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Full Length Research Paper

Prevalence and antibiotic susceptibility pattern of *Staphylococcus aureus* from clinical isolates grown at 37 and 44°C from Irrua, Nigeria

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A survey of the antibiotic susceptibility pattern of *Staphylococcus aureus* strains from clinical and skin isolates grown at 37 and 44°C respectively were carried out in Irrua Nigeria. Of the 240 different specimens, 50(20.8%) *S. aureus* isolates were reported. The highest carrier rate of *S. aureus* (48%) occurred in wound swab while the least (8.0%) was reported on the healthy skin of the volunteers. The susceptibility of the clinical isolates (10.4%) was lower than the isolates from the skin (36.7%) of the volunteers. This difference is statistically not significant (t = 2.087, P <0.075). The isolates were susceptible to gentamycin (50.0%) erythromycin (40.0%) and streptomycin (30.0%). The *S. aureus* isolated was resistant to cloxacillin, penicillin, ampicillin and tetracycline. In our studied area *S. aureus* could be effectively treated by gentamycin, erythromycin and streptomycin. The implication of resistance of the isolates to penicillin, ampicillin and the common antibiotics such as ampicillin are also highlighted.

Key words: Prevalence, Antibiotic susceptibility, *Staphylococcus aureus*, Clinical isolates, skin isolates, Nigeria.

INTRODUCTION

Staphylococcus aureus has been recognized as a very important virulent and frequently encountered pathogen in clinical practice. It is an endogenous microorganism colonizing the nasal cavity, skin, gastrointestinal, anus and vaginal vulvae of healthy women (Onanuga et al., 2005). The capacity to produce human diseases had not diminished even with the introduction of antibiotics (Waldvogel, 1990).

S. aureus has been associated with different clinical conditions. For instance, it is still one of the most frequently encountered single bacterial species in hospitals and continues to be frequent cause of burns and wounds sepsis. It produces pustules, carbuncles, boils and impetigo. It frequently causes septicaemia, osteomyelitis, bacteraemia and otitis (Emmerson, 1994; Shaposhnikbova et al., 1995). *S. aureus* exhibits remarkable versatility in their behaviour towards antibiotics (Grassi, 1988). Therefore, the insight into the antibiotic susceptiblity of clinical isolates profile in any community is very imperative and desirable for effective management of the clinical conditions considering the relative differences in the pattern of susceptibility and resistance of *S aureus* to antibiotics from one locality to another. Also the susceptibility and resistance of *S. aureus* to antibiotics is known to be altered at relatively higher temperatures. For instance, May et al. (1964) observed that clinical isolates of *S. aureus* which was resistant to streptomycin at 37°C became sensitive when cultured at 44°C.

S. aureus had been isolated from several clinical specimens from different part of Nigeria (Chigbu and Ezeronye, 2003; Ehinmidu, 2003; Olukoya et al., 1995; Odunsanya, 2002; Kolawole et al., 2005). This communication is therefore designed to investigate the antibiotics susceptible to *S. aureus* strains and enrich the existing information from clinical sources at two different temperatures at Irrua, Nigeria.

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Table 1. Isolation rate of *Staphylococcus aureus* from samples.

Specimen	Total number of samples examined	Samples that yielded *Staphylococcus* growth
Wound swab	25	12 (48.0%)
Urine	20	8 (40.0%)
High vaginal swab	15	5 (33.3%)
Skin surface swab	100	(8.0%)
Nostril	80	(8.8%)
Total	240	50 (20.8%)

Table 2. Susceptibility of *Staphylococcus aureus* isolates to various antibioticsat 37°C.

Antibiotics	Clinical Isolates	Skin Isolates
	Susceptible isolates (%)	Susceptible isolates (%)
Cloxacillin	0	0
Chloramphenicol	8	20
Erythromycin	12	0
Gentamycin	28	80
Penicillin	0	0
Streptomycin	0	53.3
Ampicillin	0	0
Tetracycline	0	0

MATERIALS AND METHODS

Between December 2005 and November 2006, samples were obtained from skin, nostrils, wounds and urethra of patients who attended the Out Patient Department of Irrua Specialist Teaching Hospital, Irrua, Nigeria. Ethical permission was obtained from the hospital. The objectives as well as the nature of the study were explained to the patients for purpose of their consent. The volunteers with informed consent were recruited for this investigation.

Isolation of *Staphylococcus aureus*

All samples were cultured on sterile blood agar and manitol salt agar and incubated at 37 and 44°C for 24 h using standard microbiological techniques (Cheesbrough, 2006).

Antibiotic susceptibility testing

The antibiotics susceptibility tests were carried out using the Mueller-Hinton agar.

Statistical analysis

The data obtained in this investigation were subjected to statistical analysis using GrapPad Instat tm (GraphPad Software V.2.04 9330465) and Microsoft Excel package.

RESULT

Table 1 showed the rate of isolation of *S. aureus* from both the various clinical healthy skin sources. Of the 240 samples examined 50 (20.8%) showed positivity for *S. aureus* colonization and/or infection. The carrier rates of the samples in our study area are wound (48%), urine (40%), high vaginal swab (33.3%), nose swab (8.8%), and skin (8.0%).

The susceptibility of *S. aureus* isolates to various antibiotics at 37°C is presented in Table 2. The highest susceptibility (80%) occurred in the skin isolates with gentamycin while the least (0%) occurred with clinical isolates with penicillin, streptomycin, ampillicin and tetracycline. Also this lowest susceptibility occurred in skin isolates with cloxacillin, ampillicin and tetracycline. The difference in the pattern of susceptibility of the clinical and skin isolates was statistically not significant at ($t = 0.06$, $p < 0.05$).

Table 3 showed the susceptibility patterns of various antibiotics to the clinical and skin isolates of *S. aureus* at 44°C. The susceptibility of gentamycin to skin isolates was the highest (86.7%). The least susceptibility occurred in both clinical and skin isolates with penicillin. This least pattern of susceptibility was observed in cloxacillin and ampicillin with skin isolates only. The difference in the pattern of susceptibility of clinical and skin isolates to various antibiotics at 44°C was not statistically significant ($t = 0.23$, $p < 0.05$).

The mean susceptibility pattern of *S. aureus* for which clinical and skin isolates at 37 and 44°C with the various antibiotics are presented in Figure 1. The highest peak occurred in both skin and clinical isolates with Gentamy-

Table 3. Susceptibility of *Staphylococcus aureus* isolates to various antibiotics at 44°C.

Antibiotics	Clinical Isolates	Skin Isolates
	Susceptible isolates (%)	Susceptible isolates (%)
Cloxacillin	4	0
Chloramphenicol	16	40
Erythromycin	32	80
Gentamycin	32	86.7
Penicillin	0	0
Streptomycin	24	66.7
Ampicillin	4	0
Tetracycline	4	6.7

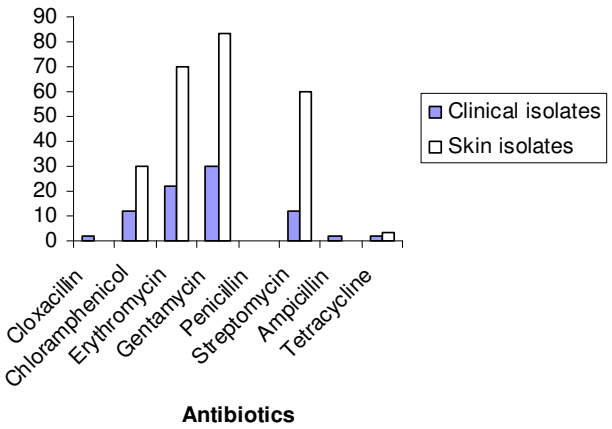

Figure 1. Mean susceptibility of *Staphylococcus aureus* isolates to antibiotics at 37 and 44°C.

cin while the least was observed with penicillin. Also this least pattern of susceptibility occurred in skin isolates with cloxacillin and Ampicillin. The difference in pattern of susceptibilities of the *S. aureus* from the clinical and skin isolates to the various antibiotics at both 37 and 44°C was statistically not significant ($t = 2.087$ $P < 0.075$). The differences in the pattern of susceptibility in the clini-cal isolates at 37 and 44°C is statistically not significant ($t = 0.03$, $P<0.05$). Also the differences between the pattern of susceptibility for the skin isolates at 37 and 44°C is statistically not significant at ($t = 0.05$, $P<0.05$).

DISCUSSION

The overall carrier rates of 20.8% observed among the clinical isolates is comparatively lower than the report of Onanya et al. (2005) who documented a 36% isolates. This pattern of prevalence may be related to the level of *S. aureus* infection in our locality. The carrier rates of *S. aureus* of 45, 40 and 33.3% reported on the wound swab, urine and high vaginal swab indicated high colonization with *S. aureus* than other samples like skin and nostril. This present investigation deviates from the report of Chigbu and Ezeronye (2003) where they observed a colonization rate of 50.0% in the nostril of their studied subjects. The highest prevalence of 48% in wound swab reported in our present study can be attributed to the level of contamination arising from the habit of some of the volunteers to treat their wound aseptically before seeking appropriate medical attention. Also possible contamination in these areas where low personal hygiene and poor health education still persist and the sexual abuse among youths can be a major factor advanced for the level in urine and high vaginal swab.

We found out that *S. aureus* was more susceptible in our locality to gentamycin, erythromycin and streptomycin. The susceptibility of gentamycin to *S. aureus* had been documented (Uwaezuoke and Aririatu, 2004; Ehinmidu, 2003). Oyagade and Oguntoyinbo, (1997) and Uba and Umar (2002) also reported the susceptibility to *S. aureus.* This observed relatively higher level of susceptibility in gentamycin and streptomycin may be due to the route of administration which is intravenous, thereby making abuse difficult. Also erythromycin is relatively expensive in our locality where poverty still abounds.

The data indicated that the bacterial isolates were resistant to penicillin, ampicillin, cloxacillin and tetracy-cline. This investigation accords (Ehinmidu, 2003) where he documented the resistance of ampicillin, penicillin and tetracycline to *S. aureus.* This observation can be attributed in part to earlier exposure of the isolates to these drugs which may have enhanced resistant development (Krumpermann, 1983). This assertion can further be strengthened by the high level of antibiotic abuse in our locality, arising from self medication which are often associated with inadequate dosage and failure to comply to treatment (Odugbemi 1981) and availability of antibio-tics to consumers across the counters with or without prescription (Adekeye, 1979; Paul et al., 1982) The level of susceptibility to antibiotic in our locality is relatively low and therefore worrisome. This trend had been documented by Eke and Rotimi (1987), Kesah et al. (1997) and Egah et al. (1991) in different parts of Nigeria.

May et al. (1964) reported loss of resistance to *S. aur-*

eus at high temperatures. This assertion is proved valid by the observation in our present study. For instance, we observed that clinical isolates that were resistant to streptomycin at 37°C, became sensitive at 44°C. Also more isolates were sensitive to erythromycin at 44°C than at 37°C. Similar trend occurred for skin isolates to chloramphenicol.

In conclusion, gentamycin, erthromycin and streptomycin with relatively higher susceptibility to the *S. aureus* can be used for management of these clinical conditions in our locality. This accords the reports of Dyagade and Oguntoyinbo (1997) and Uba and Umar (2002). The need for appropriate health education to reduce self medication and drug abuse is very imperative and desirous.

REFERENCES

Adekeye D (1979). Resistance of Staphylococcus aureus of man and other animal to five antibiotics commonly used in Nigeria. Nig. med. J. 9: 195-197.

Cheesbrough M (2006). District Laboratory Practice in Tropical Countries. Cambridge University Press. p. 434.

Chigbu CO, Ezeronye OU (2003). Antibiotics resistant Staphylococcus aureus Abia State of Nigeria. Afr. J. Biotechnol. 2(10): 374-378.

Egah DZ, Bello CSS, Banwat EE, Allana JA (1991). Antimicrobial Susceptibility Patter of Staphylococcus aureus in Jos, Nigeria. Nig .J. Med. 8: 58- 61.

Ehinmidu JO (2003). Antibiotics susceptibility patterns of urine bacterial isolates in Zaria, Nigeria. Trop. J. Pharm. Res. 2: 223-228.

Eke PI, Rotimi VO (1987). In *Vitro* Anti-microbial Susceptibility of Clinical Isolates of Pathogenic bacteria to Ten Antibiotics Including Phosphomylin. Afr. J. Med. Sci. 16:18.

Emmerson M (1994). Nosocomial Staphylococcal outbreak. Scandinavian J. Infect. Dis. Suppl. 93: 47-54.

Grassi GG (1988). Infections by Gram-positive bacteria: an overview. J. Antimicrobiol. Chem. 21(Suppl. C): 1-7.

Kesah CN, Ogunsola F, Niemogha TMT, Odugbenmi T (1997) In Vitro Study on Methicillin and other Antimicrobial Agents against Staphylococcus aureus 1994-1996. Nig. J. Med. 7(3): 286-288.

Kolawole DO, Bisi-Johnson MA, Shittu AO (2005). Epidemiological analysis of clinical isolates Staphylococcus aureus in Ile-Ife, Nigeria. Pakistan J. Bio. Sci. 8(7): 1016-1020.

Krumpermann PH (1983). Multiple Antibiotics resistance indexing of E. coli to identify high risks sources of faecal contamination of foods. App Environ. Microbiol. 46: 165-170.

May JW, Houghton RH, Petrret CJ (1964). The Effect of Growth at Elevated Temperatures on Some Heritable Properties of Staphylococcus. Z. Gen. Microbiol. 37:157.

Odegbemi T (1981). The use and abuse of antibiotics .Nig. Med. Pract. 1(1): 5-8.

Odunsanya OO (2002). Antibiotic susceptibility of Micro organanisms at a general hospital in Lagos. Nig. J. Nat. Med. Assoc. 94(11): 994-998.

Olukoya DK, Asielue JO, Olasupo NA, Ikea JK (1995). Plasmid profiles and antibiotic susceptibility patterns of Staphylococcus aureus isolates from Nigeria. Afr. J. Med. Sci. 24(2): 135-138.

Onanuga A, Oyi AR, Onaolapo J.A. (2005). Prevalence and susceptibility pattern of methicillin resistant Staphylococcus aureus isolates among healthy women in Zaria, Nigeria. Afr. J. Biotechnol. 4(11): 1321-1324.

Oyagade JO, Oguntoyinbo FA (1997). Incidence of antibiotic resistant Staphylococcus aureus strains among isolates from environmental and clinical isolates. Nig. J. Microbiol. 11: 20-24.

Paul MO, Aderibigbe DA, Sule C Z, Lam Kanra AA (1982). Antimicrobial sensitivity pattern of hospital and non hospital strains of Staphylococcus aureus isolated from nasal carrier. J. Hyg. 89: 253-260.

Uba A, Umar U (2002). Incidence and the antibiotic susceptibility pattern of Staphylococus species from clinical specimens in Bauchi, Nigeria. Book of Abstract. 26th Annual conference of Nigerian Society for Microbiology. University of Uyo, Akwa Ibom State, Nigeria.

Uwaezuoke JC, Aririatu LE (2004). A survey of antibiotic resistant Staphylococcus aureus strains from clinical sources in Owerri. J. Appl. Sci. Environ. 8(1): 67-69.