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FORMULATION AND EVALUATION OF HERBAL SOAP ENRICHED WITH ETHANOLIC EXTRACT OF *EUPHORBIA HIRTA LINN*

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ABSTRACT

The main objective of the current study is to formulate and evaluate herbal soap using cold process techniques. E*uphorbia Hirta linn*, were developed and evaluated using coconut oil and sodium hydroxide. Skin irritancy tests, total fatty matter, moisture content, foaming index, foam retention time, percentage of free alkali and pH are some of the evaluation methods that have been employed. The soap also showed good cleansing efficacy in terms of removing bacteria from the skin. Herbal soap has been prepared and evaluated.

KEYWORDS: E*uphorbia Hirta linn*, Coconut oil, Sodium Hydroxide.

1. INTRODUCTION

Bar soaps were solid formulations designed for topical application. The soap recipes contained a variety of extracts, herbal oils, and excipients.[1] The utilisation of medicinal plants has long been the foundation of traditional medicine. The leaves, stems, and roots of many different medicinal plants have been used as natural remedies for a wide range of diseases and ailments. To treat acne, these extracts are administered topically as oils, lotions, soaps, and ointments; their therapeutic qualities are derived from their active constituents. Additionally, they are utilised in cosmetics and as an antimicrobial agent.[2]

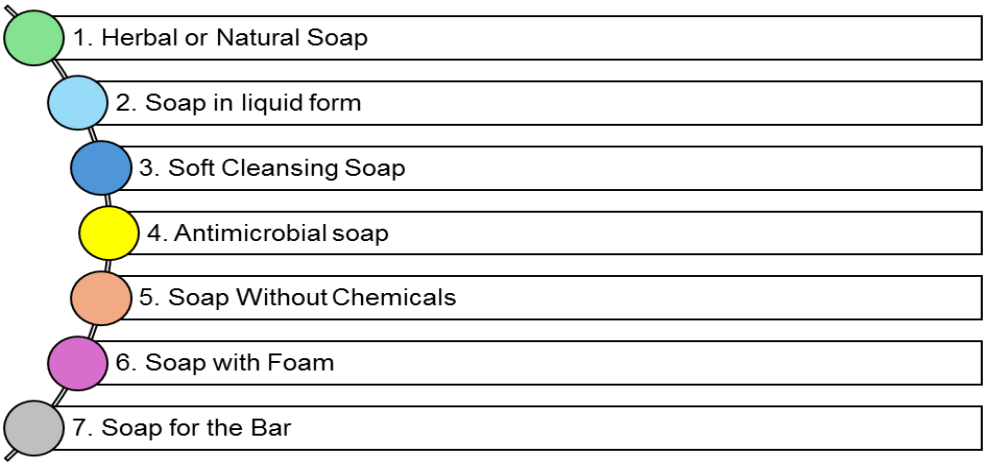
1.1 SOAP

The term soap (Latin Sapo), which initially applied to the material produced by the digestion of tallow with ashes, is derived from the Latin sebum tallow. "Soap is a body that yields alkali on treatment with water in the commercial sense."[3] Soap is a fatty acid salt and is employed in numerous cleaning and lubricating preparations. Soaps are surfactants most frequently employed for bathing, washing, and housekeeping. Soaps can be utilized to wash the body of bacteria, dirt, and odors. Soaps utilized in commercial products are likely to contain poisonous chemicals like plastics, bisphenol, aluminum, barium, and mercury. These poisonous chemicals have deadly side effects and are absorbed by the skin and internal organs.[4, 5]

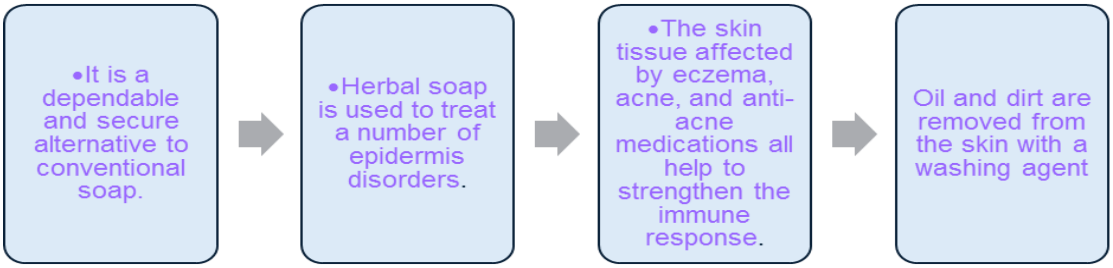
1.2 HERBAL SOAP

Herbal soap making is a type of medicine that cures diseases and maintains health through the use of plant material like pulps, seeds, rhizomes, and nuts. It also has antiseptic, antibacterial, anti-aging, and antioxidant properties.[6] Herbal soap lacks artificial colouring, flavouring, fluoride, and other substances found in traditional soap.[7] Herbs are nature-made products used normally to heal nearly all ailments and skin conditions because of their immense therapeutic significance, low costs, accessibility, and compatibility.[8] Cosmetic skincare items promote the texture, moisture, and health of the skin. The solid texture of polyherbal soap is for topical use. In the form of a cream, a series of excipients, vegetable extracts, and almond oil are utilized.[9] It primarily cleanses and hydrates the skin and serves as a skin tonic. The plant's secondary metabolites will maintain the strength, texture, and integrity of the skin along with hydrating and keeping it elastic.[10] Thus, the use of herbal ingredients in cosmetics prevents the generation of free radicals in the skin temporarily and to a great extent. Antioxidant, anti-acne, and anti-wrinkle activity of the active component protects the skin from UV rays.

1.2 SOAP TYPES



1.3 USES OF HERBAL SOAP



2. METHODOLOGY

2.1COLLECTION & AUTHENTICATION

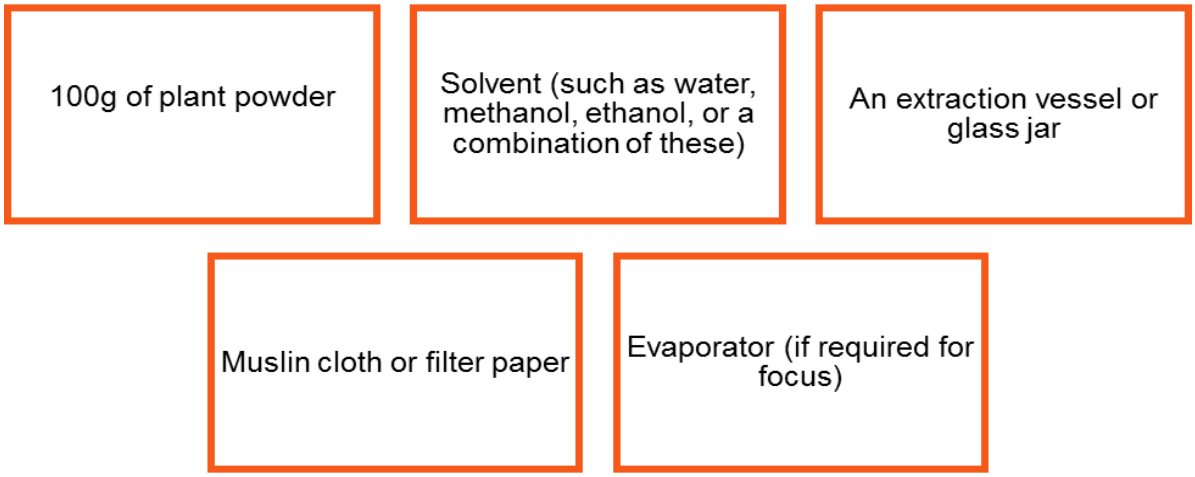
The E*uphorbia Hirta Linn* aerial plant was gathered from the home town city's Vellore football field. Dr.V.Ravi, M.Sc., Ph.D., Associate Professor & Head of the PG & Research Department of Botany Government Arts College for Men, Krishnagiri-635001, Tamil Nadu, recognized and verified it.

2.2 EXTRACTION PROCESS

2.2.1Ethanol extraction[11]

Plants were dried for 2 weeks at room temperature, pulverized to a powder, and passed through a No. 40 sieve. The plant powder (100 g) was weighed, transferred to a round-bottom flask, and treated with 95% ethanol using a maceration method.

2.2.2 MATERIALS REQUIRED



2.2.3 MACERATION PROCEDURE

PREPARATION OF ETHANOLIC EXTRACTION BASED ON MACERATION METHOD

E*uphorbia hirta* ethanolic extract preparation, The E*uphorbia hirta* plant should be dried and ground into a coarse powder. In a closed container, suspend 50 g of powder in 500 mL of ethanol (1:10 ratio). Shake daily for seven days at room temperature. Use muslin cloth or filter paper to filter the extract. Use a water bath or let

the ethanol air dry. To apply, keep the concentrated extract in a well-sealed container.

Figure 02: Ethanol Extraction.

2.3 PHARMACOGNOSTICAL PROFILE OF ACTIVE INGREDIENT[12]

Table 1: Pharmacognostical Profile of Active Ingredients.

S. No	Name	Biologicalsource & Family	Parts	Chemical constituents	Uses
1.	Amman pacharisi	E*uphorbia Hirta linn* (Euphorbiaceae) 	Leaves	Alkaloids, Tannins, Flavonoids (quercetin, Kaempferol), Terpenoids, Phenolic compounds, Essential oils, Phytosterols.	Treating asthma, bronchitis, and cough. Used as an anti-diarrheal, anti-dysenteric. Applied externally for cuts, wounds, and skin infections.
2.	Grape seed oil	V*itis vinifera* (Vitaceae) 	seed	Fiber, Oil, protein and complex phenols and tannins, sugars & mineral salts	Antioxidant properties, Diabetes, Protection against bacterial infections.

2.4 SOAP INGREDIENTS

Table 2: Soap Ingredients.

S. No.	Ingredient	Use
01	Active pharmaceutical ingredients	Anti-acne, Anti-bacterial, Anti-asthma
02	Coconut oil	Provides hydration and nourishments.
03	Sodium Hydroxide (NaoH)	Lye
04	Sandal wood oil	Fragrance
05	Grape seed oil	Anti-Oxidant, Preservative
06	5% Niacinamide (vit B3)	Anti-aging
07	Distilled water	Aqueous vehicle

COLD PROCESS TECHNIQUE[14]

Pour 65 ml of coconut oil into a 500 ml beaker to create the soap base. To bring the liquid to a boil, around 40 to 45 degrees Celsius, place it over a water bath and spin. Use a thermometer to keep an eye on the temperature. Again, keep the temperature steady with a thermometer as you mix weighed sodium hydroxide, or in a sterilized beaker, combine distilled water and lye. After adding this solution, bring the liquid to a boil at 40 to 45 degrees Celsius, or until a base consistency appears. The mixture can be kept in the freezer for two to three hours after it has been poured into soap molds. The molds containing the soap can then be removed from the freezer and left there for five minutes. Soap will begin to develop during that period.

Figure 03: Cold Process.

2.5 SOAP FORMULATIONS WITH DIFFERENT CONCENTRATION

Table 3: Soap Formulation with Different Concentration.

INGREDIENTS	F1	F2	F3	F4	F5
Active pharmaceutical ingredients	1ml	1.5ml	2ml	2.5ml	3ml
Coconut oil	64ml	63ml	62ml	61ml	60ml
Sodium Hydroxide (NaoH)	10grams	10grams	10grams	10grams	10grams
Sandal wood oil	2-3 drops	2-3 drops	2-3 drops	2-3 drops	2-3 drops
Grape seed oil	1ml	2ml	3ml	4ml	5ml
5% Niacinamide (vit B3)	5ml	5ml	5ml	5ml	5ml
Distilled water	q.s	q.s	q.s	q.s	q.s

3. Evaluation criteria

Physical examination

Organoleptic features, such as appearance, color, form, and odor, were identified.

Figure. 01: Herbal Soap.

PH

A digital pH meter was used to measure the pH when 1 g of soap was dissolved in 10 mL of distilled water.[15]

Foam height

25 ml of distilled water were blended with a 0.5-gram sample of soap. Next, transfer it to a 100 ml measuring cylinder and top it off with water to reach 50 ml. During 25 strokes, the foam height was measured above the aqueous volume, and the aqueous volume was measured up to 50 ml.[16]

Foam retention

25 ml of the 1% soap solution was put into a 100 ml graduated measuring cylinder. The measuring cylinder's top was sealed with our hand, and after 4 minutes of agitation, the volume of foam was measured every minute.[17]

Test for skin irritation

After applying soap to the skin for 10 minutes, the reaction was noted and recorded.[19]

Total fatty matter

Fatty matter was computed by observing the quantity of fatty acids that were formed after the soap and acid reacted with hot water. Upon dissolving 10 g of soap that was prepared in 150 ml of distilled water, it was then heated. Upon heating this to a clear solution, 20 ml of 15% H_2SO_4 were added. After heating the resulting solution again, 7 g of beeswax is added to harden the surface fatty acids. A cake was formed. The resulting cake was then dried and weighed based on the following formula to determine TFM.[19]

% TFM = (Weight of the cake–Weight of the wax) in g/Weight of the soap in g×100.

Determination of total moisture content

Total moisture content was calculated by placing 5 g of the soap in a petri dish and drying it for two hours at 105°C in a hot-air oven. After that, it was weighed, heated, and cooled. The moisture content is indicated by the weight difference.[19]

Water content = m/Mx100 m = loss in mass of the material after drying M = mass of sample taken.

Determination of Alcohol insoluble matter[19]
Percentage alcohol insoluble matter = Weight of the residue /Weight of sample x 100.[18]

4. RESULT AND DISCUSSION

Colour, odour, appearance and pH were among the organoleptic properties of herbal soap that were measured. Total fatty matter, percentage-free alkali, alcohol insoluble matter, moisture content, foam height, and foam retention are among the estimated parameters that are displayed in the table. The soap does not irritate the skin.

S. No.	Parameters	Result
1	Colour	Pale green
2	Odour	Aromatic
3	Shape	Oblong
4	PH	8
5	Foam height	4cm
6	Foam retention	3min 47sec
7	Texture	Smooth
8	Washability	Good washable
9	Skin irritation	Non irritant
10	Total fatty matter	68.9%
11	Total moisture content	14.7%
12	Alcohol insoluble matter	10%

5. CONCLUSION

The result of the cold process herbal soap manufacturing technique has suitable compatibility and physical characteristics. According to reports, the formulations had a strong foaming quality and were free of particles and alkali components. Based on a number of tests, the herbal soap formulation was deemed suitable. Since using such soaps has been shown to cause no skin irritation at all, soap is not proven to cause any skin irritation at all. The study's findings indicate that cold process soap made with herbal ingredients can have anti-aging, anti-fungal, anti-acne, and anti-psoriatic properties.

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