



ANTIBACTERIAL ACTIVITIES OF LOCALLY MADE SOAP ON *Staphylococcus aureus* FROM THE SKIN

*¹Okeke K. S., ¹Obi P., ²Bala, J. D. and Hassan, V. O.

¹Department of Biological Sciences, The Federal Polytechnic Bida,
Niger State, Nigeria. ²Department of Microbiology, Federal University of
Technology, Minna, Niger State, Nigeria

ABSTRACT

Overuse of chemicals like triclosan has been suggested to cause sensitive bacteria to evolve resistance to its antibacterial actions. Locally medicated Soaps play an important role in the prevention and treatment of infections because they have the ability to remove and kill pathogens and this ability is well exploited in skin hygiene. The antibacterial activities of locally produced black soap were examined against some clinical isolates of pathogenic microorganism (*Staphylococcus aureus*) using Kirby-Bauer modified disk diffusion method. Result revealed that the pattern of inhibition varied ($P < 0.05$) with the soap concentration and the organism tested. The zone of inhibition ranged from 16.70mm to 30.00mm with sample A1 having the highest zone of inhibition. The soap was more effective on *Staphylococcus aureus* with maximum zone of growth inhibition of 30mm at 100%w/v. The minimum inhibition concentration and minimum bactericidal concentration was 6.25 and 12.5%w/v for sample A and B respectively. The ingredients used in the preparation the soap may be responsible for the antibacterial potentials of this medicated soap.

Keywords: Local medicated soap, skin infection, antibacterial activity, *Staphylococcus*

INTRODUCTION

Most local soap are produced from a mixture of vegetables oils, (palm kernel oil and sheabutteer). Other ingredients such as line, ginger, pawpaw, carrot and garlic have been added (Aliyu *et al.*, 2012). Some people still prefer using local black soap such

as Ghana soap, Zee Black soap and Dudu Osun, may be due to its industrial modification.

Locally medicated soaps play an important role in the prevention and treatment of infections because they have the ability to kill pathogens and this ability is well exploited in skin hygiene. Skin hygiene, particularly of hands, is considered one of the primary mechanisms to reduce risk of transmission of infectious agents by both the contact and fecal-oral routes. The washing of hands with soaps and water is a routine practice which was established many generations, as a means to ensure personal hygiene. Washing traditions have become established within the health care setting (Igbeneghu, 2013, Olakunle *et al.*, 2019).

No matter how efficient the modern antiseptic soap and organic soap are, their cost still remains a challenge to the masses. The chemical combination used in its production may also have side effect on other organs of the body. In addition, some microorganisms have developed resistance to already familiar medicated soap due to constant usage hence there is the need for new research into local ingredient that could be used in the production of antiseptic soap and organic soap. The aim of this study is to determine the antibacterial activities of locally made soaps on *Staphylococcus aureus* from skin.

MATERIALS AND METHODS

Collection of Samples

All ingredients needed for the production of local herbal soap were purchased from New Market, Bida metropolis.

Solid Sample Preparation

Twenty grams of clove were ground to smoothness using a sterile mortar and pestle alongside with 10g of ginger, turmeric and garlic and then mixed together. About which 5g of orange peel powder, black seed powder, vitamin C powder, 2g of sulphur and sander wood powder were also added followed by pure natural honey (one tea spoon). Camood powder (one tea spoon), 100g of natural black soap (raw soap) which serve as the starter followed by the addition of lime extract (2 teaspoons), 2 tablespoons of virgin oil, one tablespoon of fragrance, 2 tablespoons of lote powder

were added and mix together and then allowed to solidified (produced by local indigenes).

Preparation of Soap Sample Disc

A sterile blade was used to scrape 1g each of the prepared sample, safe guard soap, black soap sold in the market. These were dissolved in 9mL of sterile water to give a stock solution. Soap suspension at different concentration of 100, 50, 25, 12.5, 6.25 % w/v were prepared following serial dilution. Sterile filter disc Whatman No 1 filter paper (6mm) were soaked in the different soap solution for an hour and allowed to dry at room temperature.

Test Organism

Clinical strain of *Staphylococcus aureus* obtained from patient wound was collected from Medical Centre, Federal Polytechnic, Bida was used for this investigation

Antimicrobial Susceptibility Testing

The antimicrobial susceptibility test used was the Kirby-Bauer modified disk diffusion method as described by Aliyu *et al.* (2012) and Olakunle *et al.* (2019). The test organisms from an overnight culture plate incubated at 37° C were suspended in saline solution (0.85% NaCl) and adjusted to match a turbidity of 0.5McFarland Standard. This standard solution was used to inoculate the surfaces of Mueller Hinton agar (Oxoid) plates. The plates were left for 30min. The impregnated disks were aseptically transferred into the sensitivity plates with the aid of a sterile forceps. These was then inverted, incubated at 37°C for 24h and then examined for zone of inhibition around the disk (EUCAST, 2000). Data obtained from this study were analyzed using ANOVA.

RESULTS AND DISCUSSION

As shown on Table 1 the zone of inhibition of different soap and local soap against test organism. The zone of inhibition ranged from 16.70mm to 30mm with sample A 1 having the highest zone of inhibition followed by sample A2 and lastly by sample A3. There were no significant different between sample A2, B and C. The minimum

inhibition concentration and minimum bactericidal concentration was 6.25 and 12.5%w/v for sample A and B/C respectively.

Different Soaps	Zone of Inhibition (mm)
Sample A1	30.00±1.10 ^a
A2	24.50± 0.01 ^b
A3	16.70± 0.29 ^c
A4	11.20 ± 0.01 ^d
A5	8.00 ± 0.05 ^d
B	23.00±1.00 ^b
C	20.60±040 ^b

Values on Table are Mean ± S.D of 3 determinants, Different letters across the column are significantly different P<0.05, Sample A1=local organic soap 100% w/v, A2=50%, A3=25%, A4=12.5%, A5=6.25%, B=Commercial local soap, C=Tura soap

Table 2: MIC and MBC of locally made black soap against Test Organism (%w/v)

	MIC	MBC
Sample A	6.25	6.25
B	12.5	12.5
C	12.5	12.5

Sample A=local organic soap, B=Commercial local soap, C=Tura soap

Discussion

The zone of inhibition (mm) of samples of local soap ranged from 8.00 to 30.00 for *Staphylococcus aureus*. Black soap A1 had more effect on *S. aureus* (30.mm) with Black soap A5 having the least effect on the organism (8.00mm). The control soap (safeguard) had more effect as compared to the rest soaps produced; this is in agreement with the research conducted by Obi *et al.* (2014) where different medicated soaps were used against *Staphylococcus aureus* isolated from wound. There was significant different (P<0.05) among the mean of zone of inhibition across the

column; however, black soap A2, B and C did not differ ($P>0.05$) in zone of inhibition of *S. aureus*. The diameter of zone of inhibition of the local organic soap produced reflect that the soap has antimicrobial effect on *Staphylococcus aureus* up to a concentration of 6.25%w/v. The antimicrobial effect may be accredited to presence of antimicrobial properties. *S. aureus* is one of the microorganisms responsible for skin infection such as boil, thrush, eczema, psoriasis and impetigo (Aliyu *et al.*, 2012). The clear zone of inhibition of the organism indicated the susceptibility ability of the organism to the black soap and as such the soap could be used in the treatment of the various disease caused the organism.

The antimicrobial power of the soap may be accredited to the various ingredients used in the production of the soaps such as ginger, garlic, clove, honey and lime. Ginger and garlic have been reported to have adverse effect on *S. aureus* (Okiemute *et al.*, 2020). Clove on the other hand has biological activities and antioxidant hence its used has antiseptic. Its essential oil has been reported to inhibit the growth of bacteria (Nunez and Aquino, 2012). The zone of inhibition (30mm) observed from this study was near range to (28mm) reported by Aliyu *et al.* (2012) and more than 26mm reported by Olakunle *et al.* (2019). findings of this present study were The MIC and MBC was both at 6.25%w/v indicating the efficacy of the soap in eliminating *S. aureus*.

CONCLUSION

This study has revealed that most of the assayed medicated soaps have satisfactory antibacterial activity on *S. aureus* that are associated with skin diseases. And the local organic soap had a lower MIC and MBC values compared to Tura soap.

COMPETING INTERESTS

The authors declare that they have no competing interests

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