

Formulation and Evaluation of Polyherbal Soap

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Abstract: *This study focuses on the formulation and evaluation of polyherbal soap by using natural components such as neem, aloe vera, turmeric, lemon juice, tomato seed oil, coconut oil, stearic acid, glycerin, sodium hydroxide, and almond oil. The soap was manufactured through a cold - process method, including these ingredients for their synergistic effects in cleansing, moisturizing, and improving skin health. Then the soap was evaluated for its physical characteristics, pH, lathering ability, skin irritation potential, and antimicrobial activity. The results disclosed that the polyherbal soap exhibited sufficient qualities, making it a promising natural alternative for skin care. The Polyherbal soap was examined for its antibacterial activity and revealed positive results. So, the use of medicinal plants in soap formulation provides cost - effective benefits with lesser side effects.*

Keywords: Polyherbal, Neem, Turmeric, Tomato Seed oil, TFM

1. Introduction

Soaps are necessary in daily hygiene, acting as cleansing agents that help remove dirt, foreign particles, oils, and impurities from the skin. However, conventional soaps often contain synthetic chemicals that may lead to skin irritation or other adverse effects over time. This has increase the demand for herbal soaps, which are believed to offer multiple skin benefits due to their natural properties. Polyherbal soaps, which combine several plant - based ingredients, are gaining popularity because they hold the individual benefits of each herb. Soap is a material that is used with water for cleaning, washing and made of a mixture of herbal oils or fats with sodium hydroxide or any other strong alkali. The skin is the largest sensory part of the body in the body. The epidermis, hypodermis and dermis are the three prime layers of the skin. All layers supply a complete unique manner to how the skin performs as a whole. As the skin transmit a specialized characteristic to body wellbeing, it is necessary for us to keep it away for the skin illnesses and alignments. Skin conditions are a generic infection and it affects human beings of all ages. Infections, allergies, sun exposure, accidents, and other factors can all result in pores and skin related problems. Any salt of those fatty acids which are water - soluble and has 8 or more carbon atoms is mentioned to be cleaning soap. Sodium and potassium are the metals normally used in soap making, which generate water laundry and cleansing products that might be soluble in soap. The cleansing action of the cleaning soap is due to the negative ions at the hydrocarbon chain connected to the carboxylic group of the fatty acids. For example, cleaning soap manufacture for medicinal purposes other medicinal significance substances are added to it to produce medicated soaps. Other metals including calcium, magnesium and chromium are also used to supply metal insoluble cleaning soap that are used for other purposes not used as cleaning agents. Natural cleaning soap practice is a medicine it include antibacterial, anti - aging, anti - oxidant, anti - septic properties which particularly makes use of part of plant like seeds, rhizomes, nuts and pulps to cure for a harm or disease or to obtain health.

Benefits of soap: -

- Remove oil and foreign particles from the skin.

- Prevent any infection, acne, pimples and other skin related problems.
- Eliminate harmful germs from the skin.
- Provide soothing effect on skin and helping to protect the skin from environmental damage.

Classification of soap: -

1) Based on the type of fat/oil used:

- Animal - based soaps (e. g. tallow, lard)
- Vegetable - based soaps (e. g. coconut oil, olive oil)

2) Based on their use:

- Toilet soaps (for personal care)
- Industrial soaps (used in cleaning and other industrial applications)

3) Based on formulation:

- Herbal soaps (contain plant - based extracts and oils)
- Synthetic soaps (contain artificial chemicals)

Plant profile and ingredients:

1) Neem: -

Botanical name - *Azadirachta indica*

Constituents - Flavonoids, Alkaloids, Azadirone, Nimbin, Nimbidin, Terpenoids, Steroids, Margosicacid, Vanilic acid, Glycosides, Kaempferol, Quercusertin

Uses: Prevent dry skin and wrinkles, Heal wounds, acne, Minimize moles, enhance collagen production, and minimize Scars.

2) Aloe vera: -

Biological name - *Aloe Vera*

Biological source: Aloe is the dried latex of leaves of different species of Aloes.

Uses: Prevent skin with irritation, sunburn, or inflammation and hold antioxidants, Vitamin C, and other different minerals (which allow the skin to heal faster than it normally would) and soothes the skin.

3) Turmeric: -

Biological name: *Curcuma longa*

Uses: It is used for skin injuries and minor sores, Ringworm wounds, and especially athletes' foot, luminous skin, increases healing, treating psoriasis, appearance of acne.

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4) Lemon juice:

Biological name: citrus Limon

Chemical constituents: Vitamin C, Etc.

Uses: Avoid blackheads and pimples, prevent wrinkles and other ageing indicators, Help in small Pores, giving you clearer, smoother and more youthful looking skin, it has Astringent qualities due to its acidic composition, hold volatile oil used for aroma, contains Vitamin C, which has antioxidant activity and antibacterial activity, prevent acne.

5) Tomato seed oil: -

Botanical name: Solanum Lycopersicum

Uses: Contain lycopene, which help in removing dark spots and Skin, Rich in Vitamin C, which has antioxidant property, Rich in Vitamin K which has blood clotting properties and antifungal activity.

6) Coconut oil: -

Biological name: Cocos nucifera

Chemical constituents: fatty acids, Caprylic acid, Capric acid, Lauric acid, Myristic acid, Palmitic Acid, Stearic Acid, Oleic Acid, Linoleic Acid, Etc.

Uses: Relief in sunburn, soothe inflamed skin, minimize redness and remoisten skin, helps to protect and smooth's skin. Prevent fine lines and wrinkles and calms temporary redness.

7) Almond Oil: -

Biological name: Prunus Amygdalus

Chemical constituents: laic acid, stearic acid, linoleic acid, palitoleic acid, palmitic acid etc.

Uses: Enhance Skin tone and complexion, prevent dry skin, lessens the appearance of under - eye bags and puffiness and prevent acne, Aids in reporting solar damage the appearance of stretch marks and scars.

2. Materials and Methods**Materials**

- Neem (*Azadirachta indica*): Known for its antibacterial and antifungal properties.
- Aloe Vera (*Aloe barbadensis*): Known for its moisturizing and soothing properties.
- Turmeric (*Curcuma longa*): Known for its antioxidant and anti - inflammatory effects.
- Lemon Juice (*Citrus Limon*): Known for its skin brightening and cleansing.
- Tomato Seed Oil: Rich in antioxidants and vitamins protects against UV damage.
- Coconut Oil: Known for its nourishing and moisturizing property.
- Stearic Acid: Used as a thickening agent and emulsifier.
- Glycerin: Humectant, which helps retain moisture in the skin.
- Sodium Hydroxide (NaOH): Used as a base for saponification.
- Almond Oil (*Prunus amygdalus*): Rich in vitamins E and A, helps to soften and rejuvenate the skin.

Methods of Preparation:**Composition of soap base:**

- 1) Distilled Water - 100 ml
- 2) NaOH - 15 gm
- 3) Palm Oil - 35 ml
- 4) Coconut Oil - 35 ml
- 5) Castor Oil - 35 ml
- 6) Glycerine - 20 ml
- 7) Ethyl Alcohol - 30 ml
- 8) Sugar - 20 gm

The formulation of polyherbal soap typically involves the following steps:

- 1) **Selection of Oils and Herbs:** The oils (Coconut oil, Almond oil, and Tomato seed oil) are chosen for their specific skin benefits. Herbs such as Neem, Aloe Vera, Turmeric, and Lemon juice are incorporated for their therapeutic properties.
- 2) **Preparation of Herbal Extracts:** Herbal extracts can be prepared by macerating the plant material in a suitable solvent (usually alcohol or glycerin) and filtering the liquid to obtain concentrated herbal extracts.
- 3) **Saponification Process:** Prepare a solution of sodium hydroxide by dissolving NaOH in distilled water. Melt the oils (coconut oil, almond oil, and tomato seed oil) in a different container. Mix the sodium hydroxide solution into the melted oils gradually. Add stearic acid to the mixture to reach the desired consistency. Add herbal ingredients (neem, aloe vera, turmeric, and lemon juice), once the mixture thickens. Pour the mixture into molds and allow it to cure for 3 - 4 weeks.
- 4) **Curing:** The soap mixture is left to cure at room temperature for 3 to 4 weeks to allow complete saponification and make sure hardness.

Evaluation of Herbal Soap:**1) Physicochemical Parameters of Polyherbal Soap:**

S. No.	Parameters	Results
1	Color	Yellowish Brown
2	Odour	Pleasant
3	Appearance	Good
4	pH	Between 9 - 10
5	Foam Height	6 cm
6	Foam Retention	5 min
7	Skin Irritation	No skin irritation
8	High Temperature Stability	Soap melts above 50 degree c
9	TMF Test	71.4%
10	Moisture Content Test	85%
11	Zone of inhibition (Streptococcus aureus)	18 mm

2) Antimicrobial Activity Test

There are different types of methods for microbiological assay of antibiotics like cup plate method and disc diffusion method. In Cup - plate method prepare nutrient agar plate inoculated with test organism, with a depth of 4 - 5mm and then allow it to solidify. Divide the NA plate into four equal portions. Then with the help of a sterile borer make four cavities one in each portion. Then fill three cavities with

antibiotic solution and in one fill the standard solution. Slowly incubate the plates 370 at for 24 hours. After incubation measure the zone of Inhibition.

3. Results and Discussion

The polyherbal soap showed good lathering properties and was able to cleanse the skin effectively. The pH of the soap was seen to be slightly alkaline, which is typical for most soaps, but still within a safe range for skin use. The antimicrobial activity results revealed that the soap have significant inhibition of bacterial growth, particularly against *E. coli* and *Staphylococcus aureus*. During the patch test no skin irritation or allergic reactions were seen. The soap keeps its moisturizing properties because of the presence of aloe vera, coconut oil, and almond oil.

4. Conclusion

The formulation and evaluation of polyherbal soap use Neem, Aloe Vera, Turmeric, Lemon Juice, Tomato Seed Oil, Coconut Oil, Stearic Acid, Glycerin, Sodium Hydroxide, and Almond Oil offers promising benefits for skin health. The synergistic effects of these natural ingredients contribute to improved skin hydration, antibacterial protection, and anti - inflammatory properties, making the soap ideal for various skin conditions. The preparation process ensures that the soap is safe for use, and the evaluation confirms its quality and effectiveness. Polyherbal soaps represent a growing trend towards the use of natural and organic ingredients in personal care products.

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