the skin's physiology. This makes it particularly suitable for daily use and for individuals suffering from dry, sensitive, irritated, or problem-prone skin.

The uniqueness of goat milk soap lies in the composition of goat milk itself. Goat milk is a rich source of essential nutrients such as vitamins, minerals, proteins, and fatty acids, all of which play a vital role in maintaining healthy skin. It contains vitamins A, B-complex, D, and E, which are essential for skin repair, nourishment, and protection. Vitamin A supports skin cell regeneration and helps maintain smooth and youthful skin, while B-complex vitamins improve skin texture and tone. Vitamins D and E contribute to skin hydration and act as antioxidants, protecting the skin from environmental stress and oxidative damage.

In addition to vitamins, goat milk is rich in minerals such as calcium, magnesium, potassium, and selenium. These minerals are essential for maintaining skin strength, elasticity, and normal cellular functions. Calcium supports skin cell renewal, magnesium helps reduce inflammation, and selenium provides antioxidant protection. The presence of these minerals enhances the therapeutic and nourishing value of goat milk soap, making it an effective skincare product for various skin conditions.

Another important characteristic of goat milk is its high content of fatty acids and triglycerides. These components are similar to the natural lipids found in human skin, which allows goat milk soap to penetrate deeply and provide long-lasting hydration. The fatty acids help repair the skin's natural barrier, reduce moisture loss, and maintain softness and suppleness. This

property makes goat milk soap especially beneficial for individuals with dry skin, eczema, psoriasis, and other skin disorders associated with dryness and irritation.

A key component that significantly enhances the cosmetic value of goat milk soap is lactic acid. Lactic acid is a naturally occurring alpha hydroxy acid (AHA) present in goat milk, known for its gentle exfoliating properties. It helps remove dead skin cells from the surface of the skin by loosening the bonds between them, promoting natural skin renewal. Unlike harsh chemical exfoliants, lactic acid provides mild exfoliation without causing irritation or damage to the skin. This gentle action improves skin texture, brightness, and smoothness, making goat milk soap suitable for sensitive and delicate skin types.

Lactic acid also plays a crucial role in maintaining the skin's natural pH balance. Healthy skin typically has a slightly acidic pH, which acts as a protective barrier against harmful microorganisms and environmental pollutants. Synthetic soaps often disrupt this pH balance, leading to dryness, irritation, and increased susceptibility to infections. Goat milk soap, due to the presence of lactic acid, helps maintain an optimal pH level, thereby supporting the skin's natural defines mechanism and overall health.

The effectiveness of goat milk soap is further enhanced by the inclusion of natural vegetable oils such as coconut oil, olive oil, and castor oil. These oils are commonly used in soap formulation because of their beneficial effects on cleansing, lather formation, moisturizing ability, and skin conditioning. Coconut oil contributes to excellent cleansing action and produces a rich, stable lather that effectively removes dirt, excess oil, and impurities from the skin. Olive oil acts as a natural emollient and moisturizer, nourishing the skin and improving elasticity. Castor oil enhances foam stability and adds softness to the soap, while also providing moisturizing and mild antimicrobial effects.

In addition to vegetable oils, essential oils such as lavender oil are often incorporated into goat milk soap formulations. Lavender oil is widely recognized for its pleasant aroma and therapeutic properties. It provides calming and soothing effects on the skin and mind, making the bathing experience relaxing and refreshing. Lavender oil also possesses antimicrobial, antiseptic, and anti-inflammatory properties, which help protect the skin from infections, reduce redness, and promote healing of minor skin irritations.

Due to its natural composition and balanced formulation, goat milk soap is suitable for a wide range of skin types. It is particularly beneficial for individuals with sensitive skin, as it cleanses gently without causing irritation or excessive dryness. People suffering from skin conditions such as acne, eczema, dermatitis, and psoriasis may also benefit from regular use of goat milk soap, as it helps soothe inflammation, maintain hydration, and support the skin's natural healing process.

From the perspective of herbal cosmetic science, goat milk soap represents an ideal example of a natural cosmetic product that combines traditional knowledge with modern scientific understanding. Herbal cosmetics emphasize the use of naturally derived ingredients that are safe, effective, and environmentally friendly. Goat milk soap aligns with these principles by utilizing biodegradable and sustainable ingredients that are gentle on both the skin and the environment. Its formulation avoids harsh chemicals and synthetic additives, making it a safer alternative to conventional soaps.

Furthermore, the growing demand for eco-friendly and sustainable cosmetic products has increased the relevance of goat milk soap in the cosmetic industry. Consumers are increasingly seeking products that not only enhance beauty but also promote overall skin health and environmental responsibility. Goat milk soap meets these expectations by offering a natural, nourishing, and therapeutic skincare solution.

In conclusion, goat milk soap is a valuable natural cosmetic preparation that offers multiple benefits, including gentle cleansing, effective miniaturization, mild exfoliation, and therapeutic effects. Its rich content of vitamins, minerals, fatty acids, lactic acid, vegetable oils, and essential oils makes it an important product in herbal cosmetic science. The increasing popularity of goat milk soap reflects a broader shift toward natural and holistic skincare approaches, highlighting its significance in modern cosmetic formulation and natural skincare development.

BENEFITS OF GOAT MILK SOAP:

- Provides deep moisture and prevents skin dryness.
- Helps preserve the skin's natural pH while strengthening the protective skin barrier.
- Gently exfoliates the skin due to lactic acid present in goat milk.

- Suitable for sensitive, dry, and irritated skin.
- Produces rich, creamy, and stable lather.
- Processes' antimicrobial properties that help prevent skin infections.
- Soothes skin and reduces inflammation and redness.
- Helps in managing acne and minor skin problems.
- Improves skin softness, smoothness, and elasticity.
- Provides calming and relaxing effect due to lavender oil fragrance.

INGREDIENTS:

- Goat milk - Functions as a skin-conditioning agent with moisturizing and nourishing properties.
- Coconut oil - provides cleansing action and good lather format.
- Olive oil - Acts as ask in conditioner and emollient.
- Castor oil - Enhance foam stability and softness of the soap.
- Lavender oil - - Used as fragrance and therapeutic agent.
- Sodium hydroxide - Is used as saponification agent in soap preparation.
- Distilled water- Used to dissolve sodium hydroxide pellets.

EQUIPMENTS:

Measuring Cylinder – for accurate measurements of liquids, oil, and lye to reduced errors.
Spoon – scrap the sides and bottom of the mixing bowl, to handle small quantities of ingredients.
Molding and curving – create soap bars with specific shapes, sizes, and design.
Thermometer – Is used to monitor temperature of both the lye solutions and oils.
Mixing bowl – used to mix the lye with water, goat milk and other ingredients.
Blender – utilize to thoroughly combine oils, fats, and lye, to create a uniform mixture.
Grouse, mask, Goggles – prevent skin contact with lye (sodium hydroxide),which can cause severe skin irritation, burns, and other injuries.

METHODS OF PREPARATION:

1. Preparation of lye solution:

- Dissolve sodium hydroxide pellets in distilled water.
- Cool the solution to avoid overheating.
- The lye goat milk solutions are slowly added to fresh goat milk with continuous stirring with completely dissolved.

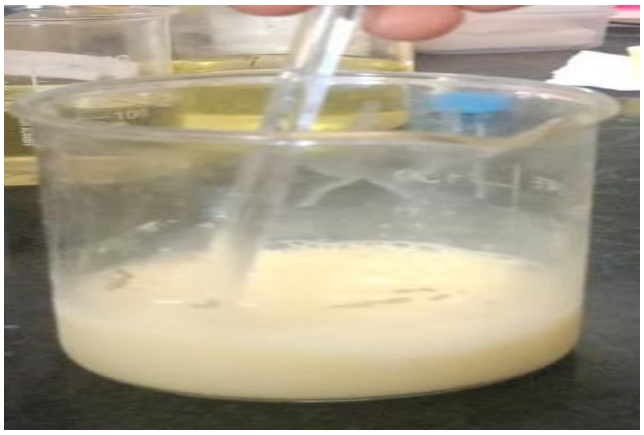

Fig no:01 Preparation of lye solution

2. Preparation of oil phase:

- Oils such as coconut oil, olive oil, and castor oil are weighed accurately and gently heated to melt and mix uniformly.

Fig no : 02 Preparation of oil phase

3. Mixing:

- The lye –goat milk solution is slowly added to the oil mixture with constant stirring or blending until trace is achieved

Fig no: 03 Mixing

4. Addition of additives:

- Lavender essential oil is incorporated into the mixture and blended uniformly.

5. Molding and curing:

- The prepared soap mass is transferred into molds, kept undisturbed for 24-48 hours, and then remolded. And cured for 3-4 weeks prior to use.

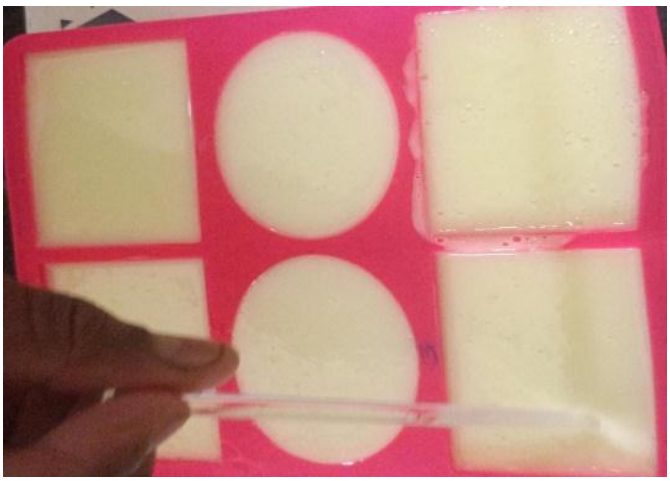

Fig no: 04 molding and curing

Table no 01 ; FORMULATION:

The goat milk soap was formulated using coconut oil, olive oil, and castor oils the base oils, lavender oils as a fragrance and soothing agent, goat milk as a natural moisturizer, and sodium hydroxide as the saponification agent

S.NO	INGREDIENTS	FORMULATION(1)	FORMULATION(2)	FORMULATION(3)
1.	OLIVE OIL	70 ml	90 ml	40ml
2.	COCONUT OIL	50 ml	30 ml	80 ml
3.	CASTOR OIL	10 ml	10 ml	10 ml
4.	GOATMILK	35 ml	35 ml	35 ml
5.	WATER	20 ml	20 ml	20 ml
6.	NaOH	23.3 g	23.36g	26.27g
7.	FRAGRANCE	3 ml	3 ml	3 ml

FORMULATION(1)

Fig no :05 Goat milk soap formulation(1)

FORMULATION (2)

Fig no :06 Goat milk soap formulation(2)

FORMULATION(3)

Fig no:07 Goat milk soap formulation (3)

EVALUATION TEST FOR GOAT MILK SOAP:

1. **Physical appearance:**

   Evaluated for Color, Odor, and, surface texture.
   Soap should be uniform in appearance. Free from cracks and air bubbles.

2. **pH test:**

   The pH value of a 1% soap solution is determined with the help of a pH meter.
   Ideal pH range 7-10
   Goat milk soap usually shows a mild pH, suitable for skin.

3. **Foaming ability and foam stability:**

   Soap solution is shaken in measuring cylinder.
   Foam volume is measure immediately after 5 minutes.
   Good soaps show stable and sufficient foam.

4. **Moisture content:**

Determined by drying a weighed sample in a hot air oven.
Low moisture content improves shelf life and hardness

5. **Hardness test:**

Evaluates resistance to pressure or break.
Hard soap ensures longer durability during use.

6. **Cleansing test:**

Test by washing oily substance from a surface.
Indicates the detergent efficiency of the soap.

7. **Skin irritation test:**

Soap applied on a small skin area.
Observed for redness, itching, or irritation.
Goat milk soap is gently non- irritant.

8. **Total fatty matter:**

Measures the percentage of fatty substance.
Higher TFM= better quality and moisturizing effect.

9. **Free alkali test:**

Determines presence of unreacted sodium hydroxide.
Excess alkali can cause skin irritation.

10. **Stability study:**

Soap stored at different temperature.
Observed for changes in Color, Odor, and Texture.

Table no : 02 RESULTS:

S.NO	PARAMETERS	RESULTS
1.	COLOUR	CREAMY OFF WHITE
2.	Odor	PUNGENT
3.	APPEARANCE	GOOD
4.	TEXTURE	SOLID AND SMOOTH
5.	pH	5.5-6.5
6.	FOAM HEIGHT	6.5 cm
7.	MOISTURE CONTENT	25%

CONCLUSION:

From the evaluation studies, it can be concluded that goat milk soap prepared using natural oils exhibits good physicochemical properties, acceptable pH, adequate foaming ability, and high fatty matter, indicating good cleansing and moisturizing effect. The soap showed satisfactory hardness, low free alkali content, and no signs of skin irritation, making it safe for regular use. Stability studies revealed no significant changes in appearance or odor during storage. Overall, goat milk soap can be considered a mild, skin- friendly and effective cosmetic product suitable for daily personal care.

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