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Formulation and Evaluation of Anti - Fungal Poly - Herbal Soap using Lantana Camara

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Abstract: ***Fungal skin infections are the most frequent among humans, necessitating immediate treatment as well as ongoing care to keep excellent and healthy skin. Some medicinal herbs have antifungal properties. The current study's goal is to create antifungal herbal bath soap with Lantana Camara as the primary ingredient. The antifungal activity of the produced formulation was evaluated against the organism Candida albicans using the agar diffusion method. The antifungal impact of the developed herbal soap compositions was strong.***

Keywords: Herbal soaps, Antifungal, Lantana camara

1. Introduction

The majority of commercial soaps and detergents contain substances that are potentially harmful to the skin. Natural herb detergents and soap can be a good substitute. Herbal soaps and detergents are made with natural herbs and components that are better for the skin and healthier. Nowadays, people are much more aware of the ingredients in cosmetics. The benefits of plant - based products outweigh the disadvantages of chemical additives. The soap and detergent industry is tremendously profitable, with a large market potential and bright future prospects. To meet market demand, it is recommended that many more new units be built on a small and cottage scale.

Herbal cosmetics are classified according to dosage form (cream, powder, soaps, solutions, etc.) and part or organ of the body to be applied for (cosmetics for skin, hair, nail, teeth, and mouth, for example). The underlying concept of skin care cosmetics is rooted in the Rigveda, Yajurveda, Ayurveda, Unani, and Homoeopathic medical systems. These are the items in which herbs are utilised in their raw or extract form.

Skin: The skin or cutaneous membrane covers the external surface of the body. It is the largest organ of the body in surface area and weight. The function of the skin is body temperature regulation, a reservoir for blood, protection from the external environment, cutaneous sensations, excretion and absorption, and vitamin D synthesis. The external defense system prevents microbial microorganisms to enter the body. Skin is biggest external defense system. Skin covers the outside of the body but has other functions beside the defense mechanism. It serves as a mechanical barrier between the inner part of the body and the external world. Temperature of skin varies in a range of 30 to 40°C degree depending on the environmental conditions.

Skin is one of the most readily accessible organs on human body for topical administration and is main route of topical drug delivery system. This research is concern with all detail information regarding rational approach to topical formulation, aim of topical permeation and basic components of topical drug delivery systems. Absorption of ointment through the skin depends on a number of factors, the important of which are concentration, time of contact, solubility of drug, and physical condition of skin layer and part of the body exposed.

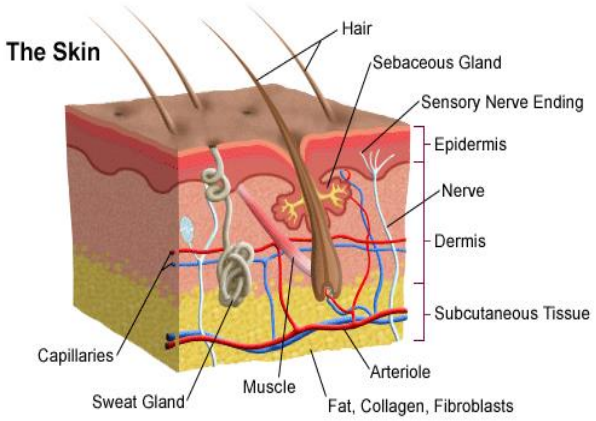

Figure 1: Components of Skin

Fungal Infection: A fungal infection, commonly known as mycosis, is a fungus - caused skin illness. Fungi number in the millions. They can be found in dirt, plants, household surfaces, and even on your skin. They can sometimes cause skin problems such as rashes or pimples. Fungal infections can be caused by a variety of fungi. Fungi that aren't normally found on or inside your body might multiply out of control and cause an illness in some situations. Fungal diseases can be spread. They can spread from person to person. Fungal skin infection is currently one of the most important dermatological issues in the globe. Fungal infections have been reported to affect around 40 million persons in emerging and poor countries.

Introduction to Fungal Disease: - Mycosis, often known as a fungal infection, is a condition brought on by a fungus (yeast or mould). Although fungi (plural of fungus) can cause infections in your mouth, throat, lungs, urinary tract, and many other parts of your body, fungal infections are most frequently found on your skin or nails. Different topical formulations, such as soaps, lotions, serums,

ointments, gels, liquids, and creams, can be used to treat fungus infections. But in daily life, soaps are more practical and environmentally friendly. both in terms of cost and time efficiency.

Fungal infection and Symptoms

- Skin that is scaly and itchy.
- Redness & Itching.
- Swelling & Blisters.

Type of Fungal Infection: On your body, fungus can cause skin infections. Athlete's foot, jock itch, ringworm, and yeast infections are a few of the most prevalent.

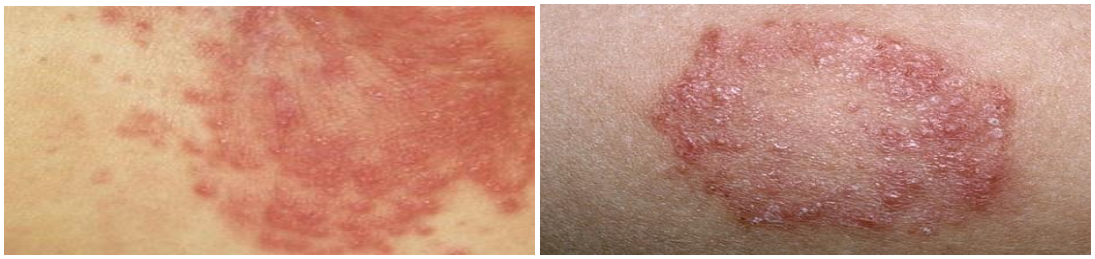

Figure 2: Fungal Infections

Herbal Soap: Herbal soap is a medicine because it possesses antibacterial, anti - aging, anti - oxidant, and antiseptic properties. It primarily treats wounds, treats ailments, and promotes health by using plant parts such as seeds, rhizomes, nuts, and pulps. Herbal soap contains no artificial colours, scents, fluorides, or other additives when compared to conventional soap. Herbs are the natural things most commonly employed in the treatment of virtually all diseases and skin disorders due to their great medical value, cost effectiveness, availability, and compatibility.

Advantages of Soap:

1) The fat membrane that binds the bacteria together and renders it inactive is broken down by soap.
2) Proven to be among the easiest and most efficient ways to combat infections.
3) Effect of moisturizing.
4) Aids in removing corrosive acids.

Disadvantages of Soap:

1) Since soap is alkaline and sensitive skin is typically acidic, it irritates the skin.
2) When soap is used with hard water, which has a lot of calcium dissolved in it, scum forms.
3) Carbonate salt deposits from soap are left behind on the skin.
4) Soap degrades when it is stored.

2. Materials and Methods

2.1 Materials:

- **Anti - fungal Herbs:** Many of these medicinal plants have antifungal properties that have been used experimentally to prevent or cure a range of illnesses. Lantana camara, neem, and maize silk are three medicinal herbs used in Benin's traditional approach to treating candidiasis.
- **Exicipients used in polyherbal soap:** - Bee wax, Propylene glycol, Glycerine, Ethanol, Sodium lauryl sulfate, Stearic acid, Sodium hydroxide, Triethanolmine, Rose oil
- **Extraction process:** - In order to prepare Antifungal polyherbal soap, the selected plant material was shade dried and made into coarse particles and these powder materials were subjected for maceration.

2.2 Lantana Camara

Plant Material: - Fresh leaves of Lantana camara L. will collected from Kg. Chabang, Terengganu for the extraction. The species of Lantana camara L. that had been collected is from the Asian Verbenaceae family.

2.3 Plant Collection and Extraction

L. camara leaves were collected and cleaned under running tap water to remove sand and other impurities. The leaves were air - dried at room temperature for 7 days before being ground into powder with a mortar and pestle. About 110 g of powdered leaves of L. camara were macerated in ethanol for 72 hours before being concentrated to dryness in a water bath (50°C) as described by Alexander et al. The formula below was used to calculate the percentage of total yield.

$$\%\text{extraction yield} = \frac{W_2 - W_1}{W_0} \text{ x } 100$$

Where W_0 = the weight of the initial dried sample,
W_1 = the weight of the container alone,
W_2 = the weight of the extract and container.

Plant Material: Fresh leaves of Lantana camara L. will collected from Kg. Chabang, Terengganu for the extraction. The species of Lantana camara L. that had been collected is from the Asian Verbenaceae family.

Extraction Process: Samples from fresh leaves that had been estimated around 350 grams will shade dried around 10 days and made into a coarse powder with the mechanical grinder for further use. The powder from Lantana camara L. leaves (320 g) will through a hydro extraction process in soxchlet type apparatus for 6 hours according to British Pharmacopoeia (1980) method. The essential oil collected will subsequently dry with anhydrous sodium sulfate (Na_2SO4) in 6 to 8 hours according to Hand Book on Medical and Aromatic Plants and filtered by using Whatman no.1 filter paper. Then, it kept refrigerated at below 4ºC to be analyzed.

2.4 Phytochemical Screening

- **Saponins:** The extract (300 mg) was boiled in 5 ml water for 2 minutes. Then the mixture was cooled and mixed vigorously, and left to stand for 3 min. The formation of froth indicates the presence of saponins.
- **Terpenoids**: The extract (300 mg) was mixed with 5 ml chloroform and warmed at 80 °C for 30 min. A few drops of concentrated sulfuric acid were added and mixed well into the mixture. The appearance of a red color indicates the presence of terpenoids.
- **Phenolics**: Diluted NaOH, followed by diluting HCl, was added to the methanolic extract of the sample residue. The solubility and color change of the mixture were noted. A yellow solution with NaOH, which turns colorless with the addition of diluted HCl, confirms the presence of flavonoids.

Preparation of Soap: The lye solution was made by mixing 1.6g NaOH and 2. ml distilled water in a 250 beaker. Heat the contents of a 250 ml beaker with a stir bar to 60 °C while adding 18.75 g of propylene glycol, 6.25 g of vegetable glycerin, 19 g of 95% ethanol solution, and 15 g of SLS. Add 13 g of stearic acid after this temperature is attained, then raise the mixture's temperature to 68 °C. Once the liquid has reached the desired temperature, add the 50: 50 lye solution gradually while stirring continuously for 20 minutes, halting only when required, or until the mixture becomes translucent. L. camara, Neem extract were added to the aforementioned combination in the required amounts, and the volume was then measured. Add 5ml triethanolamine to maintain the pH.

- **Evaluation of Poly - Herbal Soap:** The following physicochemical parameters were evaluated to confirm the quality of prepared formulation.
- **Determination of clarity, colour and odour:** Clarity and colour were examined visually on a white background, and the fragrance was detected.
- **pH:** All of the prepared formulations' pH values were measured using a digital pH metre. Separately diluted in 100 cc of distilled water, each of the nine formulations was kept for two hours. Using a previously calibrated Digital pH meter, the pH was determined.
- **Weight Variation**: - Collected 10 soap's to calculate the individual weight finally calculated the average weight of herbal soap's.
- **Percentage Yield**: - The empty container was Weighed in which the herbal soap's formulation was stored then again the container was weighed with herbal soap's formulation. Then subtracted the empty container weighed with the container with herbal soap's formulation then it gives the practical yield. Then the percentage yield was calculated by the formula.

Percentage Yield = Practical Yield / Theoretical Yield × 100

Solubility: - 2gm of soap added 10ml of solvents and shake it 2min view the solubility result.

Percentage free alkali content: Weighing about 10g of dried soap, 150 ml of pure water was added to the beaker. To dissolve the soap, it was heated for 30 to 40 minutes at reflux on a water bath. This solution was cooled, transferred with the washings to the 250 ml conical flask, and the capacity was filled with distilled water. Two drops of the phenolphthalein indicator were added to 10 ml of the soap solution in the titration flask. The solution was then titrated against 0.1M HCl until it became colourless.

Foam height: 50ml of distilled water were mixed with 1gm of sample soap. After that, it was put into a measuring cylinder and filled with water to a volume of 100 ml.25 strokes were administered while standing until the aqueous volume reached 100 ml, at which point the height of the foam above the aqueous volume was measured.

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

Skin Irritancy: - Test Mark an area (1sq. cm) on the left hand dorsal surface. The herbal soap was applied to the specified area and time was noted. Irritancy, erythema, edema, was checked if any for regular intervals up to 24 hrs and reported.

Moisture content: A sample of soap weighing 10g was weighed right away and noted as the "wet weight of sample". Using the appropriate drying equipment, this wet sample was dried to a constant weight at a temperature not to exceed 239 °F (115 °C). After cooling, the sample was weighed once more, and the result was noted as the "dry weight of sample". The following equation was used to calculate the sample's moisture content:

%W=100 A - B/B ×100e

Where %W is the percentage of moisture in the sample, A is the weight in gram of the wet sample, and B is the weight in gram of the dry sample.

Total Fatty Matter: A 250 ml beaker was fillled with 5 g of soap that had been precisely weighed. The soap was completely dissolved with the addition of 100 cc of hot water. To make the contents somewhat acidic, 40 ml of 0.5 N nitric acid was added. In a water bath, the mixture was heated until a layer of fatty acids was floating on top of the solution. The fatty acids were separated after cooling in ice. The residual solution was mixed with 50 cc of chloroform and then poured into a separating funnel. Shake the mixture and give it time to divide into two layers. Drainage was done on the bottom layer. To the residual solution in the separating funnel, 50 ml of chloroform was added the fatty acid that was dissolved in chloroform was once more separated and added to the fatty substance that had been gathered. In a pre - weighed china plate, the fat was measured. Weighed the residue after allowing the contents to evaporate. Calculated the proportion of fatty matter in the provided soap sample using the difference in weight.

Alcohol Insoluble Matter: 50ml of boiling alcohol was used to dissolve 5g of soap sample. With 20 ml of warm ethanol, the solution was filtered through tarred filter paper before being dried at 105°C for an hour. The weight of dried filter paper was taken Formula:

% alcohol insoluble matter = residual weight multiplied by 100 / sample weight

Saponification value determination: The amount of potassium oxide, measured in milligrammes, needed to completely saponify 1 g of fat or oil. According to Schumtterer et al. (1983), it is defined as the average molecular weight of fatty acids found in oil or fat. About 2 gramme of the soap sample was taken for the saponification value determination and placed in a conical flask with a 0.5 M KOH solution. On a hot water bath, this mixture was cooked to a temperature of around 55 degrees Celsius while being continually stirred. The temperature was then raised by another 100 degrees Celsius, and boiling continued for approximately one hour. Phenophtlein was used as an indicator during the titration process, along with 0.5M HCl. The observed final point is pink color to disappear.

Saponification is calculated as Saponification Value = Avg Volume of KOH X 28.056/ Weight of oil (g)

Anti - Fungal Activity: - The formulated herbal soapwere inoculated on the plates of agar diffusion method and a control Amphotericin - B was prepared by herbal soap. The plates were placed in to the incubator and are incubated at 37 °C for 24 hours. After the incubation period, plates were taken out and check the microbial growth by comparing it with the control.

3. Result and Discussion

The result is as bellow: -

1) Organoleptic Evaluation

For.	Colour	Odour	AV. WT.	% YIELD
A1	Green	Arometic	44.07	
A2	Green	Arometic	44.11	
A3	Green	Arometic	43.88	
A4	Green	Arometic	45.43	
A5	Green	Arometic	43.26	
A6	Green	Arometic	46.92	
A7	Green	Arometic	47.17	
A8	Green	Arometic	45.87	
A9	Green	Arometic	48.34	

2) Solubility Analysis

For.	Hot Water	Cool Water	Ethenol	Acetone
A1	+++	+++	+++	++
A2	+++	+++	+++	++
A3	+++	+++	+++	+
A4	+++	+++	++	++
A5	+++	+++	+++	+
A6	+++	+++	+++	+++
A7	+++	+++	++	+
A8	+++	+++	+++	++
A9	+++	+++	++	+

Keys: + (weakly soluble), ++ (Partially soluble), +++ (soluble),

3) Pysical Parameter:

For.	Total Fatty Matter	Alcohol Insoluble Matter	Moisture content	Ph	Free Alkali	Foam Height	Foam Retention	Saponification value determination	Skin Irritancy
A1	77.8	20.33 %	12.63 %	7.5	0.35	26 cm	03 min	190.68	NIL
A2	81.0	19.98 %	11.98 %	7.3	0.31	24 cm	03 min	191.29	NIL
A3	78.9	20.42 %	12.49 %	6.9	0.47	29 cm	04 min	190.53	NIL
A4	73.6	20.17 %	12.69 %	6.8	0.51	28 cm	04 min	192.05	NIL
A5	74.4	19.76 %	12.17 %	7.7	0.40	30 cm	05 min	190.69	NIL
A6	77.6	20.69 %	12.67 %	7.3	0.43	31 cm	03 min	190.98	NIL
A7	77.8	21.06 %	12.59 %	6.9	0.39	33 cm	06 min	191.11	NIL
A8	78.9	20.36 %	12.25 %	7.8	0.50	27 cm	03 min	190.38	NIL
A9	73.8	20.21 %	11.63 %	6.6	0. .55	25 cm	04 min	190.94	NIL

4) Anti - Fungal Test: -

FORMU.	MICROORGANISMS	CONTROL	AMPHOTERICIN - B	CONTROL
A1	Candida albicans	YES	A1	YES
A2	Candida albicans	YES	A2	YES
A3	Candida albicans	YES	A3	YES
A4	Candida albicans	YES	A4	YES
A5	Candida albicans	YES	A5	YES
A6	Candida albicans	YES	A6	YES
A7	Candida albicans	YES	A7	YES
A8	Candida albicans	YES	A8	YES
A9	Candida albicans	YES	A9	YES

4. Conclusion

The physicochemical and biological characteristics of the prepared soap were examined. The use of soap was attractive and had a pleasant aroma and hue. The pH was found to be between 7 to 10, which is within the recommended range. Other measures that represented the normal soap values were found. The amount of free alkali, foam ability, foam stability, moisture content, and alcohol insoluble matter were some of these. According to biological characteristics including an antifungal and antioxidant study, the made soap is a rich source of both antioxidants and antifungal. According to the study's conclusions, it is possible to make cold - process herbal soap while taking into account a variety of variables, including skin state, herbal potentials, and their activity. This kind of herbal remedy.

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