ORIGINAL ARTICLE

Sensitivity Pattern of Staphylococcus Aureus Isolates to Commonly Used Antibiotics

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ABSTRACT

Aim: To investigate the sensitivity pattern of Staphylococcus aureus isolates obtained from clinical specimens including urine, and wound to commonly used antibiotics.
Methods: This prospective study was conducted from June 2010 to July 2011.Clinical specimens including urine, wound swab were collected from the patients of Orthopedic Department of Hayatabad Medical Complex Peshawar with informed consent and was analyzed in Pathology Department of Kabir Medical College Peshawar. The samples were cultured aerobically in blood agar and cystine lactose electrolyte deficient (CLED) agar. The isolates were identified using motility test, colony morphology, Gram staining and Biochemical tests. The discs of Amoxycillin, Co-Amoxiclav, Cephradine, Cefuroxime, Sparfloxacin, Meronem, Tinem and Linzolid were used.
Results: There were total 150 cases which contain 75 each of high urine sample and wound swab. There were 85 male patients and 65 female patients. In wound swab specimens, sensitivity pattern was; Tinem (98.7%), Linzolid (97.3%), Meronem (94.7%), Co-Amoxiclav (93.3%), Cephradine(90.7%), Cefuroxime(86.7%), Amoxycillin (82.7%) and Sparfloxacin (80%). In urine specimen the S. aureus was sensitive to Tinem(94.7%), Meronem(93.3%), Sparfloxacin(93.3%), Linzolid (90.7%), Cefuroxime (86.7%), Co-Amoxiclav (80%), Amoxycillin (69.4%), Cephradine
Conclusion: Staphylococcus aureus in wound and urine culture almost always sensitive to Tinem antibiotic. Sensitivity to Cephradine in wound culture is double that of urine culture.
Keywords: S. Aureus, Sensitivity, Gram positive, Antibiotics

INTRODUCTION

The Staphylococci are gram-positive bacteria that often occur as a part of the harmless bacterial community inhabiting the skin and nasal cavities of humans and animals. Of 31 species of staphylococci currently recognized, 15 are potentially pathogenic to humans and these are often implicated in healthcare and community-acquired illnesses, ranging from mild skin infections to life threatening diseases and death.[1] Since staphylococci are capable of acquiring a remarkable range of resistance to antibiotics, staphylococcal infections can be recalcitrant to antibiotic chemotherapy. Antibiotic-resistant staphylococci have become a world-wide problem that not only impacts public health, but also affects the health care system itself by causing prolonged hospitalization and increases in costs of treatments and patient mortality[2]. Historically, Staphylococcus aureus has been regarded as the most important staphylococcal species in terms of public health.[3] For example, S. aureus and antibiotic-resistant S. aureus strains such as methicillin-resistant S. aureus (MRSA) are regarded as important causative agents of healthcare- and community-associated infection[4], resulting in skin and soft-tissue infections in addition to more serious respiratory (pneumonia), circulatory (bacteremia), central nervous system (meningitis), and other diseases.[5] However, many other Staphylococcus species that were previously disregarded as insignificant clinical contaminants have gained increased attention as important human pathogens. For example, S. epidermidis, the most frequently isolated Staphylococcus species from human samples[1], can cause a wide range of health problems, including infections of the bloodstream (bacteremia), throat, nose, ear, eye, cardiovascular system (e.g. prosthetic-valve endocarditis and intravascular catheter infections), surgical wounds, central nervous system, and infections associated with dialysis[6,7]. Other important non-aureus staphylococci include S. saprophyticus, the second most- frequently-isolated species in acute urinary-tract infections and S. haemolyticus, S. hominis and S. lugdunensis, which often contaminate blood samples and are associated with a variety of human infections diseases[5]. The coagulase-negative staphylococci (CNS) are a subgroup of the staphylococci that include many clinically-important species that are sometimes collectively considered equally or more clinically-important than S. aureus.[1]

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This is especially important as staphylococcal species have been reported to occur in the hospital environment, contaminating surfaces and spreading infections to patients. For example, staphylococci have been isolated from hospital surfaces, including indwelling medical devices, computers, bed rails, countertops, floors, door handles, faucets, bed linens, tables, blood pressure cuffs/tourniquets, and gowns and gloves of healthcare personnel.[8] The objective of this study was to investigate the sensitivity pattern of Staphylococcus aureus isolates obtained from clinical specimens including urine, and wound to commonly used antibiotics.

PATIENTS AND METHODS

This prospective study was conducted from June 2010 to July 2011.Clinical specimens including urine, wound swab were collected from the patients of Orthopedic Department of Hayatabad Medical Complex Peshawar with informed consent and was analyzed in Pathology Department of Kabir Medical College Peshawar. Wound swabs and urine samples were collected from patients of orthopedic department of Hayatabad Medical Complex Peshawar. Wound swabs were collected from extremities wound using sterile swab sticks while mid stream urine samples were collected from patients using sterile precautions. The samples were cultured aerobically in blood agar and cystine lactose electrolyte deficient (CLED) agar. The plates were incubated at 37^0 C overnight. Streak plate technique was used to obtain pure culture of each isolate prior to identification. The isolates were identified using motility test, colony morphology, Gram staining and Biochemical tests.

Sensitivity testing using disc diffusion technique: The discs of Amoxycillin, Co-amoxiclav, Cephradine, Cefuroxime, Ciprofloxacin, Meronem, Tinem and Linzolid were used in this study. Overnight cultures of each isolate were adjusted to Mc Farland turbidity standard (0.5). Overnight cultures of each isolate were adjusted as in the case of disc diffusion described by Piette et al[9]. Sterile swabs were used to inoculate the test organism on the sensitivity agar. Sterile forceps were used to carefully distribute the antibiotic discs evenly on the inoculated plates. After allowing for about 30 minutes on the bench for proper diffusion, the plates were inverted and incubated aerobically at 35^0C for 18 hours. The inhibition zone diameters were measured in millimetres using meter rule. All the data were put in SPSS version 10, percentages and frequencies distribution was calculated.

RESULTS

Only those specimens were selected in which the growth of S. aureus was detected by Culture. This was further confirmed by using motility test, colony morphology, Gram staining and biochemical tests. There were total 150 cases which contain 75 each of high urine sample and wound swab. There were 85 male patients and 65 female patients (Fig. 1). All the specimens were separately evaluated for S. aureus sensitivity to different antibiotics. In wound swab specimens, S. aureus was almost always sensitive to Tinem (98.7%) antibiotic and less sensitive to Ciprofloxacin (80%). The sensitivity pattern of S. Aureus to other antibiotics are; Linzolid (97.3%), Meronem (94.7%), Co-Amoxiclav (93.3%), Cephradine(90.7%), Cefuroxime(86.7%) and Amoxycillin [82.7%] (Table 1). In urine specimen the S. aureus was sensitive to Tinem (94.7%), Meronem (93.3%), Ciprofloxacin (93.3%), Linzolid (90.7%), Cefuroxime (86.7%), Co-Amoxiclav (80%), Amoxycillin (69.4%) and Cephradine (53.4%). The S. aureus is mostly sensitive to Tinem and least sensitive to Cephradine in urine specimen (Table 2). When we compare the sensitivity pattern of both specimens then wound culture is mostly sensitive to Tinem (98.7%) Linzolid (97.3%), Meronem (94.7%) and Co-Amoxiclav (93.3%) while the urine culture is mostly sensitive Tinem (94.7%), Meronem (93.3%), Ciprofloxacin (93.3%) and Linzolid [90.7%] (Table 3).

Fig. 1: Distribution of genders

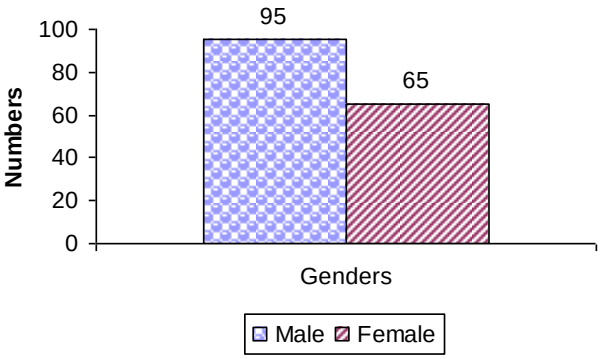

Table 1: Percentage of S. Aureus sensitivity against different antibiotics from wound swab

Antibiotics	Sensitivity pattern	%age of sensitivity
Amoxicillin	62	82.7
Coamoxiclav	70	93.3
Cephradine	68	90.7
Cefuroxime	65	86.7
Ciprofloxacin	60	80.0
Meronem	71	94.7
Tinem	74	98.7
Linzolid	73	97.3

Table 2: Percentage of S. Aureus sensitivity against different antibiotics from urine specimen

Antibiotics	Sensitivity pattern	%age of sensitivity
Amoxicillin	52	69.4
Co-amoxiclav	60	80.0
Cephradine	40	53.4
Cefuroxime	65	86.7
Ciprofloxacin	70	93.3
Meronem	70	93.3
Tinem	71	94.7
Linzolid	68	90.7

Table 3: Comparison of percentages of sensitivity of S. aureus sensitivity against different antibiotics from wound swab and Urine

Antibiotics	Percentage of sensitivity	
	Wound swab	Urine
Amoxicillin	82.7	69.4
Co-Amoxiclav	93.3	80.0
Cephradine	90.7	53.4
Cefuroxime	86.7	86.7
Ciprofloxacin	80	93.3
Meronem	94.7	93.3
Tinem	98.7	94.7
Linzolid	97.3	90.7

DISCUSSION

Most of infections are due to S. aureus.[10] Its recognition and timely treatment can avoid dreadful complication of diseases.[11] In the current study in wound swab specimens, S. aureus was almost always sensitive to Tinem (98.7%) antibiotic and less sensitive to Ciprofloxacin (80%). The sensitivity pattern of S. aureus to other antibiotics are; Linzolid (97.3%), Meronem (94.7%), Co-amoxiclav (93.3%), Cephradine (90.7%), Cefuroxime (86.7%) and Amoxycillin (82.7%). Ikeagwu et al[12] noted the highest sensitivity for Ofloxacin (65%) while the least was for Co-trimoxazole (6%). Amoxicillin, Ampicillin, Tetracycline and Cloxacillin recorded 37%, 19%, 8% and 11% respectively in his study. This study is not comparable to the current study in which sensitivity of amoxicillin is 37% while in current study it is 82.7%. Hamdan et al[13] studied the urine sample of pregnant ladies and found that Escherichia coli (42.4%) and S. aureus (39.3%) were the commonest isolated bacteria. S. aureus isolates, showed 2 to 20 percent resistance to amoxicillin, naladixic acid, nitrofurantoin, ciprofloxacin, co-trimoxazole, amoxicillin/clavulanate and norfloxacin. In this study, in urine specimen the S. aureus was sensitive to Tinem (94.7%), Meronem (93.3%), Ciprofloxacin (93.3%), Linzolid (90.7%), Cefuroxime (86.7%), Co-Amoxiclav (80%), Amoxycillin (69.4%) and Cephradine (53.4%). The study of Hamdan et al is comparable to this study.

Taj et al[14] studied the sensitivity of S. aureus in different clinical isolates. He found the sensitivity of S. aureus to Cefixime (0%) Doxicycline (0%) Oxacillin (3.5%) Gentamicin, (3.7%), co-trimoxazole (4.4%) Chloramphenicol (7%) Tobramicin (18.07%), Ofloxacin (27.6%) and Ciprofloxacin (34.3%). High sensitivity was found to Ceftazidine (64%), Co-Amoxiclav (67.3%), Fosfomycin (69%), Cefroxime (76%), Amikacin (82.8%) and Meropenem (87%). All isolates were susceptible Linezolid. Taj et al study is comparable to this study. The sensitivity pattern of S. aureus in Onwubiko et al[15] study to the following antibiotics was; Gentamicin, Amoxycillin/clavulanate, Streptomycin, Cloxacillin, Erythromycin, Chloramphenicol, Cotrimoxazole, Tetracycline, Penicillin, Ciprofloxacin, Ofloxacin, Levofloxacin, Ceftriaxone, Amoxycillin and vancomycin were 92.4%, 63.0%, 44.2%, 35.8%, 52.4%, 61.9%, 15.5%, 31.2%, 7.1%, 78.9%, 76.6%, 100%, 71.4%, 30.7% and 100% respectively. Methicillin resistant isolates were sensitive to Levofloxacin 93.7% and Ofloxacin 68.7%. Dada-Adegbol[16] study showed resistance to commonly used antibiotics such as Ampicillin 97%, Tetracycline 93%, Cotrimoxazole 98%, and Amoxycillin 89% was observed among most uropathogens.

CONCLUSION

S. aureus was almost always sensitive to Tinem (98.7%) antibiotic and less sensitive to Ciprofloxacin (80%) in wound swab specimens while in urine specimen the S. aureus was most sensitive to Tinem (94.7%) and least sensitive to Cephradine (53.4%) This study shows that Tinem is useful antibiotic in eradicating the S. aureus from wound infection and urine infection.

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