Evaluation of the Diversity Bacterial in wounds of Burn patients Hospitalized in Major Hospitals in Aba, Abia State, Nigeria

Abstract

Globally, burn injuries are common major health problems. Infection of burn injuries is a common complication as well as a major cause of death in burn patients. The aim of this research work was to evaluate the diversity of bacterial population in burn wound of patients hospitalized in major hospitals within Aba metropolis. The health facility from which wound swap samples were generated were randomly selected by simple random sampling technique. Sterile wound swabs were collected with swab sticks from burns on patients hospitalized in the facilities for analysis, after which wound swabs were cultured at room at 36^{o}c. Examination of the swaps which was performed using standard procedures revealed the presence of Klebsiella, *E.coli*, pseudomonas, and *Styphylococus aureus*, at the composition of 10.8%, 20.2%, 25.9% and 43.1% respectively. In conclusion, the study revealed that burn wound on patients within Aba metropolis were predominantly infected by *Styphylococus aureus.*

Keywords: Burn injuries, Aba, Patients, *Styphylococus aureus*

Introduction

Burn injuries have been identified as an outstanding health concern globally. An estimated 1% of the world population is affected by severe burn injury during their life [1]. It is responsible for about 1% of the total diseases that seeks hospital attention which translates to substantial health care expenditure [2]. Research has shown that more than 95% of burn injuries occur in developing countries and has been linked to significant morbidity, disability and mortality [3].

Infection of burn injuries is a common complication and a notable cause of death in burn patients [4]. Over 70% of deaths occur in burn patients owing to infection in the absence of adequate care and treatments. Patients with thermal injury require immediate and specialized care in order to minimize morbidity and mortality [5].

Wound infection is the primary reason for delayed healing. However, it is worthy to note that wound infection is initiated by particular bacteria at a certain critical level [6]. Therefore, an in depth knowledge of the bacterial composition of would could serve as an effective treatment guide.

METHODLOGY

Selection of Facility of Interest

Hospitals that participated in this study were randomly selected using random sampling technique and were all situated within Aba metropolis.

Consent

Informed consent was sought and obtained from the management of the selected hospitals.

Sample Collection and Isolation of Bacteria

Two hundred and fifty (250) wound swab samples were obtained from patients with burn injuries hospitalized across all major hospitals in Aba metropolis. Wound bed was prepared prior to collection of sample according to Levine's technique, where the wound surface exudates and contaminants were cleaned off with a moistened sterile gauze and sterile normal saline solution. The swab stick was rotated over 1 cm^2 area for 5 seconds with enough pressure to express fluid and bacteria to surface from within the wound tissue [7]. The wound swab samples were preserved in 0.5 ml sterile normal saline solution.

Microbiological Analysis

To culture, the wound swab were plated onto 5% Blood agar, Chocolate agar and MacConkey agar plates and incubated under aerobic condition at 37˚C for 24 hours. Suspected colonies were subcultured further to acquire discrete colonies. Preliminary test conducted was gram staining. Pure culture was isolated and identified based on morphological appearance on enriched (Blood agar) and differential media (MacConkey agar), motility, Gram stain reaction and reaction to biochemical tests which include phenylalanine deaminase, urease, hydrogen sulphite production,

indole, methyl red, vogesproskauer, citrate, maltose fermentation and ornithine decarboxylase test[8][9].

RESULT

Table 1: Bacterial Diversity in wounds of Burn Patients in Aba Major Hospitals

Organism	Frequency	Percentages (%)
Klebsiella	14	10.8%
E. Coli	30	20.2%
Pseudomonas	36	25.9%
Staphylococus aureus	60	43.1%

DISCUSSION

The presence of bacteria in wounds does not necessarily indicate an infection as wound can still heal in the presence of bacteria [6]. However, when the density of certain species such as *Staphylococcus aureus* or hemolytic streptococci in a wound exceeds critical level, clinical infection which adversely affects wound healing results [9]. Many factors affect the progress of microorganisms in a wound from colonization to infection [10] one of such being the organism type and density [11]. Table 1 shows the bacterial diversity and their percentage composition in wounds of burn patients in major hospitals within Aba metropolis indicating the presence of Klebsiella, *E. Coli,* Pseudomonas, *Staphylococus aureus*. This result is consistent with the finding of Sani et al. [12] who reported *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Klebsiella neumonia, Streptococcus pyogenes* etc to be the common bacterial pathogens associated with wound infection. The result also showed that the percentage composition of *S. aureus* was more than other bacteria reportedly present. These organisms exhibit natural resistance to many antibiotics and antiseptics and may even multiply in the presence of minimal nutrients and have demonstrated ability to colonize traumatized skin [13].

CONCLUSION

The bacterial diversity reportedly present in wound swap generated from major hospitals with Aba metropolis was not too different from what other research had previously reported. However, the percentage composition of *S. aureus isolated from patients' wound* was more than other bacteria reportedly present.

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