Prevalence of MRSA in ICU in a Tertiary Care Hospital.

Kumar Gaurav[1], Yadav Rajesh[2]

[1]Assistant Professor, Department of Microbiology, T S Misra Medical College and Hospital Amausi, Lucknow, Uttar Pradesh, India.
[2]Professor and HOD, Department of Microbiology, Prasad Institute of Medical Sciences, Lucknow, Uttar Pradesh, India.

ABSTRACT

Background: MRSA is a major nosocomial pathogen. It causes severe morbidity and mortality all over the world. MRSA strains are prevalent around the world. In India it is responsible for 25%–50%. **Methods:** The study included 379 samples from various critical care units. The study was conducted in the Department of Microbiology at Prasad Institute Of Medical Sciences, Lucknow. The duration of study was over a period of three months. **Results:** In our study, we found that out of total 379 samples ,200 were isolated as Staphylococcus aureus . The prevalence of MRSA cases in ICU was 10.2%. **Conclusion:** MRSA is an important pathogen for nosocomial infections so studying prevalence of this pathogen in various clinical samples and screening for MRSA colonization in health care workers will help in hospital infection control practices.

Keywords: Staphylococcus aureus, MRSA, ICU.

INTRODUCTION

Methicillin resistant Staphylococcus aureus (MRSA) is one of the major cause of infections in the hospitals.[1,2] It can easily colonize on the health care workers who can then act as carriers in the transmission of this dangerous pathogen. It is essential to inform the infection control team if there is an increase in the number of isolates in a particular ward or ICU. In that condition, the screening of the health care workers, hand hygiene and other infection control practices should be immediately implemented. In 1961, the first case of MRSA has been reported. This resistance to methicillin arises in the Staphylococcus aureus because of an altered penicillin-binding protein, PBP2a. This protein is encoded by the mecA gene. Because of this change the new penicillin-binding protein binds beta-lactam antibiotics with lower avidity and results in resistance to all the antimicrobial agents of that class and leads to limited antimicrobial options for this pathogen.[2,3] For detecting MRSA in the lab, CLSI has formulated certain guidelines by using cefoxitin disc. It can also be detected by Nucleic acid amplification tests, like polymerase chain reaction (PCR), which can detect the mecA gene.

Name & Address of Corresponding Author
Dr. Yadav Rajesh,
Professor and HOD,
Department of Microbiology,
Prasad Institute of Medical Sciences,
Lucknow,
Uttar Pradesh,
India.

MRSA is a major nosocomial pathogen. It causes severe morbidity and mortality all over the world. MRSA strains are prevalent worldwide. It is responsible for 29%–35% of all clinical isolates.[4,5] Though, infection rates varied from 1% to 80%. It is also dependent on location, emphasizing the need to be cognizant of the local microbial resistance patterns.[6] The increasedcosts associated with MRSA infection, as well as the importance of colonization pressure has been documented in many studies recently.[7,8] Surveillancestrategies have been proposed especially in high risk areas such as the ICU, NICU, Labour room. Although pneumonia and bacteremia account for the majority of MRSA serious clinical infections, but intra-abdominal infections, osteomyelitis, toxic shock syndrome, food poisoning, and deep tissue infections are also some other important clinical diseases. Recently, new antibiotics have been released that add to the armamentarium for therapy against MRSA.

The foregone discussion showed the prevention of infection and control of endemic rates are critically important features of MRSA control.

Staphylococcus aureus continues to be a dangerous pathogen for both community-acquired as well as hospital-associated infections. S. aureus resistant to methicillin were reported soon after its introduction in October 1960[9]. Methicillin resistant S. aureus (MRSA) is now endemic in India. The incidence of MRSA varies from 25 per cent in western part of India to 50 per cent in South India.[10,11] Community acquired MRSA (CA-MRSA) has been increasingly reported from India.[12] In the present study, we will discuss the microbiology, epidemiological features and risk factors, surveillance strategies, costs,

treatment, and outcomes of patients with MRSA in the ICU.

MATERIALS AND METHODS

Sample Size
A total 379 samples were taken out of which 200 samples were found positive for Staphylococcus aureus was included in this study.

Study Area
This study was conducted in the department of Microbiology at Prasad Institute Of Medical Sciences, Lucknow.

Study Duration
The duration of study was over a period of three months.

Sample collection
A total of 200 isolates of S. aureus was included in our study; these isolates were obtained from various clinical samples like pus, sputum, urine, and blood, obtained from the patients admitted in various departments of our hospital. In the Microbiology lab the Specimens were processed for Gram staining (Direct smears) for direct smear and cultured on 5% sheep blood agar and MacConkey agar plates and incubated aerobically at 37°C for 24 hours. The isolates were then identified by their colony morphology and using tests like catalase, slide and tube coagulase. Using Clinical and Laboratory Standards Institute (CLSI) recommendations antibiotic sensitivity testing was performed by Kirby– Bauer disc diffusion method on Muller-hinton agar plate by inoculating direct colony suspension which is equivalent to 0.5 MacFarland standard and incubated at 35°C,. Cefoxitin (30 μg) disc was used for methicillin resistance testing to identify the MRSA isolates.

Data Analysis
Data were analyzed by using Microsoft excel

RESULTS

In our study, we found that out of total 379 cases 55.4% were male & 44.6 % were female. In this study, highest age group was included 41-60 years followed by 61-80years. Among the all 379 cases found 52.7% had infection of Staphylococcus aureus. Out of 200 cases that had infection with Staphylococcus aureus, 78 cases were MRSA.16% cases of MRSA was found in Blood sample followed by other samples which are shown in table number 5.Prevalence of MRSA cases in ICU was 10.2% were found in this study. Among the antimicrobials tested linezolid (0%) showed the least resistance followed by other which showed in [Table 7].

Table 1: Distribution of cases according to gender

Gender	No. Of Cases	Percentage
Male	210	55.4%
Female	169	44.6%
Total	379	100%

Table 2: Distribution of cases according to age (Years)

Age	No. of Cases	Percentage
<1	56	14.7%
1-20	65	17.5%
21-40	72	18.9%
41-60	103	27.1%
61-80	83	21.8%
Total	379	100%

Table 3: Distribution of cases according to samples

Sample	No. Of Cases	Percentage
Pus	197	51.9%
Blood	67	17.6%
Urine	37	9.7%
High vaginal Swab & Semen	21	5.5%
Body Fluids	17	4.4%
Sputum	19	5.1%
Throat Swab	21	5.5%
Total	379	100%

Table 4: Distribution of cases according to isolates

Sample	S. aureus	MRSA
379	200 (52.7%)	78 (39%)

Table 5: Distribution of cases according to prevalence of MRSA

Sample	S. aureus	MRSA
Pus	46	20 (10%)
Blood	44	32(16%)
Urine	40	12(6%)
High vaginal Swab , Semen	16	6(3%)
Body Fluids	30	4(2%)
Sputum	20	4(2%)
Throat Swab	4	0(0%)
Total	200	78(39%)

Table 6: Distribution of cases according to prevalence of MRSA in ICU

Total MRSA Cases	MRSA cases in ICU	Percentage
78	8	10.2%

Table 7: Antimicrobial Senstivity Pattern of MRSA Isolates

Antibiotics	Sensitive	Resistance
Amikacin	61(78.2%)	17(21.7%)
Gentamycin	53(67.9%)	25(32.1 %)
Ciproflioxacin	36(46.1%)	42(53.8%)
Clindamycin	34(43.5%)	44(56.4 %)
Erytromycin	14(17.9%)	64(82.1%)
Tetracyclin	58(74.3%)	20(25.6%)
Cotrimoxazole	52(66.6%)	26 (33.4%)
Linazolid	78(100%)	0%

DISCUSSION

MRSA is one of the most important pathogen that has to be strictly observed. It can easily spread from health care workers to the patient's and from one patient to other.It is very essential that its antibiogram should be in place so that the clinicians can choose the appropriate antimicrobial. This study also tries to find out the distribution of MRSA

among various samples.It has been found in the present study that among the various samples MRSA isolation was highest from blood 16% higher than Abbas et al,[13] followed by pus 10% which was lower by Abbas et al,[13] and Chada et al,[14] urine 6% and sputum 2%.

The overall MRSA isolation in this study was 39 % less than reported by Abbas et al,[13] and Sangeetha et al.[15]

It has been found in the study that 55.4% isolates from males & 44.6% in females. These results were supported by Sujatha et al,[16] Abbas et al,[13] and Mathanraj et al. As the results revealed the age majority of MRSA isolates were highest in the age group of 40-60yrs followed by 61-80 yrs. These results were contradictory with the results of other studies. Abbas et al,[13] who reported highest isolation in age group 0-20 and 21-40.

The study observed the following resistance patterns among the various antimicrobials tested for the MRSA isolates. Amikacin showed 21.7% lower than Abbas et al,[13] Summaiya et al,[8] Chada et al,[14] Vidhani et al,[17] however gentamicin showed the highest resistant of 32.1 % lower than Abbas et alChada et al,[14] Rajaduraipandi et al.[18] Further Quinolones tested ciprofloxacin disclosed of53.8% lower than reported by Abbas et al,[13] but higher than Chada et al studies. Among the Lincosamides tested clindamycin showed 56.4 % higher when compare to Abbas et al, Chada et al, Pai et al,[19] Summaiya et al,[15] studies. Macrolides tested erythromycin 82.1% higher than shown by Abbas et al,[13] Chada et al,[14] Vidhani et al, Rajaduraipandi et al,[18] Pai et al,[19] Summaiya et al.[15] Among the Tetracyclines tested tetracycline presented25.6%% higher than other studies (Abbas et al,[13] 21.67% Chada et al,[14] 33.4% Summaiya et al [15] 36.95%). In the Sulfonamides group Co-trimoxazoledisplayed33.4% lower than that reported by chadha et al,[14] Rajaduraipandi et al,[18] slightly higher than reported by Abbas et al.[13] Among the Oxazolidinones tested Linezolid exhibited the least resistance 0% as also shown by Abbas et al,[13] studies. Linezolid 0% in contrast to Rajaduraipandi et al.[18]

The overall MRSA prevalence in our study was 10.2% in ICU cases. The prevalence of MRSA in a study from Chennai was reported as 40-50 per cent. S. aureus constituted 17 per cent of catheter related blood stream infections (CRBSIs) in that centre.[13] A high prevalence of MRSA (35% in ward and 43% in ICU) was observed from blood culture specimens in a study in Delhi.[21] The present study showed that linezolid were found to be highly effective in the treatment of MRSA.

CONCLUSION

MRSA is an important pathogen for nosocomial infections so studying prevalence of this pathogen in various clinical samples and screening for MRSA colonization in health care workers will help in hospital infection control practices. The present study results showed that linezolid were found to be highly effective.

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