Antimicrobial susceptibility pattern of Methicillin-resistant Staphylococcus Aureus isolates in Fauji Foundation Hospital Rawalpindi

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Abstract
The current study was conducted in the Department of Microbiology, Fauji Foundation Hospital, Rawalpindi, from July 2018 to January 2019. The main purpose of the study was to evaluate Methicillin-resistant Staphylococcus aureus antimicrobial susceptibility pattern. Clinical samples were collected and cultured according to Clinical and Laboratory Standards Institute (CLSI) guidelines. A total of 90 (30%) samples were found to be methicillin-resistant out of 300 samples of Staphylococcus aureus. Major isolates were 42 (46.67%) from pus and 22 (24.44%) from tracheal tubes. The incidence ratio of Methicillin-resistant Staphylococcus aureus was high in the samples isolated from 69 (76.67%) females compared to those of 21 (23.33%) males. Patients were more in the age group of 41 to 60 years. Vancomycin 90 (100%) was sensitive to all strains followed by Chloramphenicol 66 (73.33%) and Doxycycline 52 (57.78%). Imipenem, Meropenem and Augmentin showed resistance to all strains.

Keywords: Methicillin-resistant Staphylococcus aureus, MRSA, Vancomycin, Antimicrobial susceptibility

Methods and Results
This cross-sectional study was conducted in the Department of Microbiology, Fauji Foundation Hospital, Rawalpindi from July 2018 to January 2019, after receiving approval from the institutional ethics committee. Consecutive non-probability sampling technique was used consisting of male and female patients from different wards between the ages of 10-90 years. Their pancultures exhibited a growth of MRSA having cefoxitin disk size <22mm and growth other than MRSA. Outpatient Department (OPD) samples, patients taking antibiotics and those whose ages were <10 and >90 years were excluded from the study. Over a seven-month period, clinical samples (including vaginal swabs, pus, sputum, urine, body fluids, tracheal tube, canula double lumen and blood) were collected aseptically as per standard microbiological methods from different departments / wards of the hospital.

Vancomycin is mostly sensitive to MRSA strains but there are some strains recorded to be resistant to vancomycin as well. A high rate of mortality due to MRSA was reported in the United States of America. MRSA is also associated with eye infections and were isolated from blepharoconjunctivitis, cellulitis, dacyrocystitis, keratitis and endophthalmitis.

The prevention of such organisms spreading among the general population requires different approaches such as general hygiene, screening, cleaning measures and vaccination. Centres for Disease Control and Prevention (CDC) organised a meeting in July 2004 on the management of MRSA. They stated that infections can be reduced by preventive measures such as wearing gloves, gowns and proper hand washing after touching contaminated items, wounds and body fluids. The main objective of this study was to evaluate Methicillin-resistant Staphylococcus aureus antimicrobial susceptibility pattern in clinical samples isolated from male and female patients.
Laboratory Standards Institute (CLSI) guidelines. The antimicrobial susceptibility testing of the samples was done on Mueller Hinton agar plates by Kirby Bauer disc diffusion method using Vancomycin (30μg), Chloramphenicol (30μg), Doxycycline (30μg), Co-Trimoxazole (25μg), Gentamicin (10μg), Erythromycin (15μg), Ciprofloxacin (5μg), Cefoxitin (5μg), Cephradine (30μg), Imipenem (10μg), and Meropenem (10μg) according to CLSI guidelines. A total of 300 Staphylococcus aureus strains were isolated, of which 90 (30%) were identified as Methicillin-resistant Staphylococcus aureus (MRSA). The maximum isolates were 42 (46.67%) from pus samples followed by 22 (24.44%) from tracheal tube samples, 8 (8.89%) from vaginal swabs, 5 (5.56%) from urine, 4 (4.44%) from canula double lumen, 4 (4.44%) from body fluids, 3 (3.33%) from sputum and 2 (2.22%) from blood samples. The prevalence ratio of MRSA was high in samples isolated from 69 (76.67%) females compared to 21 (23.33%) males (Table 1). Vancomycin was sensitive to all Methicillin-resistant 90 (100%) strains followed by the 21 (23.33%) males (Table 1). Vancomycin was sensitive to all Methicillin-resistant 90 (100%) strains followed by Chloramphenicol in 66 (73.33%), Doxycycline in 52 (57.78%), Co-trimoxazole in 41 (45.56%), Gentamicin in 34 (37.78%), Erythromycin in 18 (20%), and Ciprofloxacin in 16 (17.78%). Imipenem, Meropenem and Augmentin showed resistance to all strains (Table 2). MRSA was found most common between the age group of 41 to 60 years in 38 (42.22%) patients.

**Discussion**

Methicillin-resistant Staphylococcus aureus (MRSA) causes infections in humans and animals worldwide. Its distribution varies due to different factors such as areas studied, population and culture techniques. Antimicrobial resistance is a common issue in MRSA infections. In this study we collected 300 samples of Staphylococcus aureus, of which 90 (30%) were identified as Methicillin-resistant. The maximum isolates were from vaginal swabs, pus, tracheal tube and sputum samples. The incidence ratio of MRSA was high in samples isolated from 69 (76.67%) females compared to 21 (23.33%) males. Vancomycin was sensitive to all strains while Imipenem, Meropenem and Augmentin showed resistant to all strains. MRSA was common in patients in ages between 41 to 60 years. In the study of Saikia et al, 96 (34.78%) samples were methicillin-resistant out of 276 coagulase positive staphylococci strains. In another study, Ullah et al isolated 101 (36.1%) Methicillin-resistant staphylococcus aureus from 280 Staphylococcus aureus strains conducted on various clinical samples in Peshawar region, Pakistan.

The MRSA isolated from pus samples in our study was 46.67% and comparable to the results of another study by Kumar and Bhadauria conducted in District Jaipur, India that showed MRSA in 37.70% pus samples.

The most strains of MRSA showed resistance to different antibiotics as in our current study in which among 90 MRSA strains, 80% were resistant to erythromycin and 82.22 % were resistant to ciprofloxacin. It is similar to the study by Pandya et al in which out of 117 MRSA strains, 86.59% showed resistance to ciprofloxacin while 79.27% to erythromycin. The sensitivity pattern of vancomycin (100%) in our current study is also in accordance with the study by Ray et al. The MRSA was high in samples isolated from 69/90 (76.66%) female patients compared to 21/90 (23.33%) male patients and corroborates with the findings of Mansoor et al in which 56% were female and 44% were male patients. MRSA infection was also found common in patients of ages between 41-60 as reported in the study by Alebachew et al.

On the basis of our study we can conclude that in our institution, female patients are more prone to MRSA infection. This study was conducted only in one hospital with specific number of samples from different wards. A
wider sample study that includes patients from OPD and other wards from different hospitals from different geographic regions is recommended. The use of vancomycin in the patients should be limited only to where it is clearly needed.

**Conclusion**
The present study showed that Methicillin-resistant Staphylococcus aureus was resistant to commonly used antibiotics and Vancomycin is the better choice for staphylococcal infections. The incidence rate was high in female patients and most common in the 41 to 60 years age group.

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**Conflict of interest:** None.

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**References**