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Research Article

FORMULATION AND EVALUATION OF HERBAL ALOE VERA SOAP

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ABSTRACT

Herbal Aloe Vera Soap is a natural skincare product designed for kindly cleansing, hydration, and nourishment. Filled with aloe vera, it soothes, moisturizes, and reduces skin irritation and inflammation. The soap also contains neem, known for its antibacterial and antioxidant properties, ensuring deep cleansing without disturbing the skin balance. Made using the melt-and-pour method, it combines a goat milk soap base with aloe vera gel, essential oils, and herbal extracts. Coconut oil and vitamin E help improve skin elasticity and moisture, while essential oils like lavender or rose add fragrance and additional benefits. Free from harmful chemicals and synthetic additives, it's safe for all skin types, including sensitive and acne-prone skin. Regular use helps with hydration, acne prevention, and overall skin health, leaving it soft, radiant, and protected from environmental pollutants. This eco-friendly soap offers a natural, organic skincare solution, ideal for those seeking sustainable alternatives.

KEYWORDS: inflammation, fragrance, skincare, hydration.

INTRODUCTION

Soap: Soap is a cleansing product made by combining fats or oils with an alkali (like sodium hydroxide) through saponification. This reaction produces soap and glycerin, which break down grease and dirt, allowing them to be washed away with water.

History of Soap: Soap-like substances were first made in ancient Babylon (around 2800 BC) and used in Mesopotamia for cleaning textiles, not hygiene. Egyptians created soap from animal fats and alkaline salts, using it for wounds and hygiene as noted in the Ebers Papyrus. Romans used soap-like materials for laundry and later bathing, with a legend linking its origin to Mount Sapo. In medieval Europe, soap-making guilds and centers like Marseille emerged; soap was a luxury until it spread in the Early Modern Era. The Industrial Revolution enabled mass soap production; modern times saw the rise of synthetic and herbal soaps, now used globally.

Synthetic soap: Synthetic soap, also known as a synthetic detergent, is a cleansing agent made from chemical compounds, rather than from natural fats and lye as in traditional soap.

Herbal Soap: Herbal soap is a type of soap made primarily from natural ingredients, typically plant-based and botanical extracts, rather than synthetic chemicals. It's known for being gentle and mild, often formulated to be free of harsh chemicals, artificial fragrances, and other additives.

Herbal Aloe Vera Soap: Herbal Aloe Vera Soap is a natural skincare product made with Aloe Vera, known for its moisturizing, soothing, and anti-aging properties. It often includes ingredients like neem (antibacterial), reetha extract (foaming agent), and honey (natural humectant). It's ideal for sensitive or dry skin, offering hydration, acne prevention, and healing benefits.

Classification of soaps: Soap can be classified based on various criteria, reflecting its composition, purpose, form, and functionality. Based on Ingredients, soaps are either natural, using oils or lye (e.g., goat milk soap), or synthetic, containing surfactants and chemicals. Based on Purpose, they can be toilet soaps for personal care, laundry soaps, household soaps, or industrial soaps for heavy-duty cleaning. Based on Form, soaps are found as bar soaps, liquid soaps, powdered soaps, soap flakes, and cream soaps. Based on Manufacturing Process, methods include cold process, hot process, melt-and-pour, and commercial production. Based on Skin Type, they include moisturizing, antibacterial, exfoliating, and sensitive skin soaps. Based on pH Level, soaps can be alkaline, neutral, or acidic, affecting skin compatibility. Based on Special Properties, soaps may be herbal, transparent, luxury, or medicated, offering specific benefits. These classifications help consumers choose suitable soaps based on individual needs and uses.

Methodology: Collect the raw materials Aloe Vera, Reetha, Moringa, Honey, Rose oil, Coconut oil, Neem oil from the herbal sources and the goat milk soap base is also collected from the regarded source and this include the extraction of raw materials.

Extraction: Aloevera, Reetha and Moringa are extracted by their responsible procedures.

Fig.No.01: Aloevera extraction.

Manual extraction of aloe vera: Aloe vera gel extraction starts by selecting fresh, mature outer leaves and washing them thoroughly. The leaves are kept upright for 15–30 minutes to drain the yellow latex (aloin). After draining, the green peel is removed to extract the clear gel. The gel is then blended, stored in an airtight container, and refrigerated.

Soxhlet Extraction of Reetha & Moringa
Materials Required
Reetha powder / Moringa leaf powder (20–50g)
Ethanol or Methanol (200–300 mL)
Soxhlet apparatus (flask, thimble/filter paper, condenser)
Heating mantle / Water bath
Standard lab glassware (beakers, pipettes, etc.)

Extraction Steps
Sample Preparation
Reetha: Dry fruits are grind into fine powder
Moringa: Wash leaves then shade-dry and grind into fine powder

Setup
Place powdered material in cellulose thimble or filter paper. Assemble Soxhlet extractor with solvent-filled flask.

Extraction
Heat solvent until it boils and condenses into the extractor. Continue cycle for 4–8 hours to ensure full extraction.

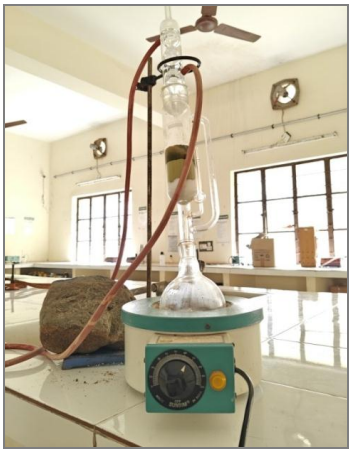

Fig.No.02: Extraction of Reetha

Fig.No.03: Extraction of Moringa

Post-Extraction
Cool apparatus.
Evaporate solvent via rotary evaporator or by using water bath**.** Optionally dry extract using vacuum/freeze dryer.

Storage
Store dried extract in airtight containers at cool, dry conditions.

Fig.No.04: Extracted Moringa and Reetha.

Herbal Aloe Vera Soap Formulation: This is the formulation of the herbal aloe vera soap and this includes the ingredients and their composition.

Table No: 01: Formulation of herbal aloe vera soap.

Sr. No.	Ingredients	Quantity taken (100 gm)	Category
1	Aloe vera extract	28 gm	Anti-aging and Moisturizing
2	Goat milk	55 gm	Soap base
3	Honey	2.0 mL	Anti-aging
4	Neem oil	2.0 mL	Anti-bacterial agent
5	Coconut oil	2.0 mL	Lathering-agent
6	Rose oil	2.0 mL	Flavoring and Fragrance
7	Moringa	6.0 mL	Coloring-agent
8	Reetha	3.0 mL	Foaming-agent
9	Lye Solution	3.0 mL	Hardening-agent

Procedure

- Weigh all ingredients accurately.
- Melt 55g goat milk base in Beaker-A at 70°C.
- Mix other ingredients (except lye) in Beaker-B.
- Prepare lye solution in Beaker-C.
- Combine Beaker-B contents with melted soap base (Beaker-A); stir at 70°C.
- Add lye (Beaker-C) slowly; stir until uniform.
- Molding: Pour into lubricated soap moulds; cure for 2–4 weeks.

Fig.No.05: Ingredients.

Fig.No.06: Soap Mounding

RESULTS AND DISCUSSION

This includes the evaluation of the parameters of the soap and results.

Evaluations

1) Colour: The Soap colour was found to be pale green colour by vision.
2) Oudor: The soap oudor was found to be Pleasant odour.
3) Fragrance: The soap fragrance was found to be rose.
4) Solubility: It is easily soluble in the water form a stable lather without excessive residue.
5) Saponification: Indicates the amount of alkali required to saponify a specific amount of fat/oil, typically 180–220 mg KOH/g of oil.
6) Hardness: The hardness of soap affects its durability it is performed by the penetrometer the value was found to be 1.8mm into the soap.
7) Moisture content: The moisture content of the soap was observed by the hot air oven. The moisture content was found to be 15% to prevent soap from becoming too soft.
8) Appearance: It is appeared in the oval, circular, square and love symbol shapes.
9) Texture: The soap is having a uniform texture, free from cracks, discoloration, or uneven spots and its good for the use.
10) Storage: The temperature of soap the not exceeds 27°C
11) Irritability: Non-Irritant to the skin
12) Cleansing Power: Should effectively remove dirt and oils while maintaining skin hydration.
13) pH: - Prepare the soap solution with 5g of sample of soap was dispersed in 50 ml distilled water and perform the pH test with use of pH meter. The pH was found to be 8 basic.

14) Foam height: A 10% soap solution was prepared by dissolving 5 g soap in water up to 50 ml in a measuring cylinder. After 25 strokes, the foam height was measured and found to be 8 cm above the aqueous layer.

15) Foam retention: A 1% soap solution was prepared, and 25 ml was shaken in a 100 ml cylinder for 10 minutes. Foam volume was recorded at 1-minute intervals, with an average foam retention time of 5 minutes.

16) Stability studies: The stability effect on the soap these are conducted by long time of duration and observing the changes in the soap. There is no change in the soap it will be stable.

17) Shelf Life: The soap's stability was tested under varying temperatures and time, observing organoleptic properties and microbial growth. No changes were noted during the half-life period, indicating good stability.

18) Thermal stability: The thermal stability of the soap was tested in a humidity chamber as per ICH guidelines at 30°C/65% RH, 60°C/75% RH, and 70°C/75% RH for two months. Samples were analyzed for physical and chemical stability. The soap remained stable with no changes up to 70°C.

19) Microbial growth: Microbial growth was tested using the ditch plate method with agar, where the soap solution was placed in the ditch and incubated at 37°C for 24–48 hours. No microbial growth was observed around the soap, indicating its antimicrobial stability.

20) Determination of percentage free alkali: 5 g of soap was refluxed with 50 ml neutralized alcohol for 30 minutes, cooled, and titrated with 0.1 N HCl using phenolphthalein as indicator. The free alkali content was found to be 0.05%, indicating it is safe and non-irritating to the skin.

21) Alcohol-insoluble matter: 5 g of soap was dissolved in warm ethanol, filtered with an additional 20 ml warm ethanol, and then the residue was dried at 105 °C for 1 h and weighed.

The Alcohol-Insoluble Matter Test assesses impurities (e.g., fillers, excess fats), where higher percentages indicate lower purity. The sample exhibited 3% alcohol-insoluble matter.

22) Total fatty matter (TFM): TFM was estimated by reacting 10 g of soap with 15% H_2SO_4 in hot water, solidifying the fatty acids using 7 g beeswax, and weighing the dried cake. The TFM (%) was calculated using: (Weight of cake – Weight of wax) / Weight of soap × 100.The soap showed a TFM value of 75%, indicating good quality with effective cleansing and skin mildness.

Table No: 02: Parameters Results.

S.No.	Parameters	Observation
01	Color	Pale Green
02	Oudor	Pleasant
03	Appearance	Circular, Oval and square
04	pH	7.8
05	Fragrance	Rose
06	Hardness	1.8mm
07	Texture	Smooth, Brittles
08	Saponification	198.5KOH/gs
09	Irritability	Non-irritant
10	Wash ability	Easily washable
11	Moisture content	15%
12	Foam retention time	5 min
13	Cleansing power	Effectively clean
14	Foam height	8cm
15	Shelf life	Good
16	Storage	27°C
17	Thermal stability	70°C
18	Microbial growth	Good
19	%Free alkali	0.05%
20	Alcohol-insoluble matter	3%
21	Total fatty matter	75%
22	Stability studies	Good

SUMMARY

- **Natural & Skin-Friendly Formulation:** Made using aloe vera, goat milk, neem, honey, and herbal extracts like moringa and reetha, offering moisturizing, antibacterial, and anti-aging benefits.
- **Method & Extraction:** Prepared using the melt-and-pour method with manual extraction of aloe vera gel and Soxhlet extraction of reetha and moringa for purity and effectiveness.
- **High-Quality Composition:** The soap contains 75% Total Fatty Matter (TFM), 0.05% free alkali, and only 3% alcohol-insoluble matter, ensuring excellent cleansing, skin safety, and minimal impurities.
- **Stable & Safe:** It showed no microbial growth, remained chemically stable at up to 70°C, and had a long shelf life with no rancidity or texture change under ICH stability guidelines.
- **Physicochemical Properties:** Pale green in color, rose fragrance, smooth texture, hardness of 1.8 mm, moisture content 15%, and pH of 7.8 making it suitable for all skin types.
- **Cleansing Efficiency:** The soap demonstrated good foam height (8 cm), 5 min foam retention, high cleansing power, and quick wash ability without residue.
- **Eco-Friendly & Non-Irritant:** Free from harmful chemicals, suitable for sensitive and acne-prone skin, and environmentally safe for regular and long-term use.

CONCLUSION

The formulated Herbal Aloe Vera Soap demonstrated excellent quality, safety, and effectiveness as a natural skincare product. It showed good physicochemical properties including ideal pH, foam height, and cleansing power, with a high TFM value of 75%, indicating superior soap quality. The soap remained stable under thermal and storage conditions, with no microbial growth or irritant effects observed. Its rich blend of aloe vera, neem, and herbal extracts ensures moisturizing, antibacterial, and soothing benefits. Overall, this eco-friendly formulation is suitable for all skin types, including sensitive skin.

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