Int.J.Curr.Microbiol.App.Sci (2017) *6*(1): 747-749

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 6 Number 1 (2017) pp. 747-749**
Journal homepage: http://www.ijcmas.com

Original Research Article http://dx.doi.org/10.20546/ijcmas.2017.601.088

Prevalence of MRSA among Clinical Isolates of *Staphylococcus aureus* and its Antibiotic Susceptibility Pattern at a Tertiary Care Hospital

M.S. Rashmi[1]*, S. Krishna[2] and Sumaira Qayoom[3]

[1]Department of Microbiology,Navodaya Medical College, Raichur, India
[2]Department of Microbiology, Vijaynagara Institute Of Medical Sciences, Ballari, India
[3]Department of Microbiology, SKIMS-MC, JVC, Srinagar, India

**Corresponding author*

Keywords

Methicillin Resistant Staphylococcus aureus (MRSA), antibiotic policy,

Article Info

Accepted:
29 December 2016
Available Online:
10 January 2017

A B S T R A C T

The present study was carried out to isolate Methicillin-Resistant *Staphylococcus aureus* (MRSA) in clinical samples. Standard microbiological and biochemical methods were used to screen 404 clinical specimens comprising of pus, urine and blood.58 isolates were MRSA out of 194 *Staphylococcus aureus* isolates. MRSA is increasing. Most MRSA are resistant to several non-beta lactam antibiotics. Frequent monitoring of susceptibility patterns of MRSA and formulation of a definite antibiotic policy may be helpful in decreasing incidence of MRSA infection.

Introduction

Staphylococcus aureus has been recognised for a long time as one of the leading causes of hospital infections all over the world. Most of its strains are opportunistic pathogens that can colonise individuals, without symptoms, for either short or extended period of time, causing disease when the immune system becomes compromised (Maida Sisirak *et al.*, 2010). Changes in pattern of antimicrobial susceptibility of *Staphylococcus aureus* has been reported worldwide especially in developing countries making antimicrobial agents increasingly less effective in treating bacterial infections (Bukhari *et al.*, 2004). Several mechanisms for Methicillin resistance seen in *Staphylococcus aureus* has been elucidated. The most important is production of a unique Penicillin binding protein (PBP) that has a low affinity for beta lactam antibiotics and whose effects are determined by several structural genes *mec*, *mec*RI, *mec*I (Krishna *et al.*, 2010). The study was taken up to review and document isolates of MRSA and its susceptibility pattern in various clinical samples, so that measures are taken to decrease the rate of MRSA infection.

Materials and Methods

A total of 404 clinical isolates were obtained in Department of Microbiology, VIMS,

Ballari, during the period from 1-1-2014 to 30-6-2014. Antibiotic sensitivity testing was done by Kirby Bauer disc diffusion method (CLSI). MRSA was detected by Cefoxitin (30µg) disk diffusion method. Specimens included pus, urine, blood, from various departments. Specimens were collected taking aseptic measures, they were subjected to preliminary tests like direct gram stain. They were streaked on MacConkey agar, 5% Blood agar, Mannitol Salt agar. *Staphylococcus aureus* was identified by colony morphology, gram stain, catalase test, tube coagulase test, DNAse test. Antibiotic sensitivity was done on Mueller Hinton agar using disc diffusion test as outlined by CLSI. The following antibiotics were used to determine the antibiogram. Penicillin, Amoxy-clavulanic acid, Erythomycin, Clindamycin, Amikacin, Gentamicin, Linezolid, Vancomycin, Teicoplanin, Cotrimoxazole. Methicillin resistance was detected by using Cefoxitin disc. Zone diameter was read after incubation at 35 degree Celsius for full 24 hours. Strains with zone diameter of <22 mm for Cefoxitin were regarded as Methicillin Resistant.

Results and Discussion

During the 6 months study period, a total of 404 samples, were received to Microbiology laboratory. Out of 404 samples, *Staphylococcus aureus* was isolated from 194 (48.01%) samples. Out of 194 *Staphylococcus aureus* isolated, 58(29.89%) were Methicillin resistant and 136 (70.10%) were Methicillin sensitive.

Table.1 Sample wise distribution of *Staphylococcus aureus* isolates

Specimens	Number of Strains	Percentage
Pus	82	42.26%
Urine	60	30.92%
Blood	52	26.80%

Table.2 Sample wise distribution of MRSA

Specimens	MRSA	Percentage
Pus	28	48.27%
Urine	18	31.03%
Blood	12	20.68%

Table.3 Sensitivity patterns of MRSA isolated

Antibiotics	Resistant	Sensitive
Penicillin	58(100%)	-
Amoxyclav	58(100%)	-
Erythromycin	58(100%)	-
Clindamycin	42(72.4%)	16(27.58%)
Gentamicin	58(100%)	-
Amikacin	16(27.58%)	42(72.4%)
Linezolid	-	58(100%)
Vancomycin	-	58(100%)
Teicoplanin	-	58(100%)
Cotrimoxazole	31(53.44%)	27(46.55%)

MRSA strains were maximum from pus(28), followed by urine (18) and blood(12). The sensitivity profile of these isolates were 100% for Linezolid, 100% for Vancomycin, 100% for Teicoplanin, 72.4% for Amikacin. All MRSA isolates showed 100% resistance to Penicillin, Amoxyclav, Erythromycin, Gentamicin, Clindamycin, Cotrimoxazole.

The present study shows 29.89% of MRSA. Similar patterns are seen worldwide as evident from many recorded surveillance studies. MRSA has become increasingly prevalent worldwide (Boutiba-Ben Boubaker *et al.*, 2004). Due to increasing number of infections caused by Methicillin-Resistant *Staphylococcus aureus* (MRSA) strains, which are now most often multiresistant, therapy has become problematic (Sharp *et al.*, 2004). MRSA spreads by physical contact or transmitted indirectly by contact with towels, clothes, etc. (Andrea Guyot *et al.*, 2006). They are generally multidrug resistant and their therapy entails a huge financial drain on the hospital resources. Good infection control practices with emphasis on strict hand washing can minimise this burden by reducing their transmission. Prudent use of antimicrobial agents is one of the major steps to reduce growing problem of antibiotic resistance (Mulla *et al.*, 2007).

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How to cite this article:

Rashmi, M.S., S. Krishna and Sumaira Qayoom. 2017. Prevalence of MRSA among Clinical Isolates of *Staphylococcus aureus* and its Antibiotic Susceptibility Pattern at a Tertiary Care Hospital. *Int.J.Curr.Microbiol.App.Sci.* 6(1): 747-749.
doi: http://dx.doi.org/10.20546/ijcmas.2017.601.088