



CODEN [USA]: IAJPBB

ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES<http://doi.org/10.5281/zenodo.3896643>Available online at: <http://www.iajps.com>

Research Article

**STAPHYLOCOCCUS AUREUS ISOLATES SENSITIVITY
PATTERN TO A FREQUENTLY USED ANTIBIOTIC**Dr. Syed Hammad Ali¹, Dr. Kainat Nazir², Dr. Masooma Ayesh¹¹ Rawalpindi Medical University (RMU)² KMU Institute of Medical Sciences (KIMS)

Article Received: April 2020

Accepted: May 2020

Published: June 2020

Abstract:

Aim: To investigate the sensitivity pattern of *Staphylococcus aureus* isolates obtained from clinical samples, including urine and wounds, to commonly used antibiotics.

Methods: This prospective study has been conducted in the Medicine and Surgical department of Benazir Bhutto hospital Rawalpindi for one year duration from March 2019 to March 2020. Clinical samples including urine, wound swab were taken from patients with informed consent and were analyzed at the Department of Pathology. Samples were aerobically cultured in blood agar and in cystine lactose electrolyte deficient (CLED) agar. The isolates were identified by motility test, colony morphology, and Gram staining and biochemical tests. Amoxicillin, co-amoxiclav, cefradine, cefuroxime, sparfloxacin, meron, tinem and linzolid discs were used.

Results: A total of 150 cases contained 75 urine and wound swabs each. There were 85 men and 65 women. The sensitivity pattern in wound swabs was; Tinem (98.7%), Linzolid (97.3%), Meronem (94.7%), Co-Amoxiclav (93.3%), Cephadrine (90.7%), Cefuroxime (86.7%), Amoxicillin (82.7%) and Sparfloxacin (80%). In the urine sample, *S. aureus* was sensitive to Tinem (94.7%), Meronem (93.3%), Sparfloxacin (93.3%), Linzolid (90.7%), Cefuroxime (86.7%), Co-Amoxiclav (80%), Amoxicillin (69.4%), Cephadrine.

Conclusion: *Staphylococcus aureus* in wound and urine culture is almost always sensitive to the antibiotic Tinem. Sensitivity to cephadrine in wound culture is twice as high as in urine culture. **Keywords:** *S. Aureus*, Sensitivity, Gram positive, Antibiotics

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Please cite this article in press Syed Hammad Ali et al., *Staphylococcus Aureus Isolates Sensitivity Pattern To A Frequently Used Antibiotic.*, Indo Am. J. P. Sci, 2020; 07(06).

INTRODUCTION:

Staphylococci are gram-positive bacteria that appear as part of a set of harmless bacteria that live on the skin and nasal cavities of humans and animals. Of the 31 currently recognized types of staphylococci, 15 are potentially pathogenic to humans, and they are often associated with health and disease in the community, from mild skin infections to life-threatening diseases and death¹⁻². Staph infections can be stubborn against antibiotic chemotherapy because staphylococci can achieve an amazing range of antibiotic resistance³⁻⁴. Antibiotic-resistant staphylococci have become a global problem that not only affects public health, but also increases long-term hospitalization and increases the cost of treatment and patient deaths⁵⁻⁶. Historically, *Staphylococcus aureus* was considered the most important staphylococcus species for public health. For example, antibiotic-resistant *S. aureus* and *S. aureus* strains, such as methicillin-resistant *S. aureus* (MRSA) are considered important infectious agents for environmental and health infections⁷⁻⁸. However, many *Staphylococcus* species, previously excreted as minor clinical contaminants, are attracting increasing attention as important human pathogens. For example, *S. epidermidis*, the most commonly isolated *Staphylococcus* species from human samples, can cause a wide range of health problems, including bloodstream infections (bacteremia), throat, nose, ear, eyes, and the cardiovascular system problems; for example, prosthetic valve, endocarditis and intravascular catheter infections), surgical wounds, central nervous system infections and dialysis. Other major non-aureus staphylococci are *S. saprophyticus*, the second most isolated species in acute urinary tract infections, and *S. haemolyticus*, *S. hominis* and *S. lugdunensis*, which often contaminate blood samples and are associated with various blood diseases⁹⁻¹⁰. Coagulase-negative staphylococci (CNS) is a subgroup of staphylococci, containing many clinically important species, sometimes considered collectively or clinically more important than *S. aureus*. This is especially important because staphylococcus species are reported in hospital because they contaminate surfaces and infect patients. For example, staphylococci are isolated from hospital surfaces, including fixed medical devices, computers, bed railings, benches, floors, door handles, taps, beds, tables, cuffs / tourniquets for measuring blood

pressure and aprons and gloves for medical staff¹¹. The purpose of this study is to investigate the sensitivity pattern of *Staphylococcus aureus* isolates obtained from clinical specimens, including urine, and damage commonly used antibiotics.

PATIENTS AND METHODS:

This prospective study was conducted in the Medicine and Surgical department of Benazir Bhutto hospital Rawalpindi for one year duration from March 2019 to March 2020. Clinical samples, including urine and wound swabs from patients were collected with informed consent and analyzed at the Faculty of Pathology. While wound swabs were collected from injured limbs with sterile sticks, medium flow urine samples were taken from patients using sterile measurements. Samples were aerobically cultured on blood agar and cystine lactose electrolyte deficient (CLED) agar. Plates were incubated overnight at 37 ° C. Streak plate technique was used to obtain a clean culture of each isolate prior to identification. Isolates were identified by motility tests, colony morphology, Gram staining, and biochemical tests. Sensitivity tests using disk diffusion technique: In this study, amoxicillin, co-amoxiclav, cefradin, cefuroxime, ciprofloxacin, Meronem, tinem and linezolid discs were used. The night cultures of each isolate were adapted to the Mc Farland turbidity standard (0.5). Sterile swabs were used to inoculate the test organism with sensitivity agar. Sterile forceps were used to evenly distribute antibiotic discs on inoculated plates. After waiting about 30 minutes for adequate diffusion on the bench, the plates were inverted and incubated aerobically at 35 ° C for 18 hours. The inhibition zone diameters were measured in millimeters using meter rule. All data was placed in SPSS 8version, percentages and frequency distribution were calculated.

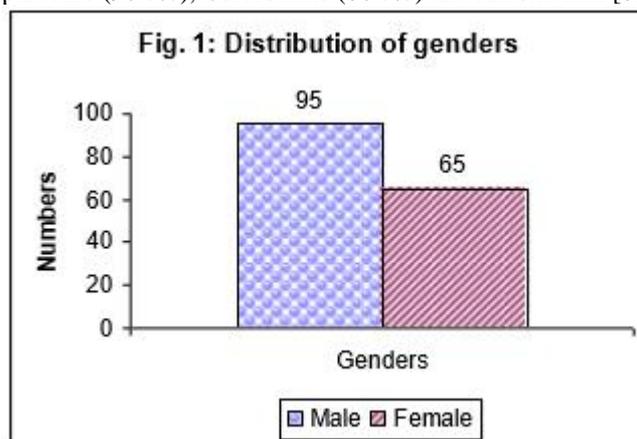
RESULTS:

Only those samples in which the *S. aureus* growth was detected were selected. This was further confirmed by motility test, colony morphology, and Gram staining and biochemical tests. In total, 150 cases contained 75 urine and wound swabs each. There were 85 men and 65 women (Fig. 1). All samples were separately assessed for *S. aureus* susceptibility to various antibiotics.

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

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

In S. aureus samples, S. aureus was almost always sensitive to the antibiotic Tinem (98.7%) and less sensitive to ciprofloxacin (80%). S. Aureus's pattern of sensitivity to other antibiotics is; Linzolid (97.3%), Meronem (94.7%), Co-Amoxiclav (93.3%), Cephadrine (90.7%), Cefuroxime (86.7%) and Amoxicillin [82.7%] (Table 1).



In the urine sample, S. aureus was sensitive to Tinem (94.7%), Meronem (93.3%), Ciprofloxacin (93.3%), Linzolid (90.7%), Cefuroxime (86.7%), and Co -Amoxiclav (80%), Amoxicillin (69.4%) and cephadrine (53.4%). S. aureus is mainly sensitive to Tinem and least sensitive to Cephadrine in a urine sample (Table 2).

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
Cephadrine	40	53.4
Cefuroxime	65	86.7
Ciprofloxacin	70	93.3
Meronem	70	93.3
Tinem	71	94.7
Linzolid	68	90.7

When we compare the sensitivity pattern of both samples, wound culture is mostly sensitive to Tinem (98.7%) Linzolid (97.3%), Meronem (94.7%) and Co-Amoxiclav (93.3%), while culture urine is mostly sensitive with Tinem (94.7%), Meronem (93.3%), ciprofloxacin (93.3%) and Linzolid [90.7%] (Table 3).

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
Cephadrine	90.7	53.4
Cefuroxime	86.7	86.7
Ciprofloxacin	80	93.3
Meronem	94.7	93.3
Tinem	98.7	94.7

Linezolid	97.3	90.7
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DISCUSSION:

Most infections are caused by *S. aureus*. Their diagnosis and timely treatment can prevent terrible complications of diseases. In this study, *S. aureus* swab specimens were almost always less sensitive to the antibiotic Tinem (98.7%) and ciprofloxacin (80%). Formula of susceptibility of *S. aureus* to other antibiotics; Linezolid (97.3%), Meronem (94.7%), Co-Amoxiclav (93.3%), Cefradin (90.7%), Cefuroxime (86.7%) and Amoxicillin (82.7%)¹¹⁻¹². Ikeagwu et al. The highest sensitivity ofloxacin (65%) was observed, and the lowest sensitivity was cortimoxazole (6%). Amoxicillin, ampicillin, tetracycline and cloxacillin were reported in their studies in 37%, 19%, 8% and 11%, respectively. This study is not comparable to the current study in which the sensitivity of amoxicillin is 37%. Hamdan et al. He examined a urine sample of pregnant women and found that *Escherichia coli* (42.4%) and *S. aureus* (39.3%) were the most frequently isolated bacteria. *S. aureus* isolates showed 2 to 20 percent resistance to amoxicillin, naladix acid, nitrofurantoin, ciprofloxacin, co-oxoxazole, amoxicillin / clavulanate and norfloxacin¹³.

Taj et al. Sensitivity of *S. aureus* was tested in various clinical isolates. Cefixime *S. aureus* (0%) Doxycycline (0%) Oxacillin (3.5%) Gentamicin (3.7%), Corticoxazole (4.4%) Chloramphenicol (7%) Tobramycin (18.07%), Ofloxacin (27.6%) and ciprofloxacin (34.3%). High sensitivity to ceftazidime (64%), co-amoxiclav (67.3%), fosfomycin (69%), cefroxime (76%), amikacin (82.8%) and meropenem (87%) was found. All isolates were sensitive to Linezolid. Taj et al. His work can be compared with this work. Sensitivity testing of *S. aureus* Onwubiko et al. Gentamicin, amoxicillin / clavulanate, streptomycin, coxacillin, erythromycin, chloramphenicol, cotrimoxazole, tetracycline, penicillin, ciprofloxacin, ofloxacin, levofloxacin, ceftriaxone, amoxicillin and 45% respectively. 100, 71.4%, 30.7% and 100%. Methicillin resistant isolates were 93.7% sensitive to levofloxacin and 68.7% sensitive to ofloxacin¹⁴⁻¹⁵. The Dada-Adegbol16 study showed resistance among commonly used antibiotics such as 97% ampicillin, 93% tetracycline, 98% cotrimoxazole and 89% amoxicillin 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 Cephadrine (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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