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PRODUCTION OF MEDICATED SOAP FROM STEM BARK EXTRACT OF VITEX DONIANA PLANT

*[1]M.H. Shagal, [2]D. Kubmarawa and [3]S.E. Mandama
[1,2&3]Department of Chemistry
Modibbo Adama University of Technology, Yola, Adamawa State, Nigeria.
E-mail: dkubmarawa@yahoo.com

Abstract: Ethanolic extract of the stem bark of *Vitex doniana* plant was used to produce medicated soap. The pH, moisture contents, chloride contents, total fatty matter, insoluble impurity, activity of the soap against *A. niger, Penicillum expansum, Candida albicans, Staphylococcus aureus*, *Escherichia coli*, *Pseudomanas aerogonisa, and Aerobic mesophilic bacteria* were carried out and the results showed that the medicated soap produced has pH (11.4), moisture contents (16.2%), chloride contents (0.46%), total fatty matter (40.2%), insoluble impurity (3.50%). The results of the bioassay showed that the medicated soap produced has activity against *A. Niger* (10.5mm), *Penicillum expansum* (10.0mm), *Candida albicans* (28.0mm), *Staphylococcus aureus* (5.0mm) *and Aerobic mesophilic bacteria* (15.0mm). These results agree with the claims by the traditional healers that parts of *Vitex doniana* plant can be used in producing medicated soap because the medicinal plant possess antifungal and antibacterial property.

Keywords: Plants, *Candida albicans*, Antibacterial, Medicated Soap, Bioassay.

INTRODUCTION

Demands for skin care products for skin toning and rejuvenating damaged or aged skin is a new area of concern in Africa. There has been surge in skin care products to the extent that an improper use of skin care products has emerged. De-pigmentation of skin and especially the face is a common problem especially among urban females. Partial cause of this problem is inadequate public education and an inadequate regulatory mechanism. Interest to refer to natural products for skin care is therefore an emerging area. Strategic mechanisms to harness available natural plant based product for skin care and treatment is an urgent area to be addressed (Ernest, 2001).

The World Health Organization estimated that perhaps eighty percent of the inhabitants of the world rely chiefly on traditional medicine (Sexana, 2001) and the use of plants for traditional medicine purposes dates back to antiquity (Ogunyemi, 1991). Many of the plants materials used in traditional medicine are readily available in rural areas and this has made traditional medicine relatively cheaper than modern medicine. Over sixty percent of Nigeria rural population depends on traditional medicine for their health care need (Apulu *et al.*, 1992).

Medicinal properties of plants are normally dependent on the presence of certain phytochemicals such as alkaloids, anthraquinones, cardiac glycosides, saponins, tannins polyphenolsetc, which are the bioactive bases responsible for the antimicrobials property (Ebana *et al.*, 1993). Medicinal plants contains pharmacologically active compound which over the years have been exploited in traditional medical practices for the treatment of various ailments (Kubmarawa *et al.*, 2007). Soaps that kill or inhibit the growth of microorganisms such as bacteria, viruses, molds, slime, fungi etc. are called medicated soaps. The antimicrobial agent could be synthetic chemicals or plants or animal extracts (Phuonget *et al.,* 2008) .One of the medicinal plants that have antimicrobial property is *Vitex doniana.*

V. doniana is a perennial shrub widely distributed in tropical West Africa, extending eastward to Uganda, Kenya and Tanzania in savannah and high rainfall areas. It is commonly known as Mfuru, Mgobe (Tanzania), Mungamazi, Nuhomozi (Uganda), Dinya (Hausa) (Atawodi, 2005). In ethnormedicine *V. doniana* is employed in the treatment of variety of diseases. Hot aqueous extracts of the leaves are used in the treatment of stomach, rheumatic pains, inflammatory disorders, and dysentery (Irvine, 1961; Etta, 1984) indicating that plant leaves may possesses anti-inflammatory and analgesic properties among others. The roots and leaves are used for nausea, colic and in epilepsy management (Bouquet *et al.*, 1971; Iwu, 1993). In eastern parts of Nigeria, the young leaves are used as vegetables for sauces and porridge for meals. The anti-hypertensive effects of extracts of the stem bark has been reported (Olusola *et al.,* 1997). Extracts of stem bark of *V. Doniana* have also demonstrated some level of in vitro trypanocidal activity against *Trypanosome brucei* (Atawodi, 2005). The aqueous methanol extract, has exhibited anti-diarrhea activity (Agunu *et al.*, 2005). The fruit is used to improve fertility and to treat anemia, jaundice, leprosy and dysentery (Orwa *et al.*, 2009). The root is used for gonorrhea treatment and women drink a decoction of it for backaches while the young tender leaves are pounded and the juice squeezed into the eyes to treat trouble/infections (Kubmarawa *et al.*, 2007; Orwa *et al.*, 2009). Therefore the aim of this research was to produce medicated soaps from the medicinal plant called *V. doniana.*

MATERIALS AND METHODS

Sampling and Sample Preparation

The stem bark of*, V. doniana* used in this study was collected from Hong Local Government Area of Adamawa state, Nigeria. The plant was identified in the Department of Biological Sciences, Modibbo Adama University of Technology, Yola. The plant materials were air-dried at room temperature for three weeks after which, the dried plant samples were grounded into powder using mortar and pestle. The powdered materials were used in preparing the extract.

Preparations of Extract

150g of the powdered materials were macerated in 400ml hydro-alcoholic solution (ethanol 70% water 30%) with occasional shaking for 24hrs and then filtered. The filtrate was concentrated using a rotary evaporator at 40°C.

Test Microorganisms

The following microorganisms were used in this study: *A. niger, Penicillum expansum, Candida albicans, Staphylococcus aureus*, *Escherichia coli*, *Pseudomanas aerogonisa, and Aerobic mesophilic bacteria*. They were all obtained from Microbiology Laboratory of Federal Medical Centre, Yola.

Formulation of the Medicated Soap

The boiling process was used during the soap preparation. 40ml of the oil mixture (Palm Kernel and Cotton seed oil) was place in the 500cm^3 beaker and 20cm^3 of the *V. doniana* extract was added. 4g of Sodium hydroxide (NaOH) in 20cm^3 of water was added to the mixture of oils and extract in the beaker. The mixture was heated for an hour in a water bath, maintaining the temperature in the range of 80 - 90^{0}C with frequent stirring at a time intervals. Little distilled water was added occasionally to prevent the content of the flask from becoming solid due to evaporation of water and alcohol during heating. After one hour of heating, 100cm^3 of a saturated solution of sodium chloride was added to the hot mixture and let to cool. The

addition of the salt solution throws the soap out of solution ("salting out"). The soap float on the surface of the solution, it was filtered and placed in a mold to dry.

Microbial Sensitivity Analysis

0.1g/ml solution of the medicated soap produced was prepared with the plant extract. The Nutrient agar media was also prepared for seven (7) plates. About 20 ml of the agar was poured in each of the plates. The contents in the plates were allowed to solidify after which the fungi and bacteria were placed on the plate (pour plate method). Holes were made using 1.0mm diameter cork borer inside which the soap solution was poured.

Quality Determination of Soap

pH Determination

Soap was grated into fine particles 10g of the fine flakes was weighed into a beaker, and 10ml of distilled water added and dissolved completely by continuous stirring. The pH of the solution was determined using a pH meter.

Determination of Chloride Content

The soap was scrapped with knife to give fine flakes. 1g was weighed into a conical flask and dissolved in 30ml of distilled water. The soap solution was titrated with 0.1M $AgNO_3$ using K_2CrO_7 as indicator. The chloride content was calculated using the formula.

$$Chloride\ Content\ \% = \frac{Titre\ Value\ \times 0.00345}{Weight\ of\ Sample\ Taken} \times 100$$

Determination of Total Fatty Matter

3g of the soap sample was boiled with 75ml of distilled water and the solution cooled. The mixture was separated using a separating funnel, 75ml of ether and 5ml of dilute H_2SO_4 were added, shaken well and allowed to separate. The lathered layer was collected and extracted repeatedly with two quantities each of 25ml of ether. The ether extract was washed with water to neutralize the reaction using methyl orange as indicator. It was then filtered through anhydrous Na_2SO_4 (on glass wool) and evaporated to dryness in a conical flask (Previously weighed). The conical flask was cooled and reweighed. The total fatty matter was calculated as:

$$Total\ Fatty\ Matter = \frac{a}{b} \times 100$$

Where a = Weighed of residue in the flask
b = Weight of sample taken

Determination of Insoluble Impurity

5g of grated soap sample was measured and dissolved in 50ml of kerosene; it was warmed to affect the dissolution of the oil. It was then filtered through a weighed filter paper. The filter paper together with the residue was dried in an oven and then cooled in a desiccator and reweighed. Insoluble impurity was calculated as:

$$Insoluble\ Impurity = \frac{a - b}{c} \times 100$$

Where a = Weight of filter paper plus residue
b = Weight of empty filter paper
c = Weight of sample

RESULTS AND DISCUSSION

Table 1: Some Physicochemical Characteristics of Soap Produced Compared to Some Soaps Sold in the Market

Parameters Determined	*V. doniana* Soap Produced	Tetmosol Soap	Dermocare Soap	Limit (NAFDAC)
pH	11.40	10.90	10.50	9.5 - 12.0
Moisture Content %	16.20	13.40	12.50	31.00
Chloride Content %	0.46	0.46	0.40	1.00
Total Fatty Matter %	40.20	41.4	40.70	62.00
Insoluble Impurity %	3.50	3.20	3.00	5.00

Table 2: Antimicrobial Activity of the Soap Produced Compared with Some Soaps Sold in the Market

Microorganisms	Zone of Inhibition (mm)		
	V. doniana Soap	Tetmosol	Dermocare
A. niger	10.5	6.0	6.2
Penicillum expansum	10.0	8.0	9.5
Candida albicans	27.0	10.0	10.0
Staphylococcus aureus	5.0	0.0	0.0
Escherichia coli	0.0	0.0	0.0
P. aerogonisa	0.0	0.0	0.0
A. mesophilic bacteria	15.0	20.0	0.0

The pH of the soap produced was found to be 11.40 which fall within the stipulated range limit of soap by NAFDAC in (9.5-12.0). Tetmosol and Dermocare sold in the market have pH of 10.9 and 10.5 respectively, which also falls within the pH limit. Moisture content of the soap produced was found to be 16.20 %. The results obtained from the soap produced from ethanolic extract of *V. doniana* respectively are within the maximum limit required by NAFDAC which is (31% max.) compared to those of tetmosol and dermocare with values of 13.4% and 12.5% respectively. The chloride content of all the soap produced was found to be 0.46%, compare to those of tetmosol and dermocare with values of 0.46% and 0.40% respectively. Total fatty matter of the soap produced was found to be 40.2% and the value is less than the minimum stipulated by NAFDAC which is 62.0%. This may be due to impurity in oils blended for the soaps making. The results obtained for tetmosol and dermocare sold in the market are also less than the minimum required by NAFDAC, which is 41.4% and 40.7% respectively. An insoluble impurities value was found to be 3.5 for the soap produced. It falls within the maximum limit required by NAFDAC which is 5.0% Max. Tetmosol and dermocare soap have insoluble impurity value of 3.2% and 3.0% respectively.

The results of the bioassay showed that the medicated soap produced has activity against *A. niger* (10.5mm), *Penicillum expansum* (10.0mm), *Candida albicans* (28.0mm), *Staphylococcus aureus* (5.0mm) *and Aerobic mesophilic bacteria* (15.0mm). These results agree with the claims by the traditional healers that parts of *V. doniana* plant can be used in producing medicated soap because the medicinal plant possess antifungal and antibacterial property.

CONCLUSION

The results obtained from this study showed that the soap produced from the ethanolic extracts of stem bark of *V. doniana* has antimicrobial property on the test organisms. These results agree that the soaps produced from these medicinal plants can be used in the treatment of skin fungal and bacterial infections.

RECOMMENDATION

This soap is in no way inferior to commercial medicated soaps sold in the market in effectiveness, I therefore suggest that interest should be referred to the available natural plant based product for skin care and treatment than soaps produced from chemical reagents causing depigmentation of the skin.

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