**Effect of Medicated Soaps on the Bacterial Isolates of Skins of Female Students from Madonna University, Elele, Rivers State, Nigeria**

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**Abstract:** Medicated soap is a substance that reduces the chance of infection by inhibiting the growth of microorganisms. A total number of 50 skin swab specimens were collected from the skin of female students of Madonna University Elele, Rivers State to determine the effect of medicated soap on bacterial isolates. Blood, Mannitol salt and MacConkey agar respectively using streak plate method were used in culturing. The isolates were identified using Gram staining technique and Biochemical tests. Antibacterial activity of the medicated soaps; Tura, Tetmosol, TCP and Medi-soft was assayed by impregnated disc diffusion method. Data were analyzed by anova (analysis of variance). Bacteria isolated from hostels were coagulase negative *staphylococcus* 17(54.8%), *Staphylococcus aureus* 7(22.6%), *Bacillus* species 3(9.6%), and *Streptococcus* species 4(12.9%). St. Mary hostel had the highest occurrence of bacteria with 8(25.8%), while, St. Anthony has the least occurrence with 4(12.9%). Statistically, there was significant difference (p<0.05) between the occurrence of bacteria by hostels. The distribution of bacteria based on age, recorded age interval 22-23years had the highest occurrence 11(35.4%) while, 24-25years showed the least 5(16.1%). There was significant difference (p<0.05) distribution by age. The soaps' antibacterial effect to various bacteria species isolated showed that TCP recorded the highest 14mm, while, Medi-soft recorded the least 4mm. There was significant difference (p<0.05) in the antibacterial effect to bacteria. Therefore, medicated soap should be used only when the skin is infected, as continuous usage may destroy the normal flora of the skin; leaving the skin vulnerable to attack by pathogens.

**Keywords:** Antibacterial activity, Female students, Medicated soaps, Normal flora, Skin infection

**Introduction**

It is known that the human skin is the largest organ in the body. It forms the outer surface of the entire body and acts to keep the internal tissues free from infection. It does this by forming a physically protective water proof layer that blocks the entry of bacteria, viruses, fungi and parasites (Grice et al., 2009). Every person has a different complement of friendly bacteria on their skin surface and there can be as many as 180 different species growing there. These include the friendly species of *Staphylococcus epidermidis, Staphylococcus hominis, Micrococcus luteus, Arcanobacterium haemolyticum* and *Propionbacterium acnes*. Other commensally is part of the Corynebacterium group, the Brevibacterium species and the Dermabacter group (Lambers et al., 2009).

These friendly bacteria species which normally covers the human skin are known as the normal flora of the skin. These normal flora protect the skin by covering all the spaces, preventing other harmful bacteria species from growing on the body. Using of medicated soap impacts the good bacterial species since medicated soap kills both the beneficial and harmful bacteria species. By killing the beneficial ones that keeps the bad bacterial species in check, these soaps ultimately leaves the skin more vulnerable (Grice et al., 2009). Soap plays an important role in removing and killing bacteria. Although fats and oils are general ingredients for soap making, but detergents are added to enhance the antibacterial activities of soaps. According to Roth and James (1988) medicated soaps can remove 65 to 89% bacteria from human skin (Nester et al., 2004). Studies have shown that soaps containing ingredients with antimicrobial activities, remove more bacteria compared to plain soaps (Grice et al., 2009).

In our today society, it is discovered that the use of medicated soap for bathing is widely accepted by individuals of all ages because it is understood as protecting the skin from skin infection and as being helpful in the fight against germs (Bibel, 2003).

The human skin which is part of the human body comes in contact with some microorganisms; some of these microorganisms which are the normal flora of the skin can be eliminated from the skin by continuous use of medicated soaps for the prevention of skin infections. Therefore, the study was done to determine the effect of medicated soaps on bacterial species found on the skin.

**Materials and Methods**

**Specimen Collection**

A total of 50 skin swab specimens were collected from the female students of Madonna University, Elele Rivers State Nigeria. The study was carried out within the period of May to July, 2015. One milliliter of normal saline was dispensed into various
bijou bottles. The specimen was collected by wetting the sterile swab stick with the normal saline and pressed against the wall of the bijou bottle to reduce the excess fluid before swabbing the surface of the patient’s skin and the swab stick placed back into its jacket.

Microbiological analysis

Cultivation of microorganism

The specimens were cultured on Mannitol salt agar, MacConkey agar and Blood agar plates. The agar plates were inverted and incubated at 37°C for 24 hours and were examined for growth. Purification of isolates was done by sub-culturing on Nutrient agar (Cheesbrough, 2003). Pure isolates were characterized using their reactions from Gram staining and biochemical tests.

Antibacterial Susceptibility Test

Preparation of Antibacterial Disk

Disks of 6 mm in diameter were punched off from Whatman’s No 1 filter paper. All disks were collected into a Petri dish and sterilized in hot air oven at 160°C for 1 hour. A sterile blade was used to scrap 1g each of the soaps and was dissolved in 9mls of sterile distilled water to give a stock solution of 10⁻¹. These stock solutions were then stored in a refrigerator in a sealed sterile container prior to use. The discs were then picked and impregnated into the different prepared medicated soap solutions and were carefully removed with forceps afterwards, dried at 28°C and stored in an air-tight container (Talaro and Talaro, 2002; Selvamohan and Sandhya, 2012; Obi, 2014).

The antibacterial susceptibility testing used was the Kirby-Bauer NICCS modified disc diffusion technique; all procedures were done under aseptic technique. MacFarland standard (0.5) was prepared by mixing 1% dilute H₂SO₄ and 1% Barium chloride to give a standard turbidity of about 10⁶ cells. Isolated bacteria were subcultured in normal saline for 3 hours interval to obtain a solution with turbidity equal to 0.5 MacFarland standards (Prescott et al., 2008). Sterile swab stick were used to evenly spread the organism across the Muller Hinton agar plate and allowed to dry. The impregnated disks was carefully picked with sterile forceps and carefully placed on the inoculated Muller Hinton agar plate. The plates were then incubated at 37°C for 24 hours.

The diameters of the zones of inhibition were measured and recorded for the medicated soaps that showed zones of inhibition. The zones of inhibition were measured using a meter rule. All measurements were recorded in millimeters (Prescott et al., 2008).

Statistical Analysis

The results obtained from this study were subjected to Analysis of variance (ANOVA) to determine the significance at 95% interval.

Results

A total of thirty-one (31) isolates were obtained from the fifty (50) specimens collected from the skin of female students of Madonna University. Bacterial species isolated include: Staphylococcus species 17(54.8%), Staphylococcus aureus 7(22.6%), Streptococcus species 4(12.9%) and Bacillus species 3(9.7%)

Table 1 shows the distribution of bacterial isolates from the skin of female students from Madonna University Elele campus by hostel. Coagulase negative Staphylococcus species (CNSS) had the highest occurrence with 17(54.8%) while Bacillus species had the lowest with 3(9.7%).

Table 2 shows the distribution of bacterial isolates from the skin of female students from Madonna University Elele by age. CNSS had the highest percentage occurrence within the age group 22-23 years with 7(22.6%) while Bacillus species had the lowest percentage occurrence with 0(0%) within the age group 20-21 years.

Table 3 shows the Antibacterial zones of inhibition (in millimetres) of the different medicated soaps (Tetmosol, Tura, TCP and Medi-soft soap) on bacterial species isolated from the skin of female students. TCP showed highest antibacterial effect on CNSS, Staphylococcus aureus, Streptococcus species and Bacillus species with 6mm, 3mm, 2mm, and 3mm respectively while Medi-soft showed the least on CNSS, Staphylococcus aureus, Streptococcus spp with 3mm, 1mm and 0mm respectively; Bacillus spp 0(0%) for Medisoft and Tura respectively.
Table 1: Distribution of bacterial isolates from skin of female students by hostels

<table>
<thead>
<tr>
<th>Hostel</th>
<th>No of specimen</th>
<th>CNSS (%)</th>
<th>Staphylococcus aureus (%)</th>
<th>Streptococcus species (%)</th>
<th>Bacillus species (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edeani</td>
<td>10</td>
<td>4(12.9)</td>
<td>2(6.5)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>6(19.4)</td>
</tr>
<tr>
<td>Madonna</td>
<td>10</td>
<td>3(9.6)</td>
<td>2(6.5)</td>
<td>0(0)</td>
<td>1(3.2)</td>
<td>6(19.4)</td>
</tr>
<tr>
<td>St.Anthony</td>
<td>10</td>
<td>2(6.5)</td>
<td>1(3.2)</td>
<td>1(3.2)</td>
<td>0(0)</td>
<td>4(12.9)</td>
</tr>
<tr>
<td>St.Barnabas</td>
<td>10</td>
<td>4(12.9)</td>
<td>0(0)</td>
<td>1(3.2)</td>
<td>2(6.5)</td>
<td>7(22.6)</td>
</tr>
<tr>
<td>St. Mary</td>
<td>10</td>
<td>4(12.9)</td>
<td>2(6.5)</td>
<td>2(6.5)</td>
<td>0(0)</td>
<td>8(25.8)</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>17(54.8)</td>
<td>7(22.6)</td>
<td>4(12.9)</td>
<td>3(9.6)</td>
<td>31(100)</td>
</tr>
</tbody>
</table>

Key: CNSS- Coagulase negative staphylococcus species

Table 2: Distribution of bacterial isolates from skin of female students by age.

<table>
<thead>
<tr>
<th>Age interval (Years)</th>
<th>No of specimen</th>
<th>CNSS (%)</th>
<th>Staphylococcus aureus (%)</th>
<th>Streptococcus species (%)</th>
<th>Bacillus species (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-19</td>
<td>6</td>
<td>3(9.6)</td>
<td>1(3.2)</td>
<td>1(3.2)</td>
<td>0(0)</td>
<td>6(19.4)</td>
</tr>
<tr>
<td>20-21</td>
<td>13</td>
<td>4(12.9)</td>
<td>3(9.6)</td>
<td>3(3.2)</td>
<td>0(0)</td>
<td>9(29.0)</td>
</tr>
<tr>
<td>22-23</td>
<td>22</td>
<td>7(22.6)</td>
<td>2(6.5)</td>
<td>1(3.2)</td>
<td>1(3.2)</td>
<td>11(35.4)</td>
</tr>
<tr>
<td>24-25</td>
<td>9</td>
<td>3(9.6)</td>
<td>1(3.2)</td>
<td>1(3.2)</td>
<td>1(3.2)</td>
<td>5(16.1)</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>17(54.8)</td>
<td>7(22.6)</td>
<td>4(12.9)</td>
<td>3(9.6)</td>
<td>31(100)</td>
</tr>
</tbody>
</table>

Key: CNSS- Coagulase negative staphylococcus species

Table 3: Antibacterial zones of inhibition of medicated soaps on bacterial isolates from the skin of female students (mm)

<table>
<thead>
<tr>
<th>Organism</th>
<th>Tura</th>
<th>Tetmosol</th>
<th>TCP</th>
<th>Medi-soft</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNSS</td>
<td>4mm</td>
<td>4mm</td>
<td>6mm</td>
<td>3mm</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>1mm</td>
<td>2mm</td>
<td>3mm</td>
<td>1mm</td>
</tr>
<tr>
<td>Streptococcus species</td>
<td>1mm</td>
<td>1mm</td>
<td>2mm</td>
<td>0mm</td>
</tr>
<tr>
<td>Bacillus Species</td>
<td>0mm</td>
<td>1mm</td>
<td>3mm</td>
<td>0mm</td>
</tr>
</tbody>
</table>

Key: CNSS- Coagulate negative staphylococcus species

Discussion

Soaps are generally used for the removal of germs and for cleaning purposes (Grice et al., 2009). Antibacterial soaps have long been favored by consumers as the result of marketing. The study showed medicated soaps were effective against all the Gram positive bacteria identified; Coagulase negative staphylococcus species, Staphylococcus aureus, Streptococcus species and Bacillus species. The inhibition of the growth pattern of the different isolates indicates the varying abilities of the organism to resist the antimicrobial effect of the soaps; these could be due to differences in the nature and structures of the bacterial cell wall which is the main target of any antimicrobial agent (Obi, 2014).

This study revealed Coagulase negative staphylococcus species which may be other species of Staphylococcus and Staphylococcus aureus to be the highest occurring bacteria and shows to be more sensitive to TCP as seen in a study work done by Obi, 2014; who reported that Staphylococcus aureus was more sensitive to antibacterial soap. Therefore, with the use of antibacterial soap can function as removal as well as killing of bacteria indicating they have bacteriostatic activity and can inhibit the growth of bacteria.

The antibacterial soap (TCP) was the most effective to the isolates, but this does not mean other antibacterial soaps are not effective. This may be due to differences in their active antibacterial components and type of formulations used (Nwambete and Lyombe, 2011). It could also be as a result of different species of microorganisms being harboured on the skin of individuals as microorganisms differ in their nutritional requirements and level of susceptibility to antimicrobial agents; and no soap contains the required ingredient that suits all individual skin (Ikpoh et al., 2012).

Most of the medicated soaps used, have shown satisfactory effect and also their antibacterial activity. However, this reveals that manufacturers of these medicated soaps do actually incorporate those active ingredients that posses antibacterial activity as seen in the labels.

Conclusion

This research work showed differences in the level of effectiveness of the medicated soaps used on the bacteria isolated from the skin, and had showed that medicated soap is an antibacterial agent of the skin. TCP medicated soap was more effective than the others hence; it can be used to prevent bacterial infections. Further investigation should be done on more effectiveness and antibacterial effect of medicated soaps. Medicated soap should be used only when the skin is infected, continuous use of antiseptic soap is not advised because it can eliminate both beneficial and harmful bacteria leaving the skin more vulnerable to pathogenic microorganism and could develop bacterial resistance.

References


