Journal of Biomedical Investigation, 2010;8(1): 1 - 4

Original Article

SURVEY OF COMMON AEROBIC BACTERIA ASSOCIATED WITH WOUND INFECTIONS AMONG PATIENTS IN NNAMDI AZIKIWE UNIVERSITY TEACHING HOSPITAL (NAUTH), NNEWI, ANAMBRA STATE

Akujobi C. N., Nlemadim I. E., Ofodeme C. N. and Chukwuma G. O.
Department of Medical Microbiology/Parasitology, Nnamdi Azikiwe University Teaching Hospital, Nnewi

ABSTRACT

The aerobic organisms associated with wound infections in Nnamdi Azikiwe University Teaching Hospital, Nnewi were ascertained. Two hundred wound swab samples from patients suspected to have wound infection were obtained. These samples were processed immediately in the microbiology laboratory using Blood, MacConkey and Nutrient agar plates. The result showed that 188 (94%) of the samples yielded growth and 12 (6%) yielded no growth. Of these, 146 (77.7%) were single microbial infections while 42 (22.3)% were due to poly microbial infections. The organisms isolated in order of frequency were: *Staphylococcus aureus* 75 (32.5%), *Escherichia coli* 60 (26%), *Pseudomonas aeruginosa* 49 (21.2%), *Proteus spp* 19 (8.2%) and *Streptococcus spp* 3 (1.3%). The infection rate was least in children 0-1year. This could probably be due to the high level of hygiene observed by the mothers as well as the high circulating antibodies. Broadly speaking, the prevalence of wound infection can be reduced drastically if aseptic procedures are observed especially hand washing and sterilization as well as routine screening of healthcare providers for carriage of *Staphylococcus aureus* and those found to be carriers could be removed from the clinics/wards and relocated to offices where they would not be in contact with patients until properly treated.

Key Words: *Honey, Eusol, Cutaneous, Ulcer, Management.*

INTRODUCTION

A wound is a breach in the skin, and exposure of subcutaneous tissue following loss of skin integrity. This provides a moist, warm, nutritive environment conducive to microbial colonization and proliferation. The outcome depends on the interaction of complex host and microbial factors[1].
It is of great importance to note that the sources of micro organisms that infect wounds vary. They could come from the air, soil, water, host's body flora and hands of other patients, doctors, nurses and attendants in the ward (nosocomial infections).

When a wound becomes infected, it develops some characteristics like foul smell, discharge of pus, tenderness and pain. Wound healing is delayed and when it finally heals, it does so with secondary intention. The patient's stay in the hospital is delayed and in some unfortunate instances, the patient may die. It is therefore, pertinent to avoid wound infection through the use of proper infection control procedures.
Furthermore, the management of wound infection has become challenging to health practitioners, not only in terms of financial burden on patients but also due to the increasing antimicrobial resistance as a result of misuse of antimicrobials[2].

A number of micro-organisms have been associated with wound infection of which *Staphylococcus aureus* is the most common[2,3]. Other organisms include: *Escherichia coli, Pseudomonas aeruginosa, Staphylococcus epidermidis*[4, 5, 6]. The type of wound, location, patient's immune status as well as other host and bacterial factors determine the outcome of wounds. Adebayo *et al*[5] conducted a study in Ile Ife, Nigeria where it was observed that out of 102 patients seen, 41 (40%) had wound infection as a result of trauma to the extremities. There is paucity of information on the aerobic bacteria associated with wound infection in Anambra State so the study was designed to ascertain that.

MATERIALS AND METHOD

The study was conducted at Nnamdi Azikiwe University Teaching Hospital, Nnewi, South Eastern Nigeria. This is a tertiary institution that serves the needs of patients from several states including Anambra, Imo, Enugu and Abia.

For Correspondence: *Akujobi C. N., E-mail: adakujobi@yahoo.com*

SPECIMEN COLLECTION

Samples were collected from patients suspected to have wound infection, from different wards in the hospital. Before sample collection, the wound site was cleaned with sterile normal saline, and then a deep swab was taken at the base of the ulcer/wound.

METHODOLOGY

The specimens were taken to the Medical Microbiology Laboratory and processed immediately. They were inoculated onto freshly prepared agar plates (Blood, MacConkey and Nutrient). These were incubated aerobically at 37^{0}C overnight. Isolates were identified from pure cultures.

RESULTS

The survey of common aerobic bacteria associated with wound infections among patients in NAUTH was done. A total of 200 patients suspected to have wound infections were used in the study. The analysis of organisms isolated showed that *Staphylococcus aureus* was the most common at 75 (37.5%), with *Streptococcus spp* being the least at 3(1.5%) as in Table 1.

The types of wounds and the organisms isolated from them are shown in Table 2 with surgical incision wound infection being the highest (44).

DISCUSSION

The survey of the common aerobic bacteria associated with wound infection in Nnamdi Azikiwe University Teaching Hospital showed that out of 200 samples from suspected infected wounds, 42 (22.3%) had polybacteria infection. It was observed that *Staphylococcus aureus* had the highest frequency of 75 (32.5%). *Escherichia coli* was next with 60 (26%), then *Pseudomonas aeruginosa* 49 (21.2%). This agrees with the study by some researchers [2,3,7,8] and could be due to nasal carriage of the organism by patients, medical officers and other health workers; this could result in nosocomial infections. The result however, is at variance with that of Oguachuba[9] who reported *Proteus* species as the most common isolate from wounds.

The high incidence of *Pseudomonas* in wounds could be attributed to the opportunistic nature of the organism. It has the tendency to cause infection in debilitated patients who have chronic wounds and burns [6,10].

It is not surprising that children 0-1 year recorded very low number of bacteria isolates- 3 (1.3%) with *Staphylococcus* being the most frequent, followed by *E. coli* with 1 (0.4%). This is due to the good sanitary care given to the children at this age, coupled with the high levels of maternal antibodies.

From the study, it can be concluded that *Staphylococcus aureus, Escherichia coli* and *Pseudomonas aeruginosa* were the most common aerobic bacteria associated with wound infection in Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State.

RECOMMENDATIONS

The prevalence of wound infection can be reduced drastically if proper aseptic procedures are observed, especially hand washing and sterilization. Routine screening of healthcare providers for carriage of *Staphylococcus aureus* is advocated. Persons found to be carriers could be removed from the clinics/wards, and relocated to offices, in order to reduce their contact with patients until the carriers are treated.

REFERENCES

1. Bowler PG, Ducrden B L, Armstrong DG. Wound Microbiology and Associated Approaches to Wound Management. Clin Microbiol Rev. 2001;**14:** 244-69.
2. Giacometti A, Cirioni O, Schimizzi A.M, Del Prete M.S, Barchiesi F.D, Errico M.M. Patrelli E. and Scalise G. Epidermiology and Microbiology of Surgical Wound Infections. J of Clinical Microbiology. 2000. **38**:918-24.
3. Emele F.E, Izomoh M.I, and Alufohai E. Microorganisms Associated with Wound Infections in Ekpoma, Nigeria. West Afr. J. med. 1999. **18** (2): 97-100.
4. Gorecki P, Schein M, Rucinski J.C, and Wise L. Antibiotic Administration in Patients undergoing Common Surgical Procedures in a Community Teaching Hospital. The Chaos continues. World J. Surg.1999. **23**: 429-32.
5. Adebayo O.S, Deboye O.K, and Emiola A.R.O. Wound Infection in Two Health Institutions in Ile- Ife, Nigeria: A cohort study. Biomedical letters. 2003: 52-57.
6. Agnihotrin N, Gupta V. and Joshi R.M. Aerobic Bacteria Isolates from Burn Wound

Infections and their Antibiograms: A five year study. J. Burns. 2004. 241-43.
7. Kluytmans J, Van Belkum A, and Verburgh H.A. Nasal Carriage of Staphylococcus aureus: Epidermiology Underlying Mechanisms and Associated Risks. Clin. Microbiol Rev. 1997. **10**. 505-20.
8. Mahdi S.E, Ahmed A.O and Boelens H. An Epidemiological Study of the Occurrence of Staphylococcus Aureus in Superficial Abscesses of Patients Presenting for Surgery in a Teaching Hospital in Khartoum, Sudan. FEMMS Immunol Med Microbiol. 2000.**29**:155-62.
9. Oguachuba Hubert N. Wound Infection in the Orthopaedic Traumatological, Department of Orthopaedic and Traumatological Surgery, University of Jos Teaching Hospital. Nig Med. Journal. 1987. 147-51.
10. White R.J, Cooper R, and Kingsley A. Wound Colonization and Infection: the role of tropical antimicrobials. Br J Nurs. 2001. **10**: 563-78.
11. Cruickshank R, Duguid J.P, Marimor B.P and Swaim R.H.A. The Practice of Medical Microbiology. **2**: 444-48.

Table 1: *Frequency of bacterial isolates.*

Organism	Number isolated	Percentage %
Staphylococcus aureus	75	37.5
Escherichia coli	60	30
Pseudomonas aeruginosa	49	24.5
Klebsiella spp	25	14
Proteus	19	9.5
Streptococcus	3	1.5

Table 2: *Organisms isolated from various Clinical Specimens.*

Wound	Staph aureus	E. Coli	Pseudo.	Klebsiella spp	Proteus	Strept. Spp	No growth	Total with growth
Surgical Incision	9	20	7	6	1	1	2	44
Ulcers/Blisters	12	8	6	5	4	1	2	36
Burns	3	-	5	-	3	-	-	11
Fracture/Amputation	7	7	7	5	-	-	-	26
Osteomyelitis	4	2	3	2	4	-	-	15
Bruise	2	4	2	3	-	-	3	11
Cut/Laceration	5	3	4	-	-	-	1	13
Bites/Scratches	2	2	4	-	-	-	-	8
Gunshot/Stab	6	2	-	2	-	-	1	10
Hepatosplenomyopathy/ Lymphoadenoma	2	-	-	1	-	-	-	3
Gangrene	1	-	-	-	-	-	-	1
Others	22	12	11	1	7	1	-	53
Total	75	60	49	25	19	3	9	231

Table 3: Organisms isolated from patients of various ages.

Age group (years)	S. Aureus	E. Coli	P. Aeruginosa	Klebsiella	Proteus	Strept. Spp	Total	%
0 - 1	2	1	-	-	-	-	3	1.3
2 - 12	8	4	8	1	4	1	26	11.3
13 - 18	4	3	2	1	-	-	10	4.3
>18	61	52	39	23	15	2	192	83.1
Total	75	60	49	25	19	3	231	100