Prevalence of Methicillin Resistant *Staphylococcus aureus* and Antibiotic Susceptibility Pattern in a Tertiary Hospital in Nepal

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ABSTRACT

Background: Methicillin resistant *Staphylococcus aureus* is a global health challenge nowadays creating problem in antibiotic therapy. This study was aimed to generate resistance pattern of Methicillin resistant *Staphylococcus aureus* to various antibiotics in order to formulate antibiotic policy for control of Methicillin resistant *Staphylococcus aureus* in Nepal.

Methods: This was a cross-sectional study conducted at the department of Clinical Microbiology, Nepal Medical College Teaching Hospital, from April 2015 to March 2016. A total of 142 *S. aureus* isolated from various clinical specimens. were screened for Methicillin resistant *Staphylococcus aureus* by cefoxitin disc method according to Clinical and Laboratory Standards Institute guidelines.

Results: Out of 142 *S. aureus* isolates, 30 (21.1%) were detected as Methicillin resistant *Staphylococcus aureus* by cefoxitin disc method. Most of the Methicillin resistant *Staphylococcus aureus* (25/30) were isolated from pus which were collected from OPD patients. Antibiotic sensitivity pattern showed all Methicillin resistant *Staphylococcus aureus* isolates were sensitive to vancomycin.

Conclusions: Prevalence of Methicillin resistant *Staphylococcus aureus* was found to be 21.1%, and all Methicillin resistant *Staphylococcus aureus* appear 100% sensitive to vancomycin.

Keywords: Antibiotic Susceptibility Test, MRSA, Nepal, Prevalence.

INTRODUCTION

Antibiotic resistance is a global health challenge nowadays. Methicillin resistant *Staphylococcus aureus* (MRSA), mediated by mecA gene, is one of the biggest problem throughout the world including Nepal.[1-4] Infections caused by MRSA are mainly nosocomial and are increasingly reported from many countries worldwide.[3-9] The prevalence of MRSA varies in different parts of the globe ranging from 1-30% in Europe, 5-40% in Asian countries, 10-50% in USA and UK. The prevalence rate of MRSA in Nepal is reported to be 15-69% from different areas in the country.[6-9]

The emergence of antibiotic resistant bacteria creates great problem in antibiotic therapy. So, this study was designed to find the antibiotic sensitivity pattern of MRSA in order to formulate antibiotic policy for control of MRSA in Nepal.

METHODS

A prospective cross-sectional study was conducted at Clinical Microbiology Laboratory of Nepal Medical College Teaching Hospital during April 2015–March 2016 after obtaining ethical approval from Nepal Medical College-Research and Ethical Sub-committee. A total of 142 *S.aureus* isolated from various clinical specimens were included in the study.

MRSA were detected by cefoxitin disc method. For this, lawn culture was performed on Mueller Hinton agar plate using the broth culture of *S.aureus* with turbidity adjusted to 0.5 McFarland standard. Then, a cefoxitin disc (30 mcg) was kept on the lawn culture after it had been left dry for about 5 min. Finally, the agar plate was incubated aerobically at 37 ^{0}c for 18 hr. The strains showing diameter of zone of inhibition of equal or less than 21 mm were considered as MRSA.

For antibiotic susceptibility test, standard microbiological technique was followed.[10] The antibiotic discs used were ampicillin, ciprofloxacin, co-trimoxazole, cephalexin, cefoxitin, erythromycin, clindamycin, cloxacillin, gentamycin, and vancomycin. Data were analysed using SPSS-version 16.

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RESULTS

Out of 142 *S. aureus* isolated from various clinical specimens, total 30 (21.1%) were found to be MRSA (Figure 1).
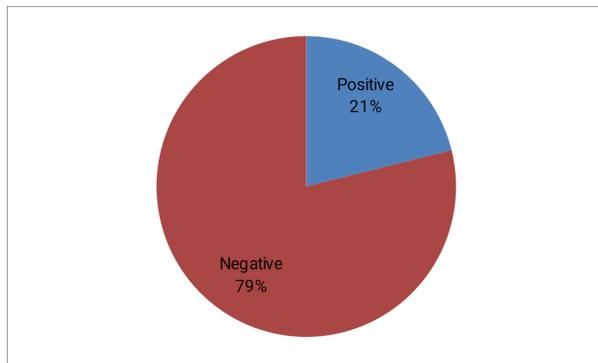

Figure 1. Prevalence of MRSA.

Among various clinical specimens, MRSA were mostly isolated from pus (25/30) and MRSA isolates were mostly seen among OPD patients (Table 1).

Table 1. MRSA from different clinical samples.

S.N.	Clinical sample	Number of MRSA		Total
		In patient	Out patient	
1	Urine	1	0	1
2	Blood	0	0	0
3	Pus	8	17	25
4	Sputum	1	0	1
5	Wound Swab	2	0	2
6	Tissue culture	1	0	1
	Total			30

Antibiotic sensitivity pattern showed that, all MRSA isolates were sensitive only to vancomycin and resistant to cephalexin (90%), erythromycin (63.3%), ciprofloxacin (33.3%), and co-trimoxazole (30%) (Table 2).

Table 2. Resistance pattern of MRSA and MSSA to various antibiotics (%).

Antibiotics used	MRSA (n=30)	MSSA (n=112)
Ampicillin	100	58.90
Ciprofloxacin	33.33	11.60
Cotrimoxazole	30.0	25.89
Cephalexin	90.0	4.46
Cefoxitin	100	0.0
Erythromycin	63.33	31.25
Clindamycin	56.66	24.10
Cloxacillin	93.33	0.0
Gentamicin	26.66	9.82
vancomycin	0.0	0.0

DISCUSSION

Our study findings showed that, the prevalence of MRSA is 21.1% which is similar to findings of other various studies in different parts of the world.[7,9-13] however, our reports did not match with the finding of previous researchers.[1,14] which might be due to differences in inclusion criteria of the samples in our study. The high prevalence of MRSA in this study might be due to hospital based specimens.

MRSA were mostly isolated from pus specimen in our study which might be due to isolation of more *S. aureus* from pus compared to other clinical specimens which is similar to findings of other various studies too.[16-19] This might be due to high prevalence of MRSA in deep seated lesions compared to superficial infections.[1] Our report indicates high prevalence of MRSA among OPD patients compared to in-patients which contrasts with findings of other previous research findings conducted elsewhere in the world.[15-24] This discrepancy in our study may be due to the frequent use of the antibiotic by the people without the clinician prescription and also may be due to the improper use of antibiotics by the individuals which is not so common in other part of the world. This might have led to development of drug resistance by bacteria to various commonly used antibiotics, specially indicating community acquired MRSA. This finding makes scientific community alert for conducting community based research study also on MRSA and other various drug resistant bacteria. Further, our finding is also in consistent with the findings of other studies in Nepal where community acquired MRSA infection is high.[11] However, due to unequal number of samples taken to compare, we can't say MRSA isolation rate is high among OPD patients compared to inpatients and this becomes limitation of our study.

Our study showed that all MRSA isolates were sensitive to vancomycin and resistant to cephalexin, erythromycin, and ciprofloxacin which is similar to the findings of various research reports.[20-24] This indicates vancomycin remains as first choice against MRSA infections with 100% treatment efficacy till date.

CONCLUSIONS

Our study showed that there is high prevalence of MRSA among clinical specimens, especially pus, and MRSA are 100% sensitive to vancomycin till date. These findings

recommend using proper antibiotics to reduce MRSA infections in Nepal which includes; discussion with physicians and the public about the impact of MRSA, surveillance and detection of MRSA, strict enforcement of infection control strategies in hospitals, and prudent use of vancomycin for treatment of MRSA related infections.

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