

IN-VITRO SUSCEPTIBILITY OF OXACILLIN, VANCOMYCIN AND TEICOPLANIN AGAINST CLINICAL STRAINS OF *STAPHYLOCOCCI*

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To the Editor:

Staphylococcus aureus, the most common cause of *staph infections*, is a spherical bacterium, frequently living on the skin or in the nose of a healthy person, that can cause a range of illnesses from minor skin infections (such as pimples, boils, and cellulitis) and abscesses, to life-threatening diseases such as pneumonia, meningitis, endocarditis, Toxic shock syndrome (TSS), and septicemia. The incidence of nosocomial infections caused by resistant staphylococci has increased significantly during the 90s. First-line treatment for serious invasive infections due to MRSA is currently glycopeptide antibiotics (vancomycin and teicoplanin). The aim of this study was to evaluate the antimicrobial sensitivity of oxacillin, vancomycin and teicoplanin against some clinical strains of staphylococci isolated from patients on admission at a secondary health care institution and National hospital, Nigeria.

In this study, *Staphylococci* isolated from various clinical specimens of patients

hospitalized during December 2006 to November 2007 were examined microbiologically. Staphylococcal isolates were identified by conventional methods. Kirby -Bauer technique was used for testing antimicrobial susceptibilities of staphylococcal isolates with *Staphylococcus aureus* ACTC12365 as control strain. Plates were inoculated with a swab and National Committee on Clinical Laboratory standard (NCCLS) guidelines was followed. The data from patients on admission at a secondary health care institution and National hospital, Nigeria were analysed.

A total of three hundred and twenty three samples were collected. 79.26% showed positivity for *S. aureus* infection. The carrier rates were wound (90.91%), urine (73.56%), endocervical swab/high vagina swab (73.21%), sputum (87.72%), eye (86.36%), ear (84.00), and others (72.09%). Oxacillin Screening Agar (OSA) is one of the new methods in screening for multi-drug resistant *S.*

aureus. Out of the 256 number of samples screened for the occurrence of oxacillin resistant. Thirty nine point zero six percent were oxacillin sensitive and sixty point nine percent were resistant. The percentage resistance were: urine (57.81%), sputum (78.00%), eye (63.16%), wound (40.00%), endocervical swab/ high vaginal swab (68.29%), ear (52.38%) . The others were isolated from breast swab (16%), umbilical cord (3%), pus (2%), aspirate and skin snip (%); the remaining isolates were from various body sites. All isolates were evaluated for oxacillin, vancomycin and teicoplanin sensitivity using disc diffusion based on BSAC standards. Zones of inhibition of the isolates to oxacillin, vancomycin and teicoplanin are presented in Table 1. Thirty one (100%) of the isolates were resistant to oxacillin (≤ 14 mm). Twenty (64.5%) of *S. aureus* were resistant to vancomycin (≤ 11 mm). Fourteen (45.2%) of the isolates were resistant to teicoplanin (≤ 14 mm) (**Table 1**).

In the study of Hanberger *et al*¹ the incidence of MRSA was approximately 80% in Italy and France, 77% in Greece, 67% in Portugal and Belgium, 54% in Spain, 53% in Austria, 37% in Germany, 14% in Switzerland, 13% in Great Britain. No methicillin resistance was detected in Norway, Holland, Sweden or Denmark. In the study of Diekema *et al*², the incidence

of MRSA was 34.2% in the US, 34. 9% in Latin America and 46% in Western Pacific Region. Methicillin – resistance rates are highest in the nations of Southern Europe (e.g. Italy, Greece, Portugal and Turkey). In the study of Prashini *et al*³ the incidence of MRSA was 56.25% in South Africa. The very highest rates of MRSA were in the Asia-Pacific region (>60% in Taiwan, Singapore, Japan and HongKong). The MRSA rate in our study was 60.9%. MRSA rates are very high in Turkey; surveys show rates of 70-48% over the period 1995-2000. Methicillin resistance was detected in 213 (15%) of 1440 clinical isolates tested in eight large hospitals in Africa and Malta. The rate was relatively high in Nigeria, Kenya, and Cameroon (21-30%), and below 10% in Tunisia, Malta and Algeria ⁴. Resistant coagulase *Staphylococcus aureus* (CNS) have been occasionally isolated in Turkey¹⁰. Coagulase *Staphylococcus aureus* (CNS) was not detected in our study.

Methicillin resistance is a big problem for staphylococci in Nigeria. Additional infection control measures are necessary to prevent spread of methicillin- resistant staphylococci. Vancomycin is a good choice for staphylococcal treatment but teicoplanin is recommended for the treatment of resistant staphylococcal strains in our study.

References

1. Diekema DJ, Pfaller MA, Schmitz J, et al.. Survey of infections due to susceptibility of isolates collected in the United States, Canada, Latin America, Europe, and the Western Pacific Region for the SENTRY antimicrobial surveillance program, 1997-1999. Clin Infect Dis. 2001; 32:S114-32.
2. Prashini M, Dhesan M, Willem S. *In vitro* activity of oxacillin, vancomycin and teicoplanin against Staphylococci isolated from patients on surgical and coronary intensive care units. Int J Antimicrob Agents. 2004 ; 24(2):193-4
3. Kesah S, Ben Redjeb T, O Odugbemi, CSB, Boye M, Dosso JO, Ndinya Achola S, Koulla-Shiro M, Benbachir K, Rahal MB. Prevalence of methicillin-resistant *Staphylococcus aureus* in eight African hospitals and Malta. Clinical Microbiology and Infection **2003**; **9** (2), 153–156.
4. Diler M, Kocabeyoglu O, Birinc I Erdemoglu A, Ozbek A. Investigation of efficacy of vancomycin and teicoplanin against 252 methicillin resistant *Staphylococci* by using microdilution method. J. ANKEM. 1998; 12:437-41.

Table 1. Zone of inhibition (mm) and site of isolation of *S. aureu* resistant to oxacillin, vancomycin and teicoplanin

Strains	Site of specimens	Vancomycin (5µg)	Teicoplanin (30µg)	Oxacillin (1µg)
SA*01	Ear	8	16	9
SA 02	Ecs	-	-	14
SA 03	Sputum	20	10	-
SA 04	Wound	20	17	-
SA 05	Ecs	16	19	-
SA 06	Stool	9	12	10
SA 07	Urine	-	-	11
SA 08	Urine	-	-	-
SA 09	Eye	7	15	-
SA 10	Urine	10	15	9
SA 12	Urine	15	19	12
SA 13	Urine	18	16	13
SA 14	Ecs	10	19	14
SA 15	Ecs	17	15	-
SA 16	Wound	16	17	10
SA 17	Ecs	-	-	-
SA 18	Sputum	-	-	10
SA 19	Abcess	7	14	9
SA 20	Urine	15	14	9
SA 21	Ear	-	-	13
SA 22	Wound	18	17	-
SA 23	Ecs	9	15	11
SA 24	Sputum	-	-	12
SA 25	Sputum	23	19	10
SA 26	Ear	9	15	-
SA 27	U/c	10	18	-
SA 28	Ear	11	20	-
SA 29	Ecs	10	16	11
SA 30	Sputum	-	-	-
SA 31	Hvs	-	-	10

KEY: * *Staphylococcus aureus*, Ecs – Endocervical swab, Hvs- High vaginal swab, U/c- Umbilical cord, - No zone of inhibition, Oxacillin, ≤14mm(R) ≥15mm(S), Vancomycin, ≤11mm(R) ≥12mm(S), Teicoplanin, ≤14mm(R) ≥15mm(S),