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A Survey of Antibiotic Resistant *Staphylococcus Aureus* Strains from Clinical Sources in Owerri

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ABSTRACT: A survey of antibiotic resistant Staphylococcus aureus strains from clinical specimens was carried out. A total of 100 different clinical specimens were investigated with a yield of 48 Staphylococcus aureus isolates. A high resistance of 95.8% to penicillin, 89.6% to ampicillin, 87.5% to tetracycline, and 75.0% to chloramphenicol by Staphylococcus aureus strains were recorded. A high susceptibility of 91.7% to gentamicin and 85.4% to cloxacillin were also record. The high percentage resistance to the antibiotics studied could be attributed to their prevailing usage and abuse in the area under study. The implication of the high percentage recorded for the antibiotics is that Staphylococcus aureus infections could be effectively treated with gentamicin and cloxacillin and not with penicillin, ampicillin, tetracycline, and chloramphenicol in the area under study.@ JASEM

Drug resistance in microorganisms is a predictable and perhaps inescapable response to the use of antimicrobial agent. It can arise from the selection of resistant strains among naturally susceptible species or from the ingress of new strains of naturally resistant species. The extent of use of particular agents in a given environment dictates the rate at which resistance arises among microbial populations (Kunin, *et al,*1990). Some organisms rapidly acquire resistance e.g. coliforms and *Staphylococcus aureus*, while others rarely do so e.g. *Streptococcus pyogenes* (Sleigh and Timbury, 1986). The emergence of drug-resistant bacteria is a major problem in antibiotic therapy.

Staphylococcus aureus has been recognized historically as a virulent and important human pathogen. Its capacity to produce human disease has not diminished with the introduction of antibiotics (Waldvogel, 1990). It is still one of the most frequently encountered single bacterial species in hospitals and continues to be a frequent cause of burns and wound sepsis (Emmerson, 1994). It produces pustules, carbuncles, boils, and impetigo; it is also a frequent cause of septicaemia, osteomyelitis, bacteraemia, and otitis (Emmerson, 1994; Shaposhnikova, *et al,* 1995). *Staphylococcus aureus* is a very common cause of infection in hospitals and is most liable to infect new born babies, surgical patients, old and malnourished persons and patients with diabetes and other chronic diseases (Tuo, *et al,* 1995).

Development of resistance to antimicrbial agents by staphylococci is a major concern primarily because they are still frequently associated with hospital and community – acquired infections (Locksley, *et al*, 1982). The organisms exhibit remarkable versatility in their behaviour towards antibiotics (Grassi, 1988), with some strains having overcome most commonly used drugs. Exposure to new antibiotics often results in further selection of homologous resistant strains (Haley, *et al*, 1982), a phenomenon particularly favoured by irrational antibiotic administration. Infection with such resistant strains is likely to be more severe and require longer hospitalization with incumbent increased costs, than infection with susceptible strains (Baron, 1992). The present study was designed to investigate the incidence of antibiotic resistant *Staphylococcus aureus* strains from clinical sources in Owerri.

MATERIALS AND METHODS

Forty-eight strains of *Staphylococcus aureus* were isolated from clinical sources. The specimens were obtained from different patients under medical attention in specialist and private hospitals in Owerri, lmo State, Nigeria. The specimens obtained were wound swabs, nasal swabs, high vaginal swabs and urine samples. The specimens were collected as described by Cheesbrough (1984).

The samples were streaked on mannitol salt agar (MSA) and blood agar (BA) plates. The plates were all incubated at 37^{o}C for 24 hours, after which the cultural and morphological characteristics of the isolates were studied. Identification of isolates was by standard microbiological methods as described by Cheesbrough (1984) and Cowan (1993).

The antimicrobial sensitivity testing was carried out by disc agar diffusion technique (Rapheal, et al, 1983) using Mueller-Hinton agar plates. The discs

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used contained the following antibiotics: Ampicillin (10mcg), Chloramphenicol (30 mcg), Cloxacillin (mcg), erythromycin (10 mcg), gentamicin (10mcg), penicillin (10U), tetracycline (30mcg), streptomycin (10mcg).

RESULTS AND DISCUSSION

100 clinical specimens were investigated for the presence of *Staphylococcus aureus* (Table 1). The frequency of isolation of *Staphylococcus aureus* from the different specimens analyzed is given in table 1; a total of 48 isolates of *Staphylococcus aureus were* isolated. The isolates were most sensitive to gentamicin (91.7%), cloxacillin (85.4%) and most resistant to penicillin (95.8%) and ampicillin (89.6%), (Table 2). The capacity of *Staphylococcus aureus* to produce human diseases has not diminished with the introduction of antibiotics (Waldvogel, 1990). The organisms exhibit remarkable versatility in their behaviour towards antibiotics (Grassi, 1988), with some strains having overcome most commonly used drugs. In this study, a high sensitivity percentage to gentamicin (91.7%), Cloxacillin (85.4%) was recorded. Also most of the strains of *Staphylococcus aureus* were sensitive to erythromycin (66.7%) and streptomycin (66.7%). This finding shows that staphylococcal infections could be treated with gentamicin, cloxacillin, erythromycin and streptomycin and corroborates that of Oyagade and Oguntoyinbo (1997) and Uba and Umar (2002). A percentage sensitivity of 4.2%, 10.4%, 12.5% and 25% were recorded against penicillin, ampicillin, tetracycline and chloramphenicol respectively in this study. Oyagade and Oguntoyinbo (1997) found a 2%, 22%, 32% and 58% sensitivity to penicillin, ampicillin, tetracycline and chloramphenicol respectively which were also relatively low (although higher than our findings). Iroegbu, *et al*, (1997) in their study showed a sensitivity of 43.3%, 58.6%. 41.4% and 30.9% to penicillin, ampicillin, tetracycline and chloramphenicol respectively by their *Staphylococcus aureus* strains. The variation found in the sensitivity pattern to these commonly used drugs could be attributed to the prevailing usage and abuse of the drugs in the areas under study. The high rate of resistance to these commonly used drugs contrast with the high sensitivity to gentamicin and cloxacillin, which are less frequently used. This further suggests a relationship between antibiotic usage and the level of drug resistance encountered in this study. The judicious use of antibiotics by health workers and efforts to control procurement and use of antibiotics officially in the locality will probably help to limit the increasing rate of drug resistance in pathogens. It is the recommendation of this study that constant evaluation of the antibiotic sensitivity pattern of pathogens for commonly used antimicrobial agents in a particular environment be carried out.

Table 1. Frequency of *Staphylococcus aureus* from different clinical specimens

Specimen	Number examined	Number isolated (% occurrence)
Wound	16	5 (10.4)
Nasal	29	16(33.3)
High vaginal	44	20 (41.7)
Urine	11	7(14.6)
Total	100	48

Table 2: Sensitivity pattern of *Staphylococcus aureus* from clinical specimens

Isolates	No. of isolates	PN	CHI	CLX	E	GM	PEN	TE
Staph. aureus	48	5(10.4)	12(25)	41(85.4)	32(66.7)	44(91.7)	2(4.2)	6(12.5)

Key: Ampicillin = PN, Chloramphenicol = CHL, Cloxacillin = CLX, Erythromycin = E, Gentamicin = GM, Penicillin = PEN, Tetracycline = TE, Streptomycin = S.

REFERENCE

Baron, E J. (1992). The detection, significance and rationale for control of methicillin –resistant *Staphylococcus aureus. Clinical Microbiology News letter*. 14:129.

Cheesbrough, M. (1984). Medical Laboratory Manual for Tropical Countries. Vol 2: Microbiology. Tropical Health Technology/Butter- worth and Co. Ltd. Cambridgeshire/Kent.

Cowan, S T. (1993). Cowan and Steel's manual for the identification of medical bacteria. Cambridge University Press London.

Emmerson, M. (1994). Nosocomial staphylococcal outbreak. Scandinavian *Journal of lnfectious Diseases. Suppl.* 93:47-54.

Grassi, G G. (1988). Infections by Gram – positive bacteria: an overview. *Journal of antimicrobials and Chemotheraphy*. 21 (Suppl. C): 1-7.

Haley, R N, Hightower, A W, Khabbaz, R F, Thornsberry, C, Martone, W J, Allen, J R, Hughes, J M. (1982). The emergence of methicillin – resistant *Staphylococcus aureus* infections in United State hospitals: possible role of the house-staff-patient transfer circuit. *Annals of internal Medicine* 97: 297 – 308.

Iroegbu, C U, Ejimofor, O D, Okpala, C N, Otti, N, Owuna, R. (1997) *Staphylococcus aureus* surveillance in Nsukka, Nigeria: II. Antibiotic sensitivity pattern of nasal isolates. *Nigerian Journal of Microbiology*. 11:15-19.

Kunin, C M, Johansen, K S, Worning, A M, Daschner, F O. (1990). Report of a symposium on use and abuse of antibiotics worldwide. *Review of Infectious Diseases.* 12:12 – 19.
1510.

Locksley, R M, Cohen, M I, Quinn, T C, Tompkins, L S, Coyle, M B, Kirihara, J M, Counts.(1982). Multiple antibiotic resistant *Staphylococcus aureus:* Introduction, transmission and evolution of nosocomial infection. *Annals of internal medicine* 9:317 – 324.

Oyagade, J O, and Oguntoyinbo, F A. (1997). Incidence of antibiotic resistant *Staphylococcus aureus* strains among isolates from environmental and clinical sources. *Nigerian Journal of Microbiology*, 11 : 20 – 24.

Shaposhnikova, I. U G, Arutcheva, A A, Okropiridze, G G, (1995) Nosocomial infections in presentdaytraumatological or thopaedic hospitals. *Vestn. Ross. Akad. Med. Nauk.* 6 : 42 – 45.

Sleigh, J D, and Timbury, M C. (1986). Notes on Medical Bacteriology. 2nd edn. Churchill livingstone. Edinburgh. p 337

Tuo, P, Montobbio, G, Vallarino, R, Tumolo, M, Calero, M G, Massone, M A. (1995). Nosocomial staphylococci in a neonatal and pediatric intensive care unit. *Pediatric Med. Chir*. 17 (2) : 117 – 122.

Uba, A, and Umar, U. (2002) Incidence and the antibiotic susceptibility pattern of *Staphylococcus* species from clinical specimens in Bauchi, Nigeria. Book of Abstracts, 26th Annual Conference of Nigerian Society for Microbiology, University of Uyo, Akwa lbom State, Nigeria.

Waldvogel, F A. (1990). *Staphylococcus aureus* (including toxic shock syndrome). In : principles and practice of infectious disease. Mandell, G L, Douglas R G Jr. and Benneth, J E. (eds). 3rd edn. Churchill Livingstone, New York. pp 1489–