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Prevalence of methicillin resistant of *Staphylococcus aureus* (MRSA) its antibiotic susceptibility pattern from various clinical specimens in a tertiary care hospital

Authors
Dr S. Senthamarai[1*], Dr S. Sivasankari[2], Dr C. Anitha[3], Dr V.M. Somasunder[4], Dr K. Akila[5], Dr V.J. Shuba[6], S. Siji Mol[7], Dr K. Muthulakshmi[8]

[1]Professor, Department of Microbiology, Meenakshi Medical College & Research Institute, Kanchipuram
[2]Associate Professor, Department of Microbiology, Meenakshi Medical College & Research Institute
[3,4,5,6]Assistant Professor, Department of Microbiology, Meenakshi Medical College & Research Institute
[7]Tutor, Department of Microbiology, Meenakshi Medical College & Research Institute
[8]Professor & HOD, Dept of Microbiology, Meenakshi Medical College & Research Institute. Kanchipuram
*Corresponding Author
Dr S. Senthamarai
Professor, Department of Microbiology, Meenakshi Medical College & Research Institute, Kanchipuram
Email: *thamaraithiagu@gmail.com*

Abstract

Background: *MRSA causes significant therapeutic threat associated with increased morbidity and mortality. Aim: This study was aimed to isolate the Staphylococcus aureus from various clinical specimens, evaluate its antibiotic susceptibility pattern and to study the prevalence of methicillin resistance among Staphylococcus aureus.*

Materials and Method: *This study was conducted at microbiology department, Meenakshi Medical College & Research Institute. Study period was from October 2017 to July 2018. All the clinical samples were collected with aseptic precautions &processed as per standard protocol. All the Staphylococcus aureus isolates were subjected for antibiotic susceptibility testing as per CLSI guidelines. Screening of MRSA was done using cefoxitin disc (30µg) as per CLSI recommended disc diffusion method.*

Results: *In our study 128 isolates isolated from various clinical samples were included. Majority (64.8%) of the isolates were from pus sample, followed by sputum. The prevalence of MRSA in our study is 21.87%. All the isolates were sensitive to Vancomycin and Linezolid which can be used as a drug of choice for MRSA strains.*

Conclusion: *This study insist the need of continuous monitoring the prevalence of MRSA in a given population and to frame the antibiotic policy because it can vary from region to region.*

Keywords: *MRSA, staphylococcus aureus, resistance.*

Introduction

Staphylococcus aureus is a gram positive cocci, which is a commensal of skin, mouth and upper respiratory tract. It causes wide range of illnesses from minor skin lesions to life threatening infections.[1]

It is one of the predominant agents of hospital acquired infections, worldwide. The antimicrobial resistance among bacteria makes the drug less

effective in treating the infections and creates significant burden to health care system.[2]

MRSA causes significant therapeutic threat associated with increased morbidity and mortality. Methicillin resistance is due to the production of penicillin binding protein (PBP) PBP2a which has less affinity to beta lactam drugs and it is mediated by mecA genes.[3]

In India reported MRSA incidence varies from 29.10% to 54.9%.

With this background, this study was aimed to isolate the Staphylococcus aureus from various clinical specimens, evaluate its antibiotic susceptibility pattern and to study the prevalence of methicillin resistance among Staphylococcus aureus.

Materials and method[4,5]

This study was conducted at microbiology department, Meenakshi Medical College & Research Institute. Study period was from October 2016 to July 2017. All the clinical samples were collected with aseptic precautions. The specimens were transported to lab immediately and processed as per standard protocol using grams staining, culture and biochemical reactions. All the Staphylococcus aureus isolates were subjected for antibiotic susceptibility testing as per CLSI guidelines. The following antibiotics were used: penicillin, amoxycillin, gentamycin, amikacin, erythromycin, cotrimoxazole, vancomycin, ciprofloxacin. Screening of MRSA was done using cefoxitin disc (30µg) as per CLSI recommended disc diffusion method. 0.5 Mc Farland standard inoculum of Staphylococcus aureus were inoculated on Muller hinton agar and Cefoxitin disc was placed on it and plates were incubated at 35°c for 18 hrs. Zone diameter of ≤ 21 mm was considered as methicillin resistance and ≥22 mm was reported as sensitive.

Results

128 Staphylococcus aureus isolates were isolated from various clinical specimen during the study period.

Table-1: Distribution of *Staphylococcus aureus* among various clinical specimen

Samples	Number	Percentage
Pus	83	64.8
Sputum	28	21.9
Blood	10	7.8
Urine	06	4.7
Synovial fluid	01	0. 8

Table-2: Distribution of MRSA among *Staphylococcus aureus*

Samples (n=128)	Number	Percentage
MRSA	28	21.87
MSSA	100	78.13

Table-3: Antibiotic susceptibility pattern for *Staphylococcus aureus*

Antibiotics	Resistance (%)
Linezolid	0
Vancomycin	0
Amoxyclav	35.9
Amikacin	46.1
Erythromycin	46.8
Gentamycin	55.5
Co trimoxazole	55.5
Ciprofloxacin	67.0
Penicillin	83.6

Discussion

Staphylococcus aureus continuous to cause wide variety of infections and resistance among them limits the therapeutic option.

In our study 128 isolates isolated from various clinical samples were included. Majority (64.8%) of the isolates were from pus sample. Similar higher rate of isolation of S.aureus from pus were reported by Gitau *et al*, Rashmi *et al. &* Jeydev Pandya *et al.*[6,7,8] The predominance in pus could be due to exposure of wound to microorganism in the environment and S.aureus present on skin as commensal makes thewound more prone for infection.

The prevalence of MRSA in our study is 21.87%. The prevalence rate of 27.5%, 27.8% & 29.1% has been reported by Bustamante *et al*., Gitau *et al*.,& Pai *et al*., respectively[9,6,10].Our study is concordant with these studies.

Compared to this study, low level prevalence has been reported in many studies. In the study of Durgadas *et al*, 9% isolates were methicillin

resistant S.aureus (MRSA).[11] 15.4% were methicillin resistant in the report of Subedi *et al*.[12] The prevalence rate varies from 0.4% in Sweden to 48.4% in Belgium. The low prevalence could be attributed to good infection control followed in that health care system.

Khadri *et al* reported a higher rate of 54.9%.[13]A very high rate of 62.14% & 80.89% were reported by Savitha *et al* & Verma *et al* respectively.[14,15]

There are several factors contribute to the rate of variations seen with different studies could be due to the geographical area, sample size, duration of study, specimens collected, methods employed for detection, availability and implementation of infection control and antibiotic prescribing practices.

All the isolates were sensitive to Vancomycin and Linezolid which can be used as a drug of choice for MRSA strains. But regular monitoring of vancomycin susceptibility is essential. It is concordant with the studies of Rashmi *et al*, Jeydev Pandya *et al. &* Arora *et al.*[7,8,16]

In our study, moderate resistance was observed for erythromycin, azithromycin, cefotaxime, gentamycin, amikacin and amoxyclav. Highest resistance were noted for amoxycillin, penicillin and cotrimoxazole.

Conclusion

In our study, pus was the predominant sample of isolation of S.aureus. The prevalence of MRSA was 21.87%. All the isolates were sensitive to Vancomycin& and Linezolid.

The emergence of resistance among microorganism leads to longer duration of stay in hospital, increased cost and economic burden to families, makes the patient more prone for hospital acquired infections. This study stress the need of continuous monitoring the prevalence of MRSA in a given population and to frame the antibiotic policy because it can vary from region to region.Regularly all medical and para medical faculties should be educated and trained regarding the control measures to prevent the spread of MRSA.

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