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Short Communication

REDUCED SUSCEPTIBILITY OF MRSA TO VANCOMYCIN

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ABSTRACT

Objective: This study was conducted to observe the antibiogram, vancomycin MIC (Minimum Inhibitory Concentration), and inducible clindamycin resistance in clinical isolates of MRSA (Methicillin-Resistance *Staphylococcus aureus*).

Methods: Drug resistance pattern was studied by Kirby-Bauer disc diffusion methods. MIC of vancomycin was determined by agar dilution method.

Results: MRSA was found to be highly resistant to gentamicin (76%), erythromycin (67.03%) and ciprofloxacin (65.09%) while glycopeptides showed uniform susceptibility.

Conclusion: Though there was no drug resistance observed against vancomycin and linezolid, it's wise to use these antibiotics safely as emerging resistance has been reported for these drugs from all over the world.

Keywords: MRSA, Vancomycin Intermediate *Staphylococcus aureus*, MIC

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The emergence of MRSA is the major concern for hospital scenario since these strains are resistant to all β-lactam antibiotics. However, recent studies on MRSA have shown an increase in MIC of vancomycin, which is the last resort for treating these resistant bugs, leading to failure of vancomycin therapy, especially when MIC value ranges from 1-2 µg/ml [1, 2]. Therefore, it becomes necessary to look for the vancomycin MIC in all MRSA isolates so that the appropriate treatment may be initiated to obtain treatment success. Herein, we present the laboratory data on the vancomycin MIC among clinical isolates of MRSA and their antibiogram for other non-β-lactam antibiotics.

A total of 465 non-repeat clinical isolates of *S. aureus* (*Staphylococcus aureus*) were collected from various clinical specimen including, pus, wound swabs, catheter tip, and blood during January 2010 to January 2011. Identification and susceptibility of the *S. aureus* were performed by standard tests. Screening of clinical isolates for methicillin resistance was performed by cefoxitin antibiotic disc. Agar plates with gradient vancomycin (0.25-256µg/ml) were prepared to determine vancomycin MIC. Quality control strains *S. aureus* ATCC 29213, *S. aureus* ATCC 43300, and *Enterococcus faecalis* ATCC 51299 were used in our study.

Of the 465 isolates, 282 strains showed resistance to cefoxitin. These strains were reconfirmed for methicillin resistance by using oxacillin agar screen method. Out of 282 cefoxitin resistant strains, 7 strains showed susceptibility in oxacillin screen agar. Therefore 275/465 (59.1%) clinical strains [205 pus (74.54%), 40 blood (14.55%), 7 sputum (2.55%), 2 throat (0.73%), 21 catheter-related (7.64%) were confirmed as MRSA. The resistance patterns of MRSA isolates to various antimicrobial agents are shown in table 1. Among all MRSA isolates 32 strains (11.63%) showed inducible clindamycin resistance (D-Test Positive). Out of which 26 were from pus samples, 4 from blood, and 2 from the catheter. In the present study, the numbers of MRSA isolates were drastically high in pus (wound/aspirate) infections; this might be due to the frequent dressing changes often necessitate a dressing tamper via multiple healthcare workers plus the inherent immune-suppression of the wound patients might lead to MRSA colonization.

The vancomycin MIC for 275 MRSA strains by agar dilution is shown in fig. 1.

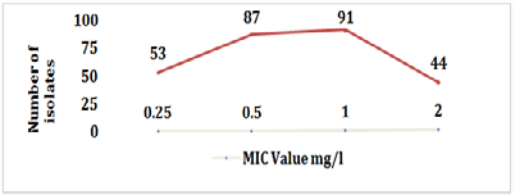

Fig. 1: Distribution of vancomycin MIC among MRSA isolates

Table 1: Resistance profile of MRSA strains against antibiotics

S. No.	Antibiotics	Sensitive		Resistance	
		Number of isolates	Percentage of isolates	Number of isolates	Percentage of isolates
1	Vancomycin	275	100	00	00
2	Gentamicin	66	24%	209	76%
3	Ciprofloxacin	96	34.90%	179	65.09%
4	Tetracycline	172	62.54%	103	37.45%
5	Erythromycin	94	34.18%	181	67.03%
6	Clindamycin	178	64.73%	97	35.27%
7	Amikacin	154	56.00%	121	44.00%
8	Cotrimoxazole	112	43.63%	163	59.27%
9	Chloramphenicol	170	61.81%	105	38.19%
10	Rifampicin	255	92.72%	20	07.27%
11	Linezolid	275	100	00	00

When these MIC values of were vancomycin arranged according to clinical specimens, we found a lot of variability accordingly (fig. 2).

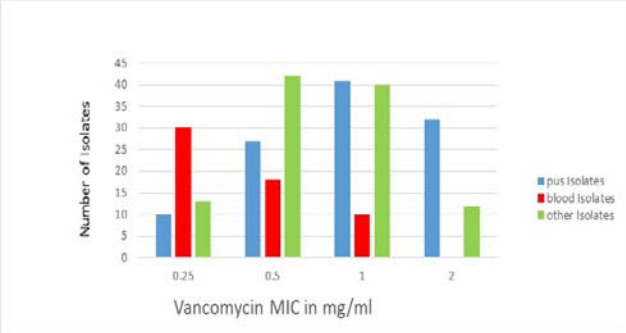

Fig. 2: Correlation between the source of MRSA strains and MIC of vancomycin

A study on the spectrum of antimicrobial resistance among MRSA, gentamycin, erythromycin and ciprofloxacin resistance was as high 63.20%, 60%, and 46% [3]. In contrast, we have 76% strains resistant to gentamycin, 67.03% to erythromycin and 65.09% strains resistant to ciprofloxacin. This might be due to the fact that at the present time these agents are tremendously used in the treatment of general infections. However, a study does not correlate with our findings in the case of gentamycin only 8% strains resistance to gentamycin as against 76% in our study [4]. Overall, 11.63% isolates showed erythromycin inducible clindamycin resistance (D-Test Positive) which is very low in comparison to shown in the study [5]. In this study, we observed 12.69% inducible clindamycin resistance in plus isolates, 10% in blood and 09.25% in isolated from the catheter. The observation of drug resistance in MRSA is leading towards the use of the last resorts of antibiotics such as vancomycin by clinicians, which can be avoided if alternate antibiotic (erythromycin, clindamycin) which has good efficacy and tissue penetration is used in the treatment. This greatly necessitates the need to look for inducible clindamycin resistance. All the isolates of MRSA were sensitive to vancomycin in contrast to recent reports of *S. aureus* isolates with reduced susceptibility to vancomycin. Several studies have also reported similar results from Kolkata and outside India [6-10]. We found a significant number of our isolates belonged to a high MIC group which is alarming. Limitation of the study is drug resistance mechanism to vancomycin in MRSA could be determined by molecular assays.

There is a requirement to identify MRSA quickly to commence effective antimicrobial therapy so that the mortality, complication and treatment cost can be reduced. The MRSA could be prevented by identifying and screening MRSA carriers inside high-risk wards.

We need to encourage and facilitate adherence to recommended prevention and control guidelines, conduct active surveillance to detect the emergence of these organisms, and ensure vigorous antibiotic stewardship by health care providers.

CONFLICT OF INTERESTS

Declared none

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