

## Prevalence of Methicillin Resistant Staphylococcus Aureus in A Tertiary Care Hospital

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### Abstract

**Introduction:** MRSA infections have been increasing in Indian hospital ICU's and wards many of which are resistant to antibiotic treatment.

**Aims:** To study the prevalence rate and antibiogram pattern of MRSA from various clinical samples in tertiary care hospital, Visakhapatnam.

**Materials & Methods:** A total of 726 various samples received in clinical microbiology laboratory, Andhra Medical College, Visakhapatnam were included in the study during the period of September 2014 to February 2015. The culture positive samples other than Staphylococcus were excluded. After Grams staining all samples were inoculated on Blood agar and MSA, incubated over 18-24 hours at 37<sup>o</sup>C. Isolation and identification was done as per standard guidelines in the laboratory. The MRSA strains were identified by using Cefoxitin 30µg disc on MHA and antibiotic susceptibility testing was done by Kirby-Bauer disc diffusion method and zones interpreted as per CLSI guidelines.

**Results:** In total of 726 samples, 386 (53%) were Staphylococcus aureus out of which 132 (34.2%) were MRSA. Samples processed were pus 68 (52%), urines 28(21%), Bloods 24(18%), aspirates 12 (9%). All the isolates were sensitive to vancomycin. The isolates were 90.9% sensitive to Linezolid followed by Levofloxacin (83.3%), Amikacin (69.6%), Azithromycin (59.8%), clindamycin (58.3%), Gentamycin(39.3%) respectively.

**Conclusion:** Present study emphasises on need for regular surveillance and control measures of resistant MRSA strains for appropriate antibiotic selection and effective infection control practices.

**Keywords:** Methicillin resistance, MRSA, Vancomycin, Linezolid, Hospital acquired infections

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### I. Introduction

The prevalence of MRSA is growing throughout the world and its prevalence ranges from 23.3% to 73%. Across the globe it was found to be the most common cause of bacteremia, respiratory and skin infections<sup>1</sup>. Recent data from the Centres for Disease Control and Prevention showed that 59.5% of all the health care associated Staphylococcus aureus infections in the united states are caused by MRSA<sup>2,3</sup>.

MRSA infections have been increasing in India<sup>4</sup>. Hospitals in India have a high burden of MRSA infections in their ICU s and wards, many of which are resistant to antibiotic treatment<sup>5</sup>. The incidence of MRSA varies according to the region, 25% in western part of India<sup>6</sup> to 50% in South India<sup>7</sup>.

MRSA is of serious concern not only due to its sole resistance to methicillin but also because of resistance to many other antimicrobials that are used on a regular basis in hospitals. Another alarming sign is that emergence of resistance to Vancomycin, although a low level has been reported<sup>8</sup>. The present study was conducted to study the prevalence rate and antibiogram pattern of MRSA from various clinical samples in a tertiary care hospital, Visakhapatnam.

### II. Materials & Methods

A total of 726 various clinical samples received in clinical microbiology laboratory, Andhra Medical College, Visakhapatnam were included in the study during the period of September 2014 to February 2015. The culture positive samples other than Staphylococcus were excluded. After Grams staining all samples were inoculated on Blood Agar and MacConkeys agar , incubated for 24-48hours at 37<sup>o</sup> C. Isolation and identification of the organism was done as per the standard procedure in the laboratory. The MRSA strains were identified by using Cefoxitin (30µg) disc on MHA and antibiotic susceptibility testing was done by Kirby-Bauer disc diffusion method and zones of sensitivity were interpreted as per CLSI guidelines<sup>9,10</sup>.

### III. Results

Out of the total 726 samples 386 (53%) were Staphylococcus aureus. MRSA were isolated from 132 (34.2%) out of 386 Staphylococcus aureus strains. (Table I) MRSA strains were isolated predominantly from

pus samples 68 (52%) followed by urine 28 (21%), bloods 24 (18%) and aspirates 12 (9%).(TableII) All the isolates were sensitive to vancomycin. The isolates were 90.9% sensitive to Linezolid followed by Levofloxacin (83.3%), Amikacin(69.6%), Azithromycin (59.8%), Clindamycin(58.3%) and Gentamycin(39.3%).

**Table I : Distribution Of Mssa & Mrsa**

TOTAL SAMPLES	726
S.aureus	386
MSSA	254
MRSA	132

**table ii: prevalence of mrsa isolates from different clinical samples (n=132)**

S.NO	CLINICAL SAMPLE	NO.OF MRSA	% OF MRSA
1.	PUS	68	52%
2.	URINE	28	21%
3.	BLOODS	24	18%
4.	ASPIRATES	12	9%
	TOTAL	132	100%

#### IV. Discussion

Indian network for surveillance of Antimicrobial Resistance (INSAR) group, a multihospital based study in various parts of India shown that the overall MRSA prevalence in India was 42% in 2008 and 40 % in 2009<sup>11</sup>.

Most common reason for multidrug resistant MRSA is indiscriminate use of antibiotics without drug sensitivity testing which may be due to lack of advanced laboratory facilities or negligence on the part of medical practitioners or patients poor economic status<sup>12</sup>. Recently MRCONS have been associated with increased number of infections in hospitalised patients<sup>13,14,15</sup>.

There is a growing concern about the rapid rise in resistance of Staphylococcus aureus to antimicrobial agents<sup>16</sup>. In India the importance of MRSA as a problem has been recognised relatively late<sup>17</sup>. The prevalence of MRSA varies in different parts of India and is not uniform. Reports from a Delhi hospital showed a prevalence rate of 51.6% in 2001, where as it was reported as 38.44% in the same hospital in 2008<sup>18</sup>.

In the present study, out of 726 samples 386 (53%) were Staphylococcus aureus which correlates with Ankur Kumar etal<sup>19</sup> who reported 44.4% and Dr.S.Kulakarni etal<sup>20</sup> 47.8% whereas Bilal Ahmad Mir etal<sup>12</sup> reported higher incidence of 85.7%.

MRSA were isolated in 34.2% in the present study which correlates with Mehta AA etal<sup>21</sup> 31.8%, Ankur Kumar etal<sup>19</sup> 29%, Bilal Ahmed Mir etal<sup>17</sup> 32.2%, Arora S etal 46%, Deepa s.etal 48.7%, Vidhani s etal 51.6%, where as Dr.S.Kulakarni etal<sup>20</sup> reported higher incidence of 70.3%.

MRSA strains were predominantly isolated from pus samples 52% which correlates with Dr.S.Kulakarni etal 64.67% whereas Ankur kumar et al and Bilal Ahmed mir etal<sup>12</sup> reported 21.42% and 27.5%. From urine samples 21% of isolates were MRSA with present study correlating with Ankur Kumar etal<sup>19</sup> 30.5% and Bilal Ahmed Mir et al 17.2% but Dr.S.Kulakarni etal<sup>20</sup> reported 82.4%.

In the present study 18% of isolates were MRSA from blood samples which correlates with Bilal Ahmad Mir et al 13.7% whereas Dr.S.Kulakarni etal reported 62.69%.

All the MRSA isolates were sensitive to Vancomycin in the present study correlating with Ankur Kumar etal<sup>19</sup>.

The sensitivity pattern of MRSA strains to Linezolid, Amikacin, Clindamycin and Gentamycin correlates with Ankur Kumar et al.

#### V. Conclusions

1. The present study showed high prevalence of MRSA strains and their resistance to widely used antibiotics.
2. Regular surveillance of MRSA will be useful for selecting appropriate antibiotics and to know the changing trends of antibiotic susceptibility pattern which helps in developing hospital antibiotic policy.
3. Continuous responsibility and controlling efforts of infection teams and healthcare workers is recommended to prevent infections.

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