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Methicillin Resistant Staphylococcus Aureus (MRSA) – A Study On Its Prevalence And Antimicrobial Susceptibility Patterns In A Tertiary Teaching Hospital Of Rural West Bengal

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ABSTRACT

INTRODUCTION- Methicillin resistant *Staphylococcus aureus* (MRSA) is endemic in India with more than 50% of S. aureus infections being caused by methicillin-resistant strains of *Staphylococcus aureus* which poses a high therapeutic challenge. Healthcare workers are the main source of transmission of MRSA among hospital admitted patients. MRSA is resistant to several classes of antibiotics including some recent resistance also being observed towards glycopeptides as well as aminoglycosides making the treatment of infections and their eradication very difficult.

AIMS- To identify MRSA strains from different clinical samples of hospital patients and to study their clinic-demographic profile and antibiotic susceptibility pattern.

MATERIALS AND METHODS- This study was conducted at the Department of Microbiology of Tamralipto Government Medical College and Hospital from May 2024 to April 2025 on 1385 clinical samples received from various departments and were subjected to automated ID and AST by VITEK2 compact (Biomerieux) and Methicillin resistance was detected by using Cefoxitin susceptibility as a surrogate marker by VITEK2 compact method.

RESULTS- Out of 1385 clinical samples received at our laboratory, 488 MRSA samples were isolated (35.23%). MRSA was highest in pus sample (36.07%) and lowest in respiratory samples. Most of the MRSA isolates were from Medicine department (37.91%) followed by ICU (19.06%) least from chest medicine department (3.07%). Among all the 488 MRSA patients, highest number was observed in the younger age group 21-40 years and least patients were in the elderly age >60 years. MRSA isolates showed maximum sensitivity towards Glycopeptides and Linezolid and least sensitivity towards Norfloxacin and Macrolides.

CONCLUSION- Regular surveillance of antimicrobial susceptibility pattern of MRSA infections for the formulation of antibiotic policies and proper infection control practices will help to reduce the burden of MRSA infections in hospitals.

KEY WORDS- MRSA, VITEK 2 COMPACT, CEFOXITIN

INTRODUCTION- *Staphylococcus aureus* is a human pathogen causing a variety of diseases, ranging from mild skin infections to severe life threatening systemic infections,[1,2] thus increasing hospital and health care system costs.[3] The emergence of strains resistant to multiple antimicrobial agents including methicillin is of major concern in healthcare systems due to high mortality from systemic methicillin-resistant Staphylococcus aureus (MRSA) infections.[4] After being first reported in United Kingdom in 1961,[5] MRSA has since been increasingly prevailing and posing a high therapeutic challenge,[6] with more than 50% of *Staphylococcus aureus* infections being caused by methicillin-resistant strains of S. aureus.[7] Methicillin resistant *Staphylococcus aureus* (MRSA) is now endemic in India, incidence varies from 25 per cent in western part of India to 50 per cent in South India.[8]

Since the prevalence of healthcare-associated infections (HAIs) caused by multidrug resistant organisms has been increasing continuously[9], it is essential to prevent the transmission and reduce the number of MRSA HAIs.[1] Some predisposing factors that may lead to the emergence and spread of MRSA are prolonged repeated hospitalization, indiscriminate use of antibiotics, lack of awareness, intravenous drug abuse, and presence of indwelling medical devices.[10] Hospital admitted patients infected and colonized with MRSA mediate its dissemination and healthcare workers are the main source of transmission,[2] therefore it is important for healthcare workers to control the MRSA rates.[1]

MRSA were already resistant to several classes of antibiotics but recently resistance has also been observed towards glycopeptides as well as aminoglycosides[2,11,12] making the treatment of infections and their eradication very difficult. The prevalence and antimicrobial- susceptibility pattern of MRSA are important for appropriate management of these infections, therefore the present study was conducted at our hospital.

AIMS- To identify MRSA strains from different clinical samples of hospital patients and to study their clinic-demographic profile and antibiotic susceptibility pattern.

MATERIALS AND METHODS- This study was conducted at the Department of Microbiology of Tamralipto Government Medical College and Hospital from May 2024 to April 2025 on 1385 clinical samples received from various departments and were subjected to automated ID and AST by VITEK2 compact (Biomerieux) and Methicillin resistance was detected by using Cefoxitin susceptibility as a surrogate marker by VITEK2 compact method.

RESULTS- Out of 1385 clinical samples received at our laboratory, 488 MRSA samples were isolated (35.23%) using VITEK. 2 compact automated ID and AST platform.

Distribution of MRSA among various clinical samples was highest in pus (36.07%) followed by blood (29.92%), urine (20.08%) and lowest in endotracheal tube aspirate (7.99%) and sputum (5.94%) as shown in Table 1.
Most of the MRSA isolates were from Medicine department (37.91%) followed by ICU (19.06%), ENT (14.96%), Surgery (12.09%), Gynaecology & Obstetrics (6.97%), Orthopaedic (5.94%) and least from chest medicine department (3.07%) as shown in Table 2.

More MRSA samples were isolated from male patients (62.09%) than female patients (37.91%). Among all the 488 MRSA patients, highest number was observed in the age group 21-40 years (45.08%), followed by 41-60 years age (36.07%), 0-20 years age (13.93%) and least patients were in the elderly age >60 years (4.92%) as shown in Figure 1.
The antibiotic sensitivity pattern among MRSA isolates showed maximum sensitivity towards Vancomycin, Teicoplanin, Linezolid and least sensitivity towards Norfloxacin, Erythromycin and Azithromycin as shown in Figure 2.

Table 1: distribution of MRSA among clinical samples

Samples	Number	Percentage
urine	98	20.08%
blood	146	29.92%
wound swab/pus	176	36.07%
ET tube	39	7.99%
sputum	29	5.94%

Table 2: distribution of MRSA cases among various departments

Department	Number	Percentage
Medicine	185	37.91%
Surgery	59	12.09%
Gynaecology & Obstetrics	34	6.97%
Orthopaedic	29	5.94%
ENT	73	14.96%
Chest medicine	15	3.07%
ICU	93	19.06%

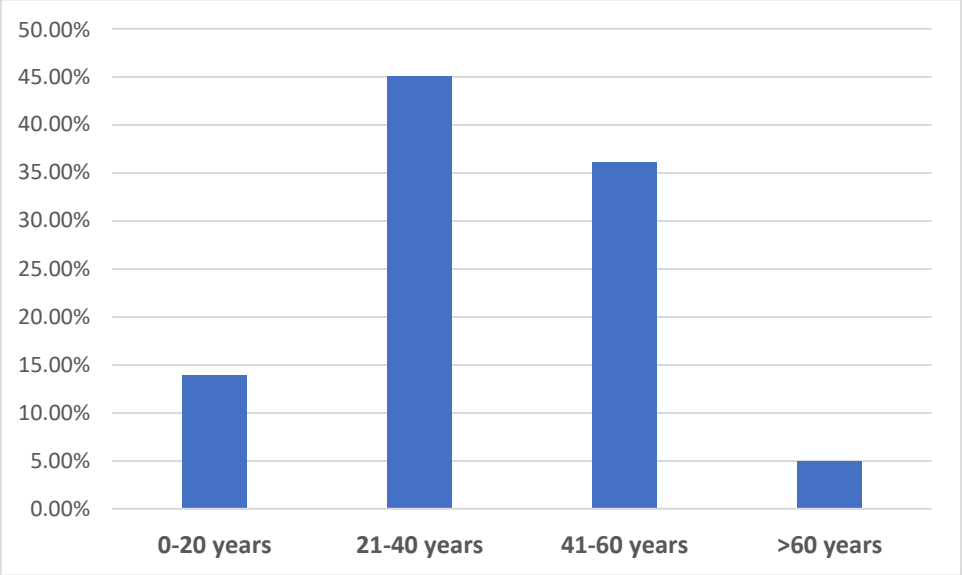

Figure 1: age distribution among MRSA patients

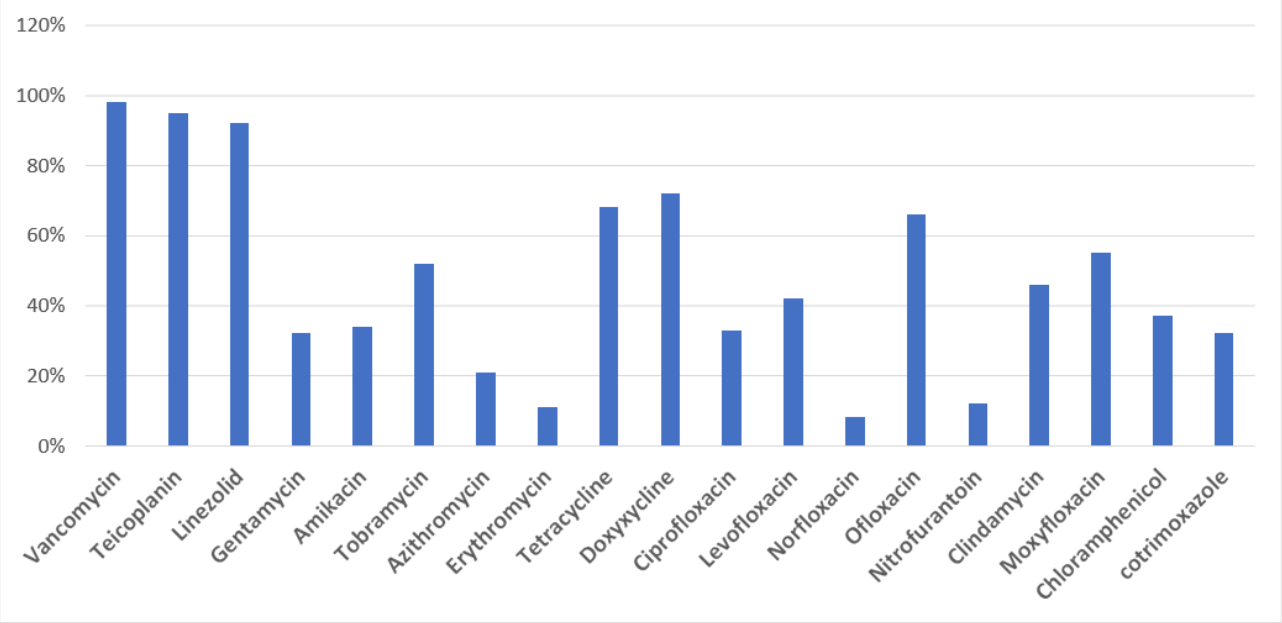

Figure 2: sensitivity pattern of antibiotics among MRSA samples

DISCUSSION- In the present study the prevalence of MRSA was 35.23% which is more or less close to the findings in a few other studies: 38.44% in a study in Varanasi,[13] 38.56% in Delhi,[14] 31.1% in a multicentric study in Tamil Nadu[15] and 39.50% in South Gujarat.[16] However other studies have shown that the prevalence of MRSA is not uniform in different parts of India. While some studies have found quite a high prevalence of MRSA,[2,8,10,17] other studies have shown much lower prevalence.[18,19,20] The variation in prevalence may be due to factors like hospital infection control practices and antimicrobial usage pattern in different hospitals which varies across different parts of the country.

In our study distribution of MRSA among various clinical samples was highest in pus (36.07%) followed by blood (29.92%), urine (20.08%) and lowest in endotracheal tube aspirate (7.99%) and sputum (5.94%). This is a different finding to the study by Pai V et al[18] where even though highest MRSA was found in pus samples, it was followed by urine samples, respiratory samples and least in blood samples.

Most of the MRSA isolates in our study were from Medicine department (37.91%) followed by ICU (19.06%), ENT (14.96%), Surgery (12.09%), Gynaecology & Obstetrics (6.97%), Orthopaedic (5.94%) and least from chest medicine department

(3.07%). In the study by Arora S et al[2] maximum MRSA was isolated from Orthopaedic department, followed by Medicine, Gynaecology, Surgery department and very few from ENT and chest medicine department.
More MRSA samples were isolated from male patients (62.09%) than female patients (37.91%) in this study and highest number of MRSA was observed in the age group 21-40 years (45.08%), followed by 41-60 years age (36.07%), 0-20 years age (13.93%) and least patients were in the elderly age >60 years (4.92%). The reason for this could be that the age group 21-40 years is an economically productive age group who are exposed to active healthcare infections.

The antibiotic sensitivity pattern among MRSA isolates showed maximum sensitivity towards Vancomycin, Teicoplanin, Linezolid and least sensitivity towards Norfloxacin, Erythromycin and Azithromycin. A few other studies[2,8,17] have also shown high susceptibility of MRSA strains towards Vancomycin, Linezolid, Teicoplanin. However due to high prevalence of MRSA and indiscriminate empirical use of Glycopeptide, there is an alarming risk for spread of VRSA. Therefore, Glycopeptides and Linezolid must be kept in reserve only for MDR MRSA infections.

CONCLUSION- Regular surveillance of antimicrobial susceptibility pattern of MRSA infections for the formulation of antibiotic policies and proper infection control practices will help to reduce the burden of MRSA infections in hospitals.
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