Exploration of Ziziphus Leaves for Production of Herbal Soap on Antimicrobial Effects for Skin Diseases and Care in Adamawa State, Nigeria

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Abstract

The study seeks to utilize plants leaves and formulate soap from it, using Ziziphus and white potash for skin care. Z. lotus were collected from Michika, Ganye, Yola South and Yola North local government areas of Adamawa state by prospective sample technique. The leaves extract of Ziziphus Lotus was screened for antimicrobial activity against two Gram positive bacteria (Streptococcus, Staph. aureus), two Gram negative bacteria (Esch. coli, Klebsiella) as well as two fungi namely (Asp. niger and C. albicans) using the disc diffusion method. The microbial activities were provided, that most of the extract of Z. lotus leaves exhibited inhibitory effects against most of the tested organisms with the zone of inhibition ranging from Ganye (9 to 10 mm), Michika (4-8 mm), Yola North (4-5mm) and Yola South (10-11mm) respectively. The plant leaves Z. lotus was recommended for herbal soap production due to its microbial activities on skin diseases. The research established the formulation of herbal soap for skin protection from infection and harshness of weather among the people within the region and ascertained how herbal soap is effective on the skin. The materials and equipment used Ziziphus Lotus leaves extract, white potash, chemical SLS (nitro sol, caustic and soda ash), sieve, pot, steering stick, maul bottle, cutter, spatula and plastic cup, and plastic bucket, which will be formulated into mixture and solidified into different shapes and sizes design and package it. Then it would be ready for use. The result of the research work is expected to contribute to the health of people such as economic of the state, and new ideas for industries not only Adamawa state but, Nigeria at large. It also helps people that are reacting to the harsh weather on the skin, ageing and natural skin lightning.

Key word*: Ziziphus**, Soap, Plant, Antimicrobial, Organism, Spatula*

INTRODUCTION

Soap are carboxylate salts with very long hydro carbon chains. Soaps can be made from the base hydrolysis of a fat or oil that's used for washing, bathing and cleaning. Also its used in textile spinning for lubricants saponification process in making the soap by reaction of triglyceride fats are hydrolyzed into free fatty acids then it will combine with alkali to forming crude soap hydrolysis reaction: They serve as cosmetics for the care of body and its part and the botanical

ingredients influence biological function of the skin and provide nutrients necessary for the healthy skin. Human skin, the outer covering of the body constitutes the first line of defense protecting the body against various pathogens Tortora, (2015). As the skin interfaces with environment, it is constantly exposed to different environmental stimuli. This makes the skin prone to damage prone (Ggrace et. al., 2012). Severely damage skin will often try to heal by forming scar tissue, which is often decolorized and depigmented. Plants have been used in the treatment of human diseases and infections since ages (Sunhyo et. al.,2020). The active constituents of plants can be formulated as ointment, cream, gel, lotion, soap, or crude/solvent Chouri (2015). Utilization of plant extracts and their derived phytoconstituents have a likely future for controlling hyperpigmentation. Plant-based remedies mentioned in ayurvedic texts are gaining popularity these days in India due to validation of such therapies with respect to their modern counterparts. Soaps are one among the modern-day cosmetics for maintaining and enhancing the vigor of skin. Hence herbs mentioned under Varnya in Ayurveda are selected for formulation. It was the physician galen who mentions the use of soap for washing and maintaining the body. However, the present chemical soaps quite frequently can cause dryness increasing due to their efficacy on tropical disorders. The plants Hemidesmus indicus, saussurea lappa, and cyperus rotundus are mentioned under varnya herbs in Ayurveda and their modern counterpart, i.e., tyrosinase inhibition is also proven (Saad 2018).

Soap is a salt of a fatty acid used in a variety of cleansing and lubricating products. In a domestic setting, soaps are surfactants usually used for washing, bathing, and other types of housekeeping. In industrial settings, soaps are used as thickeners, components of some lubricants, and precursors to catalysts.

When used for cleaning, soap solubilizes particles and grime, which can then be separated form the article being cleaned. In hand washing, as a surfactant, when lathered with a little water, soap kills microorganisms by disorganizing their membrane lipid bilayer and denaturing their proteins. It also emulsifies oils, enabling them to be carried away by running water. Soap is created by mixing detergent which is also created by combining chemical compounds in a mixer.

Action from an organic base such as ammonium can be used instead of a metal; ammonium nonamniote is an ammonium-based soap that is used as an herbicide. Unlike detergents, when used in hard water soap does not lather well and a scum of stearate, a common ingredient in soap, forma as an insoluble precipitate.

Ziziphus leaves are used as an antibacterial, antifungal, and anti-inflammatory agent and for treating skin illnesses, including atopic dermatitis. Dkhil MA, (2018). Metabolites such as flavonoids and alkaloids are the main antimicrobial agents which cause inhibition of bacteria growth. Detailed examination of Ziziphus leaves showed that this plant contains flavonoids, alkaloids, saponins, lipids, proteins, and free sugar as the dominant chemical composition has antibacterial activity. Asgarpanah J. (2012) Analysis activities related to the Ziziphus, its methanolic and ethanolic extract indicated the preventing growth effect on different species of Gram-negative bacteria. Kadioglu O, et al (2016).

New antifungal tactics attempt to create drugs that combine lower manufacturing costs, high efficacy, local toxicity, and safety for humans, animals, host plants, and ecosystems. Furthermore,

investigations have shown that Ziziphus leaves have antifungal properties. Bahmani M, et al (2009).

Herbal soap formulation with Ziziphus leave extract for antimicrobial and antifungal protection against skin diseases has significant value as an organic soap for human use.

Soap was developed as an intermediate for applications that have different programming languages, enabling these applications to communicate with each other over the internet. SOAP is flexible and independent, which enables developers to write SOAP application programming interfaces (APIs) in different languages while also adding features and functionality.

PROBLEM STATETMENT /JUSTIFICATON

The researcher observed that nosocomial infection has been recognized as a crucial issue in the outcome of hospital care, with significant morbidity and mortality results. The primary routes of infection transmission from one person to another especially to patients are the hands of some health -care workers. In schools from one student to another from nursery secondary and tertiary school toilet (pre-school, secondary, university collages to another. This makes the researcher to evoke utilization of antiseptics from herbal soapmaking purpose. Many of the commercially available normal soaps around are without anti-fungal and ageing effect. The regular use of the soap cannot improve the skin properly and destroy the infection cause on dermal irritation. Vanjire Divya and Nerkar (2020) Formulated herbal soap and hand sanitizer using Azadiracta indica(neem) leaf, bark and seed extract and raddy et. al., (2013) formulated herbal soap for anti-microbial activities from Azadiracta indica (neem) leaf, bark and extract. Therefore, the investigator wishes to formulate herbal soap that has anti-bacterial treatment and ageing with the agent using traditional herbal soap that will not cause skin problem due to the tender of skin, weather or climatic condition of the environment in other human and natural problems in the study area. Consequently, this study will contribute to the industry which uses it by providing a healthy skin free from infection that will supplement the already existing normal soap in the market. This will provide or improve new ideas opportunity for the soap makers in the market and business people when making soap. It will also give (answer) to the clarion call into active research development in safer natural herbal soap making.

OBJECTIVE Of THE STUDY

The objectives of the study are to:

1. Determine the availability of Ziziphus spp, in Adamawa State.

2. Extract, content of the plants leaves for formulation of herbal soap for skin protection against infection.

3. Determine the effectiveness of the herbal soap for skin protection against infection.

LITERATURE REVIEW

Research studies on plant extracts and its antimicrobial properties have greatly escalated in recent years due to fact that these plans have been used as a part of traditional system since the time

immemorial. With the fore going of time theses plant extracts, seeds, leaves stem have gained an individual importance or in combination in various fields of pharmaceutical sciences and their constituents are being evaluated for their therapeutic activity (Melendez 2006). Scientist find a great use of these plant derived preparations in the formulation of various ointments, soaps, creams, gels etc. Moreover, the use of scientific chemicals may lead to various health issues which have been overcome by the use of products that are naturally obtained as means of traditional medicines. These biologically obtained pharmaceutical product are often referred to as natural or herbal cosmetic product (Thongdon and Inprakhon, 2009). Therefore, herbal plants are of great importance as they are harmless and more effective than chemically derived products (Batubara 2009). As per WHO approximately 80 population of Indian rely upon traditional systems of medicines like ayurvedic, unani, siddha and tibbi for day life health problems (Londhe 2015).

Skin is the most exposed part which needs to be protected from foreign pathogens, Patel et. al., (2013). Therefore, a better and a safer product is required for the maintenance of hygiene and cleanliness with less of the side effects such as rashes, redness, itching or any of the kind. Herbal products are enriched with essential nutrients and minerals which are useful to the human body and has minimum side effects. The diverse plant kingdom contains various essential ingredients or phytochemical constituents which not only impart emollient action but also help in restoration, protection and healing of the skin. The ingredients used in the cosmetic or herbal preparation impart antioxidant, antibacterial, antifungal, scrubbing, antispasmodic properties and also have high nutritional value. The therapeutic activity is only dependent upon their chemical constituents as plants are very complex in nature. In addition, standardization of herbal drugs is also an essential factor to prevent adulteration of herbal dugs (Pandey et. al., 2014)

METHODOLOGY

The researcher used the exploratory research design to explore natural content of leaves from Ziziphus Lotus which was selected from three senatorial zone in Adamawa state, while qualitative method was used to describe the usefulness of the content to produce or manufacture herbal soap for healthy skin.

Area of the study.

The samples of Ziziphus Lotus leaves were collected from Michika, Yola south, Yola North and Ganye Local Government Area in Adamawa State, representing the three senatorial zone in the state. The leaves extraction and formulation of the soap process was conducted at Federal Collage of Education Yola. Department of Science Education and Home Economics.

Plant Material

The Ziziphus Lotus Leaves was collected from four Local Government Area in Adamawa State (Ganye, Michika, Yola North, and Yola South Local Government Area) between June and July 2024. The plant was sampled and identified by the researcher based on the related literature on plant taxonomist.

Preparation of crude extracts Processing and Extraction of Plant Samples.

The leaves were dried in the absence of sunlight and pounded to powdered form, 50g of the leaves from the four local government was weighed and extracted successively with ethanol in Soxhlet extractor by continuous hot percolation. Each time before the leaves extracted from each Local Government the powdered material will be dried in a hot air oven below 45ºC for 10 minutes.

Test microorganisms

The extracts of Ziziphus Lotus of Ganye, Michika, Yola North and Yola South Local Government of Adamawa State was tested against four bacterial species: two Gram positive bacteria viz., Staphylococcus aureus and Streptococcus bacteria, two Gram-negative bacterial strains Escherichia coli and Klebsiella, and two fungal strains viz, Apergillus and Candida albicans. The bacterial and fungal strains used in the study were obtained from Microbiology Laboratories of Modbbo Adama University Teaching Hospital and Specialist Hospital Yola in Adamawa State, Nigeria. The bacterial cultures and fungal culture were maintained on nutrient agar and sabouraud dextrose agar and incubated at 37°C for 24h and then used for the antimicrobial test.

Preparation of the test organisms Preparation of bacterial suspensions

One full loop of a 24 hours broth culture of the test organisms was aseptically distributed onto nutrient agar slopes and incubated at 37º C for 24 hours. The bacterial growth was harvested and washed off with 100 ml sterile normal saline, to produce a suspension containing about 100 ml. The suspension was stored in the refrigerator at 4° C till used.

The average number of viable organisms per ml of the stock suspension was determined by means of the surface viable counting technique. Serial dilutions of the stock suspension were made in sterile normal saline solution and 2.0µl volumes of the appropriate dilution were transferred by micro pipette onto the surface of dried nutrient agar plates. The plates were allowed to stand for two hours at room temperature for the drops to dry and then incubated at 37 °C for 24 hours. After incubation, the number of developed colonies in each drop was counted. The average number of colonies per drop (2.0µl) was multiplied by 50 and by the dilution factor to give the viable count of the stock suspension, expressed as the number of colonies forming units per µl suspension.

Each time a fresh stock suspension was prepared. All the above experimental conditions were maintained constant so that suspensions with very close viable counts would be obtained.

Preparation of fungal suspension

The fungal cultures were maintained on Sabouraud dextrose agar, incubated at 25 °C for 4 days. The fungal growth was harvested and washed with sterile normal saline and finally suspension in 100ml of sterile normal saline, and the suspension were stored in the refrigerator until used.

Testing of antibacterial susceptibility Disc diffusion method

The paper disc diffusion method was used to screen the antibacterial activity of plant extracts and performed by using Nutrient Agar (NA). Bacterial suspension was diluted with sterile physiological solution to 100 µl (turbidity = 0.5). One hundred microliters of bacterial suspension

were swabbed uniformly on surface of NA and the inoculum was allowed to dry for 5 minutes. Sterilized filter paper discs (Whatman No.1, 6 mm in diameter) were placed on the surface of the NA and soaked with 20 µl of a solution of each plant extracts. The inoculated plates were incubated at 37 °C for 24 h in the inverted position. The diameters (mm) of the inhibition zones were measured.

RESULTS AND DISCUSSION

The leaves of Ganye, Michika, Yola North and Yola South extracts of Ziziphus Lotus was screened for antimicrobial activity against two Gram positive bacteria (Streptococcus, Staph. aureus), two Gram negative bacteria (Esch. coli, Klebsiella) as well as two fungi namely (Asp. niger and C. albicans) using the disc diffusion method.

Antimicrobial activities of leaf extract Z. lotus from different location in Adamawa State against tested Bacteria and Fungi.

Microorganism	**Mean Diameter of Growth Inhibition Zone (mm)**			
	Ganye L.G.A	Michika L.G A	Yola North L.G. A	Yola South L.G. A
Tested Bacteria Used				
Esch. Coli	8	-	4	11
Klebsiella spp.	9	4	3	8
Staph. Aureuse	2	8	-	10
Streptococcus	10	1	5	4
Tested Fungi Used				
Candida Albican	7	1	-	-
Aspergillus Niger	2	3	4	2

Key: The result was expressed in diameter of inhibition zone: < 5mm inactive, 5-8mm partially active, 9-11mm, active and > 12mm very active.

The microbial activities were provided, that most of the extract of Z, lotus leaves from Ganye, Michika, Yola North and Yola South, exhibited inhibitory effects against most of the tested organisms with the zone of inhibition ranging from (9 to 10 mm), (4-8 mm), (4-5) and (10-11mm) respectively.

The Ganye extract of Z. lotus leaves dissolved in ethanol (1:10) showed activity (8, 9 and 10 mm) against (Esch. Coli, Klebsiella and Streptococcus spp.) respectively, Michika extract of Z. lotus leaves dissolved in ethanol (1:10) showed activity (3, 4 and 8 mm) against (A. niger, Klebsiella spp and S. aureus) respectively, and Yola North extract of Z. lotus leaves dissolved in ethanol (1:10) showed activity (5 mm) against (Streptococcus spp) only, and Yola South extract of Z. lotus leaves dissolved in ethanol (1:10) showed high activity (8, 10 and 11 mm) against (Klebsiella Spp., S. aureus, and Esch. Coli) respectively.

Herbal soap production

Extract of Ziziphus leave when mixed with the following ingredient such as natural oil (palm oil, shea butter), Soda ash, Costic acid, Nitro sole to solidify the soap or for enhance cleaning and moisturizing properties, as herbal soap and will removed all the anti-microbial properties on the skin.

Conclusion

Herbal soap production with ziziphus leaves has anti-microbial effects on skin diseases and protection the plant leaves is available in all part of the state with good inhibitory zone on the tested bacteria and fungi.

Recommendation

The research reveals that, utilization of our local plant should be encourage by the government and more research has to be done on in due cost.

Herbal soap production should be emphasized because of it effectiveness on skin diseases and protection.

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