

## Prevalence of methicillin resistant *Staphylococcus aureus* in a tertiary care hospital in Navi Mumbai, India

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### Abstract

Methicillin resistant *Staphylococcus aureus* (MRSA) has become one of the most important pathogen in the hospital wards and OPDs. Hence, the knowledge of current trend of MRSA in hospital environment as well as in the community is necessary.

The objective of this retrospective study was to isolate *Staphylococcus aureus* and to determine the prevalence rate of MRSA in a tertiary care hospital in Navi Mumbai. The samples were collected from various departments. Standard microbiological procedures were carried out for isolation and culture. The overall prevalence rate of 14.72% MRSA was observed among varied samples. The highest numbers of MRSA were isolated from pus & wound swabs. Maximum strains of MRSA were isolated from surgery wards. We also analyzed the rate of MRSA isolation in the hospital as well as in the community. We observed a lower rate of MRSA prevalence in our study as compared to various other national level studies.

**Keywords:** MRSA, Prevalence, Pus, Surgical ward.

### Introduction

The genus *Staphylococcus* includes pathogenic organisms in which *Staphylococcus aureus* is the most important pathogen affecting humans. It colonizes skin, skin glands and mucous membranes. Although *S. aureus* is not always pathogenic, it is a common cause of skin infections such as abscesses, respiratory infections such as sinusitis, and food poisoning as well as septicemia.<sup>(1)</sup> Pathogenic strains often promote infections by producing potent protein toxins, and expressing cell-surface proteins that bind and inactivate antibodies. The emergence of antibiotic-resistant strains of *S. aureus* such as methicillin resistant *S. aureus* (MRSA) is a worldwide problem in clinical medicine. MRSA were first reported in the early 1960's.<sup>(2)</sup>

The prolonged hospital stay, indiscriminate use of antibiotics, lack of awareness, etc, are the predisposing factors of MRSA emergence.<sup>(3)</sup> Current therapeutic options for MRSA are limited few drugs like vancomycin, linezolid, teicoplanin, daptomycin and streptogramins. Low level resistance to even vancomycin is emerging at present.

MRSA is now endemic in India. Community acquired MRSA has been increasingly reported in India. The knowledge of prevalence of MRSA & their antimicrobial resistance pattern is extremely important in the selection of appropriate empirical therapy of these infections.

Hence, this study was carried out to determine the prevalence of MRSA (nosocomial as well as community acquired) in a tertiary care hospital in Navi Mumbai, India.

### Materials and Method

The present study was carried out in a tertiary care hospital in Navi Mumbai. We collected samples from IPD and OPD patients.

The retrospective study was carried out from March 2015 to February 2016.

A total number of 6010 samples were investigated. The various clinical specimens included were urine, pus, sputum, swabs, other body fluids, blood and miscellaneous.

The samples were processed as per the standard protocol for isolation & identification of aerobic bacteria.<sup>(4,5)</sup>

### Results

The total number of samples collected in the present study was 6010. 633 samples were from pus, 1144 samples were from sputum, 1542 samples were from urine, 271 samples were from wound swabs, 1150, 641 & 629 samples were from blood, other body fluids & miscellaneous respectively. From these specimens, various strains of *S. aureus*, *Enterobacteriaceae* family, *Enterococcus* spp., *Streptococcus* Spp., *Pseudomonas aeruginosa*, *Acinetobacter* spp., & other non-fermenter gram negative bacilli were isolated. Out of which 231 were *S. aureus* isolates (3.8%). Of the 231 isolates of *S. aureus*, 34 were MRSA. The overall MRSA prevalence in our study was 14.72%. (Fig. 1)

From 633 pus samples, 110 strains of Methicillin sensitive *Staphylococcus aureus* (MSSA) & 24 strains of MRSA were isolated. Out of 271 specimens of wound swabs, 30 strains of *S. aureus* (26 MSSA & 4 MRSA) were isolated. Out of 1144 specimens of sputum, 16 strains were of MSSA & 2 strains were of

MSSA. Out of 1542 specimens of urine, 3 & 2 strains were of MSSA & MRSA respectively. 9, 11 & 3 strains of MSSA were isolated from blood, body fluids & miscellaneous specimens respectively. (Fig. 2)

The highest numbers of MRSA were isolated from pus & wound swabs followed by sputum & urine specimens. No MRSA strains were isolated from blood, body fluids & miscellaneous specimens.

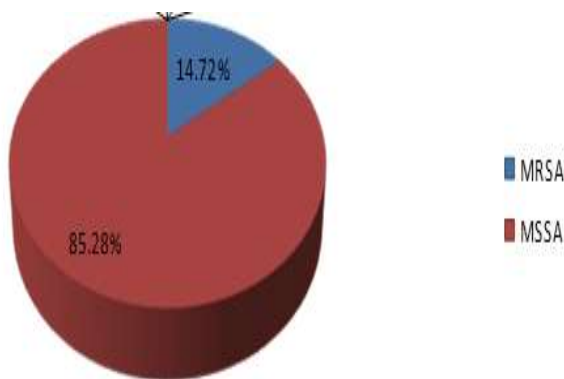


Fig. 1: Distribution of MRSA & MSSA among varied samples

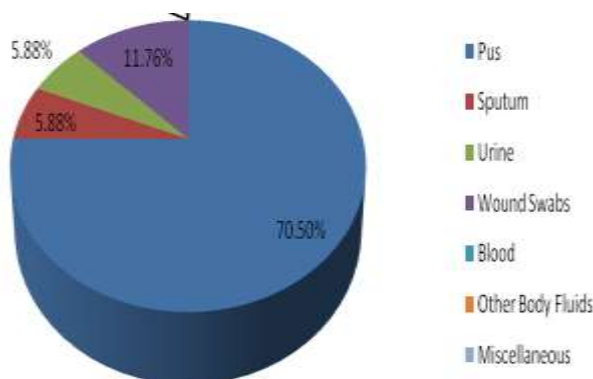


Fig. 2: Distribution of MRSA in various clinical specimens

Out of total MRSA strains isolated 91.18% were from IPDs & 8.82% strains were from various OPDs. Of the total MSSA isolated, 84.77% were from IPD and 15.23% were from OPD. (Fig. 3 & 4)

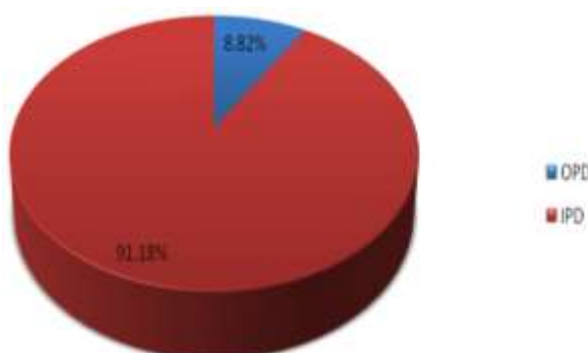


Fig. 3: Distribution of MRSA in OPD vs IPD patients

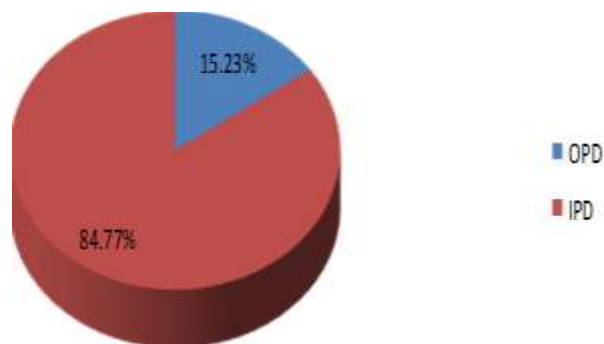


Fig. 4: Distribution of MSSA in OPD vs IPD patients

Maximum 17 strains of MRSA (50%) were isolated from surgery wards. 17.64%, 8.82% strains of MRSA were isolated from orthopedics wards, OBGY & Pediatrics ward respectively. 2.94% each of MRSA strains were isolated from ICU, ENT ward & Pulmonary medicine ward. (Fig. 5)

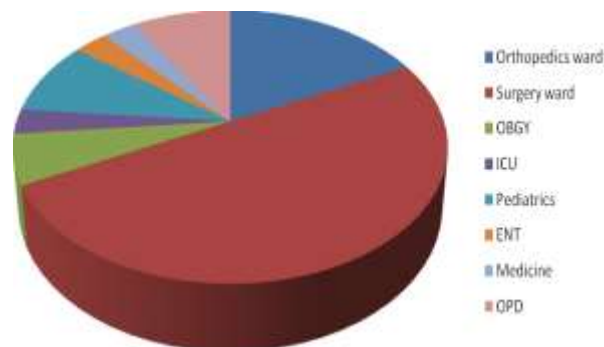


Fig. 5: MRSA distribution in different departments

**Discussion**

Staphylococcus aureus is a formidable bacterial pathogen responsible for a variety of infections. There is a growing concern about the rapid rise in resistance of S. aureus to antimicrobial agents. MRSA is a major nosocomial pathogen responsible for significant morbidity and mortality.

The overall MRSA prevalence in our study was 14.72%. The highest no. of MRSA was isolated from pus specimens (70.5%).

Various investigators have reported a prevalence rate of MRSA ranging from 13% to 68% in India.

Rajaduraipandi et al. reported 31.1% MRSA strains in their study.<sup>(3)</sup>

Mantri et al. in their study reported 67.85% MRSA from pus specimens.<sup>(6)</sup>

Srikanth et al reported 32.2% MRSA prevalence in their study, maximum isolates were from pus specimens (16%).<sup>(7)</sup> Aslam Mohd. et al have reported 13% MRSA strains in their study, maximum isolation was from pus specimens (22%).<sup>(8)</sup>

Arora et al found 46% MRSA prevalence in their study.<sup>(9)</sup>

In a study conducted by Goud et al, 22.5% subjects were found to be carriers of Staphylococcus aureus. Out of which 72.7% of them were methicillin resistant.<sup>(10)</sup>

In our study, the prevalence of Community Acquired MRSA (CA-MRSA) is 8.82% while Hospital Acquired MRSA (HA-MRSA) was 91.98%.

In a study conducted by Gerardo et al showed 64.7% CA-MRSA & 70.7% HA-MRSA while Wattal et al have reported 35% and 43% MRSA prevalence in wards and ICU respectively.<sup>(11,12)</sup>

Joshi et al have reported 42% MRSA prevalence in their study. The isolation rates of MRSA reported in their study from outpatients, ward inpatients and ICU were 27.5%, 45.5% and 45%, respectively.<sup>(13)</sup> Purav Patel et al have reported 28.46% MRSA in their study where 74.34% were HA-MRSA while 25.66% were CA-MRSA.<sup>(14)</sup> Ankur Goyal et al have reported MRSA in 56% of IPD cases and 44% in OPD cases.<sup>(15)</sup>

The maximum numbers of MRSA strains in our study were obtained from surgery ward (50%). In a study conducted by Ankur Kumar et al, 29% MRSA isolation is reported of which the maximum numbers of strains were obtained from Surgery wards (20.51%). They have isolated maximum number of MRSA strains from pus specimens (20.68%).<sup>(16)</sup>

## Conclusion

In India, the significance of MRSA had been recognized relatively late and it emerged as a problem in the 80s and in the 90's.

Surveillance studies should be carried out in every geographical region to detect the prevalence of MRSA strains. It will be helpful to select the appropriate antibiotic, to detect the changing trends of antibiotic susceptibility pattern and for developing hospital antibiotic policy.

Our study is a preamble to enable epidemiologists to understand the prevalence pattern of MRSA in this part of India.

**Conflict of Interest:** There is no conflict to declare.

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