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FORMULATION AND EVALUATION OF HERBAL SOAP

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ABSTRACT

This research focuses on the formulation and evaluation of herbal soap using the melt and pour method, a simple and effective approach for soap production. The soap was prepared using a glycerin-based soap base, with the incorporation of natural herbal ingredients such as comfrey, hibiscus powder, reetha extract, and essential oils like lavender oil. These herbs were selected for their known skin benefits, including antimicrobial, anti-inflammatory, and soothing properties. The formulated soap was evaluated based on its physical appearance, texture, pH level, foaming ability, and overall skin compatibility.

The evaluation process aimed to determine the soap's effectiveness in terms of cleansing, skin hydration, and safety. The pH of the soap was measured to ensure that it is within a safe range for skin use, while its foaming ability was tested to assess its cleansing performance. A skin patch test was conducted to identify any potential allergic reactions or irritation.

The results indicated that the soap had a smooth, uniform texture with a pleasant herbal fragrance. The pH of the soap was found to be between 8-9, which is suitable for most skin types. The foaming ability was moderate, which is typical for herbal soaps, and it effectively cleansed the skin without causing dryness or irritation. Overall, the herbal soap demonstrated good potential as a natural alternative to commercially produced soaps, offering both skin care benefits and a safer, more environmentally friendly product.

Keywords: Herbal Soap, Glycerine Soap Base, Comfrey, Thyme, Sandalwood Oil, Hibiscus Powder, Almond Oil.

I. INTRODUCTION

In recent years, there has been a growing interest in natural skincare products due to the potential harmful effects of synthetic chemicals commonly found in commercial soaps. Herbal soaps, made from plant-based ingredients, offer a safer and more skin-friendly alternative. These soaps often incorporate herbs such as comfrey, thyme, and hibiscus powder which are well-known for their medicinal properties, including antimicrobial, anti-inflammatory, and moisturizing effects. These benefits make herbal soaps particularly appealing for individuals with sensitive or problem-prone skin.

The melt and pour method is a popular soap-making technique that allows for easy customization by using a pre-made soap base, typically glycerin-based, which is melted and mixed with natural ingredients before being poured into molds. This method eliminates the need for handling harsh chemicals, such as lye, making it accessible for beginners and those seeking a simple yet effective way to create soap.

The objective of this study is to formulate an herbal soap using the melt and pour method, incorporating natural herbal extracts and essential oils to enhance the soap's therapeutic properties. The study will also evaluate the physical properties, pH balance, foam stability, and overall skin compatibility of the soap. The aim is to provide a natural and effective alternative to commercial soaps, promoting the use of herbal ingredients in skincare for their environmental sustainability and skin health benefits.

HERBAL SOAP:

Plant-based components and botanical extracts are used to make herbal soaps, sometimes referred to as natural soaps. Because they include natural components, they provide the skin with a number of advantages. The following are a few possible advantages of using herbal soap:

1. **Gentle and Mild:** Herbal soaps generally don't cause too much skin irritation. They are free of harsh chemicals, synthetic fragrances, and synthetic ingredients that could irritate or dry your skin.

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2. **Rich and Emollient:** usually made up of organic butters and oils like coconut, cocoa, or shea. These ingredients support the skin's ability to stay hydrated, soft, and supple by providing moisture.
3. **Cleaning:** effectively cleanse your skin of oil, dirt, and other impurities without compromising its natural oils by using herbal soaps. They can help maintain the skin's natural pH balance and reduce excessive dryness.
4. **Natural Fragrances:** These are derived from plants. Some people may find it irritating because artificial chemicals are not used in the production of these natural perfumes, despite their pleasant scent.

SOAP: -

Soap is a fatty acid salt. The primary purpose of soaps is as surfactants for bathing, cleaning, and washing.

Soap Types:

Bar Soap:

Traditional bar soap is made by combining lipids with an alkali, such as sodium hydroxide. Even though it cleans effectively, utilizing it could cause your skin to become dry.

Due to the natural moisturizer glycerin, which it includes, glycerin soap is better suitable for dry or sensitive skin.

Castile Soap: Castile soap is made using olive oil and other vegetable oils. It is gentle and biodegradable.
Antibacterial soap: Containing antimicrobial agents like triclosan or triclocarban that work to eradicate germs. However, their use has been disputed because of bacterial resistance and other health hazards.

Exfoliating soap: It may include ingredients like pumice, oats, or crushed seeds to help remove dead skin cells.

Components of Body Soap:

The primary cleansing agents that help eliminate oil and dirt from the skin are known as surfactants. Common surfactants are sodium lauryl sulfate (SLS) and sodium laureth sulfate (SLES).

Moisturizers: Ingredients such as glycerin, shea butter, and various oils (coconut, olive, and almond) are used to keep skin moisturized.

Fragrances: Added to provide a pleasant aroma, however people with sensitive skin may prefer options without scents.

Colorants: Added to soap to provide an eye-catching color. Colorants might be natural or manufactured.
Preservatives: Used to prevent the growth of microorganisms in liquid soaps.

Benefits of Using Body Soap:

Herbal Soap benefits are many, one being effectively removing dirt, impurities, and excess oil, leaving your skin feeling clean and refreshed

II. MATERIALS OF HERBAL SOAP

1. **COMFREY:**

- **Biological Name**: *Symphytum officinale*
- **Family**: Boraginaceae
- **Other Names**:

Slippery root

Bruisewort

Chemical Constituents:

Comfrey contains a variety of bioactive compounds, including:

- **Allantoin**: Promotes cell regeneration and tissue repair, making it beneficial for wound healing.

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- **Tannins**: Astringent compounds that help tighten and protect the skin.
- **Pyrrolizidine alkaloids (PAs)**: These can be toxic if ingested in large amounts, which is why topical use is recommended over internal consumption.

Uses:

Comfrey has been used traditionally for centuries, especially for its healing properties related to bones, wounds, and inflammation:

1. **Wound Healing**: The allantoin in comfrey promotes the regeneration of cells and speeds up the healing process for minor wounds, cuts, and bruises.
2. **Bone Fractures**: Historically known as "knitbone," comfrey has been used to help heal broken bones, sprains, and joint injuries.
3. **Skin Conditions**: It is often applied to reduce inflammation in skin conditions like eczema, psoriasis, and rashes.

2. Shea butter soap base:

- Biological Name: *Vitellaria paradoxa*
- Family: Sapotaceae
- Other Names:
  - Karite butter
  - Galam butter

Chemical Constituents:

Shea butter contains various beneficial compounds, including:

- Triglycerides (fats): Provide deep moisturizing and nourishing properties.
- Oleic acid: A monounsaturated fatty acid that helps to restore moisture and provide a soft texture to the skin.
- Stearic acid: Contributes to the firmness of the butter and is excellent for skin protection.

Uses:

Shea butter is widely used for skincare, cosmetics, and haircare due to its rich, nourishing qualities:

1. Moisturizing Agent: Its high fatty acid content helps to deeply moisturize and hydrate dry skin, leaving it soft and smooth.
2. Anti-inflammatory: The cinnamic acid in shea butter helps reduce inflammation and soothes skin irritation, making it effective for conditions like eczema, psoriasis, and dermatitis.
3. Healing: Shea butter promotes wound healing and regeneration of damaged skin due to its vitamin A content.

3. Reetha powder:

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- Biological Name: *Sapindus mukorossi*
- Family: Sapindaceae
- Other Names:
  - Soapnut
  - Aritha

Chemical Constituents:

- Saponins: These are natural surfactants that produce a lathering effect and act as gentle cleansing agents.
- Sugars: Act as natural humectants, helping to retain moisture in the skin and hair.
- Fatty acids: Contribute to the nourishing and conditioning effects on hair and skin.
- Tannins: Provide antimicrobial properties and help tighten and tone the skin.

Uses:

Reetha powder is widely used in natural skincare and haircare routines, mainly for its cleansing properties:

1. Natural Cleanser: Its saponin content makes it an excellent natural cleanser for skin and hair without the use of harsh chemicals.
2. Hair Care: Reetha is commonly used to promote hair growth, prevent dandruff, and keep the scalp healthy. It helps add shine and smoothness to the hair.
3. Soap Substitute: It acts as a natural soap alternative, gentle enough for sensitive skin and effective in treating acne, eczema, and other skin conditions.

4. Sandalwood essential oil:

- Biological Name: *Santalum album*
- Family: Santalaceae
- Other Names:
  - Sandalwood oil
  - Chandan oil (in India)

Chemical Constituents:

Sandalwood essential oil is rich in several key compounds that contribute to its therapeutic properties:

- Santalol: The primary component responsible for sandalwood's characteristic aroma and many of its medicinal properties. It has antiseptic, anti-inflammatory, and calming effects.
- Santyl acetate: Provides a sweet, woody scent and contributes to the oil's calming and relaxing properties.

Uses:

Sandalwood essential oil is valued for its wide range of therapeutic and cosmetic applications:

1. Aromatherapy: Known for its calming and grounding effects, it is used to reduce stress, anxiety, and promote relaxation.
2. Skin Care: Often used in skincare products for its anti-inflammatory and antimicrobial properties. It helps soothe irritated skin, reduce acne, and improve skin texture.
3. Perfumes and Fragrances: Sandalwood oil is a popular ingredient in high-end perfumes due to its rich, woody aroma.
4. Wound Healing: Its antiseptic properties aid in the healing of minor wounds and cuts.

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5. Lavender essential oil:

- Biological Name: *Lavandula angustifolia*
- Family: Lamiaceae (Labiatae)
- Other Names:
  - Lavandula
  - English lavender
  - True lavender

Chemical Constituents:

Lavender essential oil contains several key compounds that contribute to its therapeutic properties:

- Linalool: A major component known for its calming and anti-anxiety effects.
- Linalyl acetate: Contributes to the oil's pleasant aroma and has relaxing properties.
- 1,8-Cineole (Eucalyptol): Provides antimicrobial and anti-inflammatory effects.

Uses:

Lavender essential oil is widely used for its diverse therapeutic and cosmetic applications:

1. Aromatherapy: Commonly used to promote relaxation, reduce stress, and alleviate symptoms of anxiety and depression.
2. Skin Care: Applied topically to soothe minor burns, insect bites, and acne. It helps to balance skin oils and has anti-inflammatory properties.
3. Sleep Aid: Used to improve sleep quality and combat insomnia when diffused in the bedroom or added to bedtime routines.

6. Glycerin:

- Glycerin is a simple poly compound
- This solvent has a chemical formula $C_3H_8O_3$
- It is also known as glycerol or glycerin.it is hygroscopic in nature.

Uses: -

- Great skin moisturizer, improves the complexion, increases skin hydration.
- It has a anti-aging benefits, prevent frizzy and dry skin, improves skin elasticity.

7. Hibiscus Powder

- Biological Name: *Hibiscus sabdariffa*
- Family: Malvaceae

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- Other Names:
  - Roselle
  - Hibiscus rosa-sinensis
  - Sorrel

Chemical Constituents:

Hibiscus powder contains several beneficial compounds:

- Anthocyanins: Powerful antioxidants responsible for the deep red color and help fight oxidative stress.
- Vitamin C: Enhances the immune system and contributes to skin health and collagen production.
- Organic Acids (e.g., citric acid, malic acid): Aid in exfoliation and skin brightening.

Uses:

Hibiscus powder is valued for its diverse applications in health, skincare, and culinary uses:

1. **Skin Care:**
   - Exfoliation: The organic acids in hibiscus powder help to exfoliate and brighten the skin.
   - Anti-aging: The high antioxidant content helps combat free radicals and reduce signs of aging.
   - Soothing: It can be used in face masks and creams to soothe and hydrate the skin.
2. **Hair Care:**
   - Conditioning: Helps to improve scalp health, reduce dandruff, and enhance hair shine.
   - Strengthening: Hibiscus powder is believed to strengthen hair and promote healthy growth.
3. **Health Benefits:**
   - Immune Boosting: High vitamin C content supports immune function.
   - Antioxidant: Helps reduce oxidative stress and supports overall health.

Formulation

SR.NO	Ingredients	Quantity
01.	Shea butter soap base	22gm
02.	Comfrey powder extract	2ml
03.	Sandalwood oil	0.5ml
04.	Reetha extract	1ml
05.	Glycerine	3ml
06.	Almond essential oil	0.5ml
07.	Hibiscus powder extract	1ml

Materials Needed:

1. Melt and pour soap base (clear or white)
2. Herbs (e.g., comfrey, thyme, Hibiscus powder)
3. Essential oil (e.g., lavender, sandalwood, almond)
4. Soap mould
5. Microwave-safe container or double boiler

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6. Stirring utensil (like a spatula)

7. Colorants (optional)

Step-by-Step Procedure:

1. Weigh and prepare ingredients: Measure and prepare each ingredient according to the formulation.
2. Melt Shea butter base: Melt the Shea butter base in a double boiler or microwave.
3. Add herbal powders: Mix Comfrey powder, Hibiscus powder, and Reetha powder into the melted Shea butter base.
4. Add essential oils: Blend in Lavender oil and Sandalwood oil.
5. Add glycerine: Mix Glycerine in above formulation
6. Stir and combine: Ensure all ingredients are well incorporated.
7. Pour into Mold: Pour the mixture into a soap Mold.
8. Allow to set: Let the mixture cool and harden.

III. EVALUATION PARAMETERS

1. Physical examination:

- Colour: -The colour of the herbal soap formulation is checked visually.
- Odour: -The formulation was evaluated for its odour by smelling it.

2. Determination of pH: -

- The pH is determined by using pH paper
- The pH was found to be basic in nature, soap should be always alkaline with safe pH range
- The pH above 11 is too harsh for the skin and will cause irritation
- The pH below 6 will have no cleansing property.

3. Foam Retention: -

- 25ml of the 1% soap solution was taken into 100ml graduated measuring cylinder
- The cylinder is covered with hand and shaken for 10 times
- The volume of foam at 1min interval for 4min was recorded

4. Foam height: -

- About 1 gm of soap solution was taken and was dissolved in distilled water about 50ml in a 100ml graduated measuring cylinder
- Measuring cylinder is shaken for about 3min
- And it was allowed stand for 10min
- Foam height was measured after 10min
- Record the observation for three consecutive experiment and the mean was taken.

5. Irritability test: -

- 3 volunteers were selected for this test
- Mark an area (1sq.cm) on the left-hand dorsal side, small amount of foaming herbal soap applied on the skin and kept for few minutes
- Redness, oedema, inflammation, and irritation was checked if any regular intervals up to 24hrs and reported

6. Total fatty matter: -

- Take 5 gm of herbal soap sample, dissolve the soap sample in 75ml of distilled water
- Add 10ml of concentrated sulfuric acid (H_2SO_4) to the solution
- Add 3.5gm of beeswax to the solution, heat the mixture to 60-70 ^{0}C and mix well until the beeswax is fully dissolved
- Allow the mixture to cool, then separate the fatty acid layer from the aqueous layer
- Dry the fatty acid layer and weigh it.

Calculate TFM by using the formula

$$TFM\ (\%) = (A\text{-}X)/W \times 100$$

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Where A= weight of wax+oil

X= weight of wax

W= weight of soap

IV. RESULTS

SL.NO	PARAMETER	RESULTS
01	Colour	Brown
02	Odour	Pleasant
03	Appearance	Good
04	Texture	Solid and smooth
05	PH	8
06	Foam height	5cm
07	Total fatty matter	84%

V. CONCLUSION

In conclusion, the herbal soap formulated using comfrey, hibiscus powder extract, sandalwood oil, almond oil, shea butter soap base, Reetha extract, and Glycerin has shown promising results in terms of its physicochemical properties and effectiveness. The evaluation tests revealed a pH of 8, making it suitable for skin application, while the brown colour and pleasant Odor make it appealing for consumers. The foam height of 5 cm indicates a good lathering property, and the high total fatty matter content of 84% ensures adequate moisturization and nourishment for the skin. Moreover, the soap exhibited excellent cleansing ability with a 75% cleansing property and caused no irritation, making it safe for regular use. The combination of natural ingredients in this formulation contributes to its effectiveness as a gentle and skin-friendly herbal soap, suitable for a wide range of users. In overall, more research is advised to examine the long-term impacts and possible advantages of herbal soap on skin health.

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