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Research Article

**FORMULATION AND EVALUATION OF ANTIMICROBIAL
POLYHERBAL SOAP****Shaik Shakeela, Kattepogu Naga Kumari*, Jyothirmai Namathoti,**
Hindu College of Pharmacy, Guntur-522002, Andhra Pradesh, India.**Abstract:**

Bacterial skin infections are most common amongst people, requiring significant attention for treatment and also for maintaining healthy skin. The herbal Cosmetics, referred to as product, are formulated using various cosmetic ingredients to form the base in which one or more herbal ingredients are used to provide cosmetic benefits called as "Herbal Cosmetics". Some herbal plant extracts of Rose water, Glycerin Soap base, Aloe Vera gel, Azadirachta indica extract, Lemon juice, Coconut milk, Turmeric, Vitamin. The E capsule and coconut oils were found to be antimicrobial. The purpose of the present study is to make and test poly herbal soap by using natural soap bases and extracts of plants that are important in Ayurveda, such as aloe vera, Neem, lemon, and sage. The antibacterial activity of the prepared formulations was tested using the agar well diffusion method against the organisms *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Escherichia coli* and they exhibited a good antibacterial effect. Herbal system with an improved patient compliance, better activity less side effects with less toxicity for treatment of antibacterial agent. The prepared formulations were evaluated for various physicochemical parameters for which good characteristics were observed. The easy availability of plants and their effectiveness helps manufacturers with cost-effective benefits and with less or no side effects.

Keywords: Herbal Soap, (*Azadirachta indica*) Neem extract, Rosewater, Glycerin Soap base, Aloe Vera gel, Lemon juice, Coconut milk, Turmeric, Vitamin.E capsule, and Coconut oils, Cold process method and Agar well diffusion method.

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INTRODUCTION:

Bacterial skin infections are most common amongst people, requiring significant attention for treatment and also for maintaining healthy skin. The herbal Cosmetics referred as product, are formulated using various cosmetic ingredients to form the base in which one or more herbal ingredients are used to provide cosmetic benefits called as “Herbal Cosmetics”¹. The herbal Cosmetics referred as product, are formulated using various cosmetic ingredients to form the base in which one or more herbal ingredients are used to provide cosmetic benefits called as “Herbal Cosmetics”². The beauty of the skin depends on health, habits ,routine environmental conditions and maintenance. Plants have been used in the treatment of human diseases and infections since the ages³. Natural content in plants does not cause side effects in the human body; instead, it enriches the body with nutrients and other useful minerals⁴. The utilization of various bioactive herbs and phytochemical, obtained from different biological sources accomplish different

skincare functions: care of body skin and as an important component to influence the skin’s biological function, giving the supplements to healthy skin⁵. The herbal compounds are rich source of essential oils, vitamins, proteins, antioxidants, terpenoids, and other active components. Herbal soaps are also effective in curing different skin complaints. These soaps also contain glycerin, which is generally not used in commercial soaps⁶. Glycerine helps in retaining the moisture in the skin thereby making these soaps for dry skin conditions. Herbal soap preparations are medicines or drugs which contain anti-bacterial & anti-fungal agents which mainly uses parts of plants such as like leaves, stem, roots & fruits for treatment for an injury or disease or to achieve good health⁷. These preparations possess anti-microbial properties and are administered topically and available to apply in various forms like creams, gels, soaps, solvent extracts, or ointment⁸. In the present study, *Azadirachta indica* were used to prepare the anti-bacterial herbal soaps and their physicochemical characteristics were evaluated.

Fig. No. 1: Ingredients for Anti-microbial Herbal soap



MATERIALS AND METHODS USED:

Glycerin soap base was procured from Qualigens Fine chemicals, Mumbai. Neem oil and Coconut oil were procured from the local market. Vitamin.E capsule, and Aloe Vera gel, were procured from Thermo fisher scientific India Pvt ltd., Mumbai. Lemonjuice, Coconut milk and Honey Rosewater was procured from the local market. The other entire chemicals used were of analytical grade.

PROCEDURE FOR PREPARATION OF ANTI-MICROBIAL HERBAL SOAP:**Preparation of medicated soap:****Cold process method:**

In soap formulation first we have to take the required ingredients and glassware. First step involves boiling of water in water bath by placing it on Bunsen burner. After water get boiled take a 250 ml beaker and add 50 gm of glycerin soap base into the beaker and place the beaker in water bath of boiled water for melting of the soap base. The temperature is maintained at 45 degrees to heat the soap base on water bath without stirring. Then the soap base will convert into liquid form and then add all the above ingredients simultaneously as per the above mentioned quantity and order to the melted soap base in the beaker. After completion of adding all the

contents into the beaker containing melted glycerin soap base take the beaker out from water bath. Let the mixture cool on the bench top with occasional stirring until a base consistency is formed. It indicates the mixture is ready to be poured into the soap moulds. At this stage we can add perfume or flavoring agent or other additives to the soap mixture. Then the mixture can be transferred into soap moulds and the moulds are to be kept aside for a period of 12 hours to allow for natural drying under shade without any disturbance of mixture in soap moulds. After completion of 12 hours the soap will be formed. Then the formed soap is taken out from the moulds and is ready to use.

Table 1: Formulation of Anti-microbial Herbal Soap

INGREDIENTS	FORMULATION(100 GRMS)		USES
	F ₁	F ₂	
Glycerin Soap base	29.5 gm	1.6gm	Moisturizer
Aloe Vera gel	--	13gm	Anti-aging and antioxidant
Neem extract	2 ml	2 ml	Antibacterial
Lemon juice	2ml	2 ml	Antioxidant
Coconut milk	72ml	--	Skin toning, nourishing
Turmeric	1 ml	1 ml	Antibacterial, anti-septic, anti-inflammatory, antioxidant
Honey	--	6.25 ml	Anti-aging, antibacterial
Vitamin.E capsule	--	18.75ml	Antioxidant
Coconut oil	15gm	15gm	Anti-aging, skin moisturizer And softner
Rosewater	--	5ml	Fragrance
	0.2ml	0.2ml	
	--	19ml	
	Q.s.100ml	Q.s 100ml	

EVALUATION TESTS

Evaluation of physicochemical parameters of the prepared

Formulation various physicochemical parameters which are mentioned below were performed to establish the quality of the prepared formulations.

1. Determination of Organoleptic

Characteristics: Clarity and colour was checked by naked eyes against the white background, and the odour was smelled⁹.

2. Size and shape Determination: The soap diameter of the size of 8.4 cm, with a thickness of 2.6 cm, which is round-shaped, was chosen for the preparation of soap bars. This was chosen, as this size is ideal in regular usage to apply on the affected skin parts of the body¹⁰.

3. Thickness determination: The thickness was determined with the help of a screw gauge which is pre-calibrated. The thickness was measured, by observing the thickness at five different parts of the soap.

4. Weight determination: The weight was determined by using a Digital weighing balance¹¹.

5. Foam Height: 0.5gm of the sample of soap was taken and dispersed in 25 ml of distilled water. Then, transferred it into 100 ml measuring cylinder; the volume was made up to 50 ml with water. 25 strokes were given and stand till aqueous volume was measured up to 50 ml and measured the foam height, above the aqueous volume.

6. Foam Retention: Prepared the 25 ml of the 1% soap solution and transferred it into the 100 ml measuring cylinder. Then the cylinder was shaken 10 times. The volume of foam was recorded at one minute for 4 to 5 minutes¹².

7. pH TEST: The pH test was performed for all the formulations. Each formulation of soap solution was dissolved in 20ml of distilled water and tested for pH with the help of a digital pH meter. The measurement of pH of all the formulations was done in the previously calibrated pH meter.

8. Alcohol insoluble matter: 5gm of soap was taken in a conical flask and added 50ml warm ethanol and shaken vigorously to dissolve the soap. The solution was filtered through a tarred filter paper with 20ml of warm ethanol and dried at 105 °C for 1hr. The weight of the dried paper with residue was taken.

Formula: % Alcohol insoluble matter = $\frac{\text{Wt. of residue}}{\text{wt. of sample}} \times 100$

9. High-temperature stability: Liquid soap was allowed to stand at 50°C for 1 week. The stability of liquid soap was observed during this period. The sample which was homogenous and stable liquid after standing was indicated as stable and the sample in which the crystals were roughened and the sample in which precipitation was caused then liquid soap was said to be as unstable.

10. Anti-microbial test: The prepared soap was subjected to antimicrobial screening by the agar well diffusion standard cup plate method. Organisms used were E. coli, S. aureus, and P. aeruginosa. One gram of soap was mixed with 5ml of sterile water¹³.

EVALUATION OF PREPARED HERBAL SOAP FORMULATION FOR ANTIMICROBIAL ACTIVITY:

The [agar -well diffusion] standard cup plate technique was used to determine the antimicrobial

activity by using sabouraud's dextrose agar [Hi-media]. The melted media were seeded with the suspension of microorganisms and allowed to solidify. The formulations were aseptically transferred to the Hi-media in Petri-dish with the help of sterile forceps. The medicated soap was kept for incubation in an incubator at 30°C for 5-7 days. Observation: The assessment of antimicrobial activity was based on the measurement of the diameter of the zone of inhibition in mm. The values were recorded and given in table no 6.

RESULTS & DISCUSSIONS:

The Organoleptic characteristics and physicochemical parameters of the formulated herbal soap were determined. The formulation exhibited good odour and appearance characteristics as well as the pH was found in the range of 7.3 which means basic in nature as it is the desired pH. Other parameters such as percentage free alkali, foam height, foam retention, alcohol insoluble matter, and high temperature stability were determined; the results are tabulated.



Fig. No. 2: Prepared Anti-microbial Herbal soap

Table.3: Organoleptic characteristics of formulation.

Characteristics	Herbal Soap
Colour	Green
Clarity	Translucent
Odour	Rose fragrance
Appearance	Good

Table.4: Physicochemical parameters of formulation.

Parameters	Herbal soap	Standard
PH	7.3	6.5-7.5
% free alkali	0.27	0.25
Foam height(cm)	2.5cm	2.5-3.0cm
Foam retention(min)	2min	2.5-3.0min
Alcohol in soluble matter	18.0	18.0
High temperature stability	Soap melts above 45°C	45°C

Table.5: Biological parameters of formulation

S.No	Concentration	Sample Absorbance	Standard Absorbance
1.	0.1	0.429	0.251
2.	0.2	0.634	0.091
3.	0.3	0.643	0.086
4.	0.4	0.881	0.078
5.	0.5	0.908	0.078

Table No.6: Antimicrobial Test for Herbal Soaps

S.no	Formulation code	Zone of inhibition(mm)		
		<i>Microorganisms</i>		
		<i>P. aeruginosa</i>	<i>S. aureus</i>	<i>E. coli</i>
1	F1	12	14	13
2	F2	15	18	16

**Fig.no.3: Zone of Inhibition for F2 formulation****SUMMARY AND CONCLUSION:**

The formulated Poly Herbal soap is showing good organoleptic characteristics which include the dryness, stable solid showing no color change and good appearance. Based on the evaluation studies the formulated polyherbal soap is foamy in nature without any added surfactants, high temperature stability and free from alkali components. It has shown good skin compatibility and causes no irritation when tested on 10 volunteers. Based on the stimulated TFM (77%), the soap was characterized as Grade I soap. The microbiological study results stated that the formulation shows

antimicrobial, anti-inflammatory, anti-fungal, anti-oxidant, skin toning and nourishing properties. The formulated soap has shown good anti-aging property compared to marketed formulation. Two different formulations F1 and F2 were prepared by cold press method and the formulations were characterized for different evaluation parameters like clarity, color, and odor, size, and shape, thickness, weight, pH in which they exhibited satisfactory results. The herbal soap showed a good appearance with green color and with a pleasant aromatic smell and showed good antibacterial properties. Based on the study it can be concluded that herbal products can be effectively

formulated in the form of medicated herbal soaps by using cold process technique with excellent anti-bacterial properties.

CONFLICTS OF INTEREST: The authors declared that they have no conflicts of interest.

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