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Formulation and Development of Herbal Soap

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Abstract: *This study aims to formulate and evaluate the efficacy of a herbal soap enriched with natural botanical extracts for skincare.*

Object: The primary objective is to assess the antimicrobial activity and sensory attributes of the herbal soap compared to commercially available synthetic soaps.

Materials: The soap formulation included botanical extracts of lavender (Lavandulaangustifolia), chamomile (Matricariachamomilla), and calendula (Calendula officinalis), sourced locally. Other materials included base oils, sodium hydroxide, and distilled water.

Methods: The soap was produced using the cold-process method, wherein oils were mixed with lye solution, followed by the addition of herbal extracts at appropriate stages. Antimicrobial efficacy was evaluated against Staphylococcus aureus and Escherichia coli using agar well diffusion method. Sensory evaluations were conducted through a panel of volunteers for attributes such as fragrance, lather quality, and skin feel..

Keywords: herbal soap, antimicrobial activity, botanical extracts, cold-process method, sensory evaluation

I. INTRODUCTION

The body's greatest sense organ is the skin. It collects sensory information from the environment and acts as a barrier to safeguard the body's organs. It additionally assists in maintaining a healthy body temperature. The skin is made up of many unique cells and structures. The three main layers are the dermis, epidermis, and hypodermis. The functions of the skin as a whole are influenced by each layer differently [1]. Since the skin provides a specific function for bodily health, we must protect it from skin disorders and misalignment. Skin diseases are a common type of illness. It causes harm in multiple ways to individuals of all ages, including the elderly and neonates.Skin problems can be caused by infections, allergies, sun exposure, trauma, and other things [2]. People have used medicinal plants as a means of treatment since the beginning of time. The leaves, stems, and roots of various medicinal plants have been utilized as a natural remedy for a wide range of illnesses and ailments. Despite the fact that synthetic alternatives have supplanted many plant-based medicines, ayurvedic products continue to be notable for their safety and efficacy [3]. Many herbs have been found to have significant nutritional value and to possess anti-oxidant, anti-bacterial, cytotoxic, anti-microbial, hypotensive, anti-diuretic, anti-inflammatory, anti-spasmodic, anti-diabetic, antihemorrhagic, and anti-helminthic properties. Natural ingredients are highly medicinally valuable, affordable, readily available, and compatible. As such, adding them to a preparation can help treat almost any ailment or skin condition.According to a WHO research, skin diseases account for an astounding 34% of all occupational disorders. Data from 2020 showed that the number of deaths in India from skin diseases was 17,857, or 0.21% of all deaths. Therefore, the best course of action to address the situation is to include herbal potentials in the formulation, which have fewer effects and provide effective treatment alternatives that are safer and have fewer side effects. Therefore, the creation of medicated herbal soap is the main emphasis of this effort.

Anatomy of skin

The skin covers the whole external surface of the body and is the largest organ within it. It is an important and remarkable organ. It might be a tough surface covered in nerves, organs, hair, and nails. It is made up of hair follicles that pierce the skin to receive hair strands. It serves as a wall separating the interior from the outside world. The epidermis, dermis, and hypodermis are its three constituent layers, all of which undergo complete alterations in their

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cellular structures and functions. The intricate structure of the skin acts as the body's first line of defense against infections, UV radiation, toxins, and mechanical harm. The thickness and surfaces of the skin are characteristic.

(A) Epidermis: The epidermis is the most superficial layer of the skin and is composed of stratified keratinized squamous epithelium, the thickness of which varies in different parts of the body.

(B) Dermis: The dermis is stiff and elastic. It is formed from connective tissue and the matrix contains collagen fibres interwoven with elastic fibers. Rupture of elastic fibers occurs when the skin is stretched, resulting in permanent stretch marks or stretch marks that can appear in pregnancy and obesity.

(C) Subcutaneous Gland: These consist of secretory epithelial cells originating from the same tissue as hair follicles. They secrete an oily substance, sebum, into the hair follicles and are present in the skin of all parts of the body except the palms and soles of the feet.

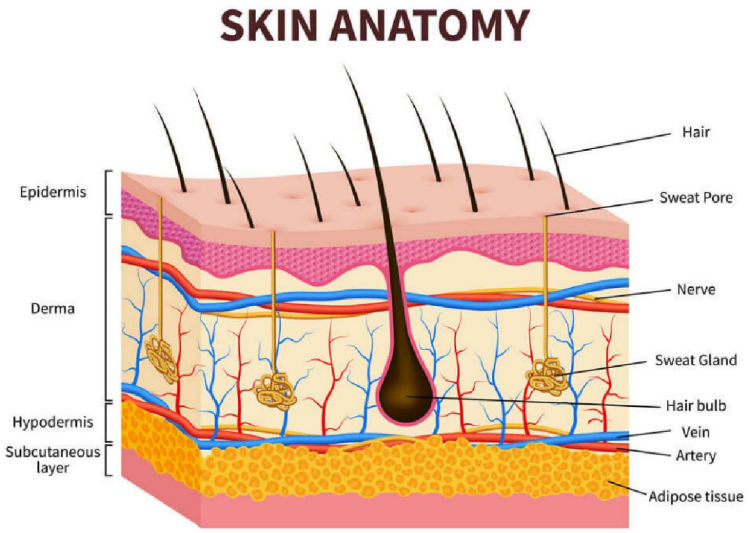

Fig.no.1. anatomy of skin

Skin functions: The purpose of skin: The physiology of the organism depends on the skin in many important ways.

Sensation: The skin has many receptors and nerve endings that allow it to detect sensations of temperature, touch, pressure, and pain.

Protection: The skin serves as a physical barrier that helps keep the deep-seated organs and tissues safe from physical absorption, UV radiation, microbial invasion, and dehydration.

Thermoregulation: Sweating is a reaction to an increase in body temperature; perspiration cools the body when it evaporates from the skin's surface. Conversely, when body temperature drops, less sweat is produced, which aids in the body's ability to retain heat.

Immunity: It transfers immune information to the proper effector cells in the lymphatic tissues that is acquired during antigen processing.

Excretion: Toxic chemicals, ions, and a number of other molecules are expelled from the skin through sweat.

Dermis: The dermis has a high degree of vascularization. An adult's skin blood vessels carry 8–10% of the total blood volume while it is at rest. The rate of blood flow increases during vigorous exertion, which causes excess body heat to dissipate.

Drug Delivery Route: Transdermal patches are one way that medications are delivered to the skin. Transdermal patches are used in the transdermal medication administration technique to absorb drugs through systemic circulation.

II. MATERIAL AND METHOD

Materials:

- **Ethanol:** Acts as a solvent and can aid in extracting active compounds from herbs.
- **Stearic Acid:** Used as a hardening agent in soap making.
- **Soft Paraffin:** Provides moisturizing properties.

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- **Orange Oil:** Adds fragrance and potentially antibacterial properties.
- **Glycerine:** Acts as a moisturizer and helps in soap formation.

Herbal Powders or Extracts:

- **Neem:** Known for its antibacterial and skin-soothing properties.
- **Shikakai:** Traditional cleanser and conditioner for hair.
- **Reetha:** Natural surfactant, helps in cleansing.
- **Tulsi (Holy Basil):** Antibacterial and soothing for the skin.
- **Giloy:** Known for its anti-inflammatory and antioxidant properties.

Methods:

Preparation of Herbal Extracts:

Powdered Herbs: If using powdered forms, measure out appropriate quantities of Neem, Shikakai, Reetha, Tulsi, and Giloy.

Extracts: Prepare aqueous extracts by boiling the powdered herbs in water and then straining to obtain concentrated liquid extracts. Alternatively, you can use oil infusions by mixing the powdered herbs with a carrier oil and heating gently to extract their properties.

Soap Base Preparation:

Combine Ethanol, Stearic Acid, and Soft Paraffin: In a double boiler or heat-safe container, melt and mix together Ethanol, Stearic Acid, and Soft Paraffin until well combined. This forms the base of the soap.

Adding Essential Ingredients:

Add Glycerine and Orange Oil: Once the base ingredients are melted and blended, add Glycerine for moisturizing properties and Orange Oil for fragrance and additional antibacterial benefits if desired. Stir well to ensure even distribution.

Incorporating Herbal Powders or Extracts:

Mix Herbal Powders or Extracts: Gradually add the powdered herbs or the previously prepared liquid extracts (Neem, Shikakai, Reetha, Tulsi, Giloy) into the melted soap base. Stir continuously to evenly distribute the herbal ingredients throughout the mixture.

Molding and Curing:

Pour into Molds: Pour the herbal soap mixture into soap molds of your choice. Tap gently to remove any air bubbles and ensure the molds are filled evenly.

Curing: Allow the soap to cool and harden in the molds for at least 24-48 hours. During this time, the soap will solidify and undergo saponification, the process where oils and fats react with lye (in this case, ethanol and stearic acid) to form soap.

Cutting and Packaging:

Cutting: Once the soap has fully hardened, remove it from the molds and cut it into individual bars or desired shapes using a soap cutter or knife.

Packaging: Wrap the soap bars in wax paper or place them in airtight containers to protect them from moisture and preserve their herbal properties.

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Content of herbal soap

1. Neem:

Fig. Neem

Biological name: Azadiractaindica
Usually used portion: Leaves
Colour: green
Chemical constituent: flavonoids, alkaloids, Azadirone, Nimbin, Nimbidin, terpenoids, steroids, marginosicacid, vanilic acid, glycosides, B-sitosterol, nimbectin, kaempeerol, and quercursertin.
Uses: It exhibits antimicrobial properties. It has antifungal properties. It aids in reducing inflammation.

2. Reetha:

Fig. Reetha

Biological name: Sapindusmukorossi 26
Usually used portion: Leaves
Colour: Brown
Uses : Skin wound healing may be the result of the anti-bacterial, anti-inflammatory and antioxidant activity.

3. Tulsi:

Fig. Tulsi

Biological name : Ocimumtenuiflorum
Usually used portion: Leaves
Colour: Green

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Chemical Constituents: eugenol ,germacrene , terpenes
Uses: It ideal for treating skin problems such as acne and skin irritation.

4.Shikakai:

Fig. Shikakai

Biological name: Acacia concinna
Usually used portion: Fruits pods
Colour: Brown
Chemical Constituents: Spinasterone , Acacic acid
Uses: Antidandruff detergent.

5. Gilloy :

Fig: Gilloy

Botanical name: Tinosporacordifolia
Chemical constituent: Tinosporacordifolia contains diverse phytochemicals, including alkaloids, phytosterols, glycosides, tinosporide, and various other phytochemicals
Uses: It can prevent oxidative stress and that in turn slows down the ageing of the skin.

Observation Table

Table no. 1: Chemicals & their source

Chemical	Sources
Ethanol	Laboratory reagent
Stearic acid	Laboratory reagent
Soft paraffin	Laboratory reagent
Orange oil	Laboratory reagent
Glycerine	Laboratory reagent

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Table no. 2: Herbal plant & their sources

Herbal Plant	Sources
Neem	Plant
Shikakai	Plant
Reetha	Plant
Tulsi	Plant
Giloy	Plant

Table no. 3: Formulation Table

Sr. No.	Ingredients	Quantity (%)	Use
1	Stearic acid	1gm	Hardening
2	Soft paraffin	0.7gm	Hardening
3	Ethanol	5ml	Solvent
4	Neem Powder	4gm	Antibacterial
5	Reetha	3gm	Surfactant
6	Shikakai	2gm	Cleanser
7	Tulsi	1gm	Antiviral
8	Orange oil	q.s	Perfume

Procedure for herbal Soap :

1. Adding Soap Base Ingredients
2. Coconut Oil 100gm
3 Heat Oil For 5 min (Water bath)
4 Add NaoH Solution to Oil (20gmNaoH + 100gm Water) Stir Continuously for 8- 10min .
5. Add SLS Solution of 10ml stir For 2 min continuously
6. Add 10 ml Glycerine Stir 2-3 min Continuously
7. Adding Herbal Drugs
8. Neem Powder (4gm) Continuous Stirring
9. Add 1gm Tulsi Powder
10. Add Mixture of Giloy (1 gm), Shikekai (2gm) &Ritha (3gm)
11 .Add stearic Acid (1 gm) For Hardening
12. Add 5ml Ethanol as a Solvent
13. Add Soft Paraffin 0.7gm Continuous stirr for 5-8 min
14. Add Rose Water / Orange Oil (q.s) As a Perfume
15. Solution with Continuous Agitation for 30 minutes until molten mixture Became homogeneous .The Semi - solid mixture was poured into a mould and allowed to solidify.

Evaluation:

The following criteria were used to assess the herbal soap formulation:

1. Organoleptic assessment-

Color: brown
Odor: orange
Appearance: good

2. Physical evaluation -

a) pH: pH paper was used to measure the pH.It was discovered that the pH was basic.

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b) Foam retention: 25 milliliters of the 1% soap solution were added to a 100 milliliter graduated measuring cylinder. The cylinder was then covered with a handshake and shook ten times. For four minutes, the volume of foam was measured at one-minute intervals. It was discovered to be five minutes.

c) Antibacterial test: A research publication on the antibacterial activity of Azadirictaindica leaf, bark, and seed extract cites several studies on the antimicrobial activity of neem.

Wash ability: A test was conducted on the formulation of the herbal soap and how easy it was to wash with water.

III. SUMMARY

Ocimumtenuiflorum, Sapindusmukorussi, Acacia concinna powder, and leaf and bark extract of Azadirachtaindica were used to create a herbal soap and hand sanitizer. Herbal cosmetics are another name for Ayurvedic cosmetics. The natural elements in herbs have no negative effects on human health [5]. The majority of herbal supplements are made from a variety of botanical ingredients that have been used for many years in traditional or folk medicine. Among the many botanical compounds that are currently on the market [6]. Cosmetics by themselves are insufficient to take care of skin and body parts; a variety of chemical toxins and microorganisms found in the atmosphere can cause chemical infection and damage to skin. The Neem (Azadirachtaindica) tree has gained global recognition due to its numerous medical benefits.It has been shown that neem leaves and their components have anti-inflammatory, antihyperglycemic, and antiulcer properties [7].

IV. CONCLUSION

The prepared soap's physico-chemical and biological characteristics were examined. The composition had a pleasing color and scent, and it looked good. It was discovered that the pH was within the designated range of 7 to 10. Other factors that represented the standard values for soap were found, including the percentage of free alkali content, foamability, foam stability, moisture content, and alcohol insoluble matter. The manufactured soap is a strong source of antioxidant and antibacterial properties, according to a study on biological parameters like antioxidant and antibacterial activity. Based on the study's findings, it is possible to formulate herbal soap using the cold process method while taking into account a variety of factors, including skin type and the potential and activity of the herbs. This desired herbal remedy can significantly impact the field of herbal cosmetics by eliminating numerous alignment and associated problems found in various chemical- or polyherbal-based formulations. The plants Azadirictaindia, Ocimumtenuiflorum, Sapindusmukorossi, and Acacia concinna were extracted with water and put through a battery of assessment tests in accordance with other studies that looked at the antibacterial activity of neem. When the synthesized mixture was tested for various tests, positive findings were obtained. The fact that soap does not irritate skin was established by a small group of volunteers using these soaps; hence, it is conclusively proven that soap does not irritate skin

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