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Prevalence of Methicillin Resistant *Staphylococcus Aureus* (MRSA) In Pus Sample In a Tertiary Care Hospital

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ABSTRACT

Methicillin Resistant *Staphylococcus aureus* (MRSA) is one of the common hospital acquired infections which is prevalent worldwide causing increase in morbidity and mortality along with hindrance in treatment of many infections. The aim of the study was to determine the prevalence of MRSA and to analyze the antibiotic susceptibility pattern of *Staphylococcus aureus* isolates in pus samples. A total of 160 pus samples from various clinical departments were analyzed. The isolates were identified by standard microbiological methods. Antibiotic susceptibility testing was done using Kirby Bauer method. MRSA screening was done using standard techniques. The incidence of *Staphylococcus aureus* infection was found to be 39.4%. Among them, 28.6% were found to be MRSA. Most of the MRSA were found to be multidrug resistant. All the MRSA were found to be susceptible to vancomycin. The high incidence of MRSA in the pus samples emphasizes the need for proper antibiotic sensitivity pattern determination for appropriate management and control measures are required to reduce the spread of nosocomial MRSA infections.

Keywords: *Staphylococcus aureus*, MRSA, antibiotic, multi drug resistance.

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INTRODUCTION

Staphylococcus aureus is one of the most common organisms isolated from the pus samples. Methicillin Resistant *Staphylococcus aureus* (MRSA) is one of the emerging threats to the world [1]. MRSA is found to be resistant to most of the antibiotics and is a challenge to the clinical practitioners. These strains are found to be resistant to commonly used drugs like betalactams, aminoglycosides, macrolides etc [2]. The first case of MRSA was reported from United Kingdom in 1961[3]. The prevalence of MRSA is now increasing alarmingly in both developing and developed countries. Recent studies showed that MRSA is now becoming community acquired infection also in addition to nosocomial infections [4]. The source of infection for MRSA is both the patients and the carriers [5]. The major risk factors of the infection are prolonged hospital stay, improper use of antibiotics, admission in intensive care units, etc. Hence it was determined to assess the prevalence of MRSA in pus samples from various infections and to study their antibiotic susceptibility pattern. This may throw light on the nature of infections, prevalence of MRSA, need of antibiogram for appropriate management and the importance of control measures to prevent their spread.

MATERIALS AND METHODS

The study was carried out in a tertiary care hospital in Chennai from August 2012 to January 2013. The study included 160 pus samples from patients suffering from various infections. The pus samples were collected using sterile cotton swabs or by direct aspiration of pus. The samples were processed immediately in the microbiology laboratory. Direct Gram smear and culture of the sample in Nutrient agar, Blood agar, Mac Conkey agar, Mannitol Salt agar and DNase agar were performed. The plates were incubated at 37⁰ C for 24-48 hrs. The diagnosis of the isolates was confirmed using standard methods. Biochemical tests were performed and Identification of *S. aureus* was confirmed with tube coagulase test. The *Staphylococcus aureus* isolates were tested for their antibiotic susceptibility pattern by Kirby Bauer method in Muller Hinton agar. *S. aureus* ATCC 29213 (oxacillin susceptible) and *S. aureus* ATCC 43300 (oxacillin resistant) strains were used as control.

A zone of inhibition of less than 10 mm with oxacillin disc (6µg/ml) is considered as Methicillin resistant and MRSA is confirmed with oxacillin resistance in Muller Hinton agar with 4% NaCl. The other antibiotics tested were amikacin -30 µgm , ceftazidime -30 µgm, cephotoxime -30 µgm, ciprofloxacin -5 µgm, erythromycin -15 µgm, gentamicin -10 µgm, ofloxacin -5 µgm, penicillin -10units, tetracycline -30µgm, vancomycin -30 µgm. *S. aureus* strain ATCC 25923 is used as control strain.

RESULTS

Out of the 160 pus samples processed, 118 were culture positive. *Staphylococcus aureus* was found to be the most common pathogen, isolated from 63 samples. The other micro organisms isolated from the pus samples were coagulase negative *Staphylococcus* (CONS),

Pseudomonas sp., *Escherichia coli*, *Klebsiella* sp., *Proteus* sp., *Streptococcus* sp., and Diphtheroids.

Table 1: Micro organisms isolated from the pus samples

Micro organism	No of isolates	Percentage
<i>S.aureus</i>	63	39.4
CONS	27	16.9
<i>Pseudomonas</i>	20	12.5
<i>E.coli</i>	15	9.4
<i>Klebsiella</i>	15	9.4
<i>Proteus</i>	10	6.3
Streptococci	6	3.8
Diphtheroids	2	1.3
No growth	42	26.3

Methicillin resistance was found in 18 of the 63 *S.aureus* isolates. Of the 27 coagulase negative Staphylococcus, 6 (22.2%) isolates were Methicillin resistant.

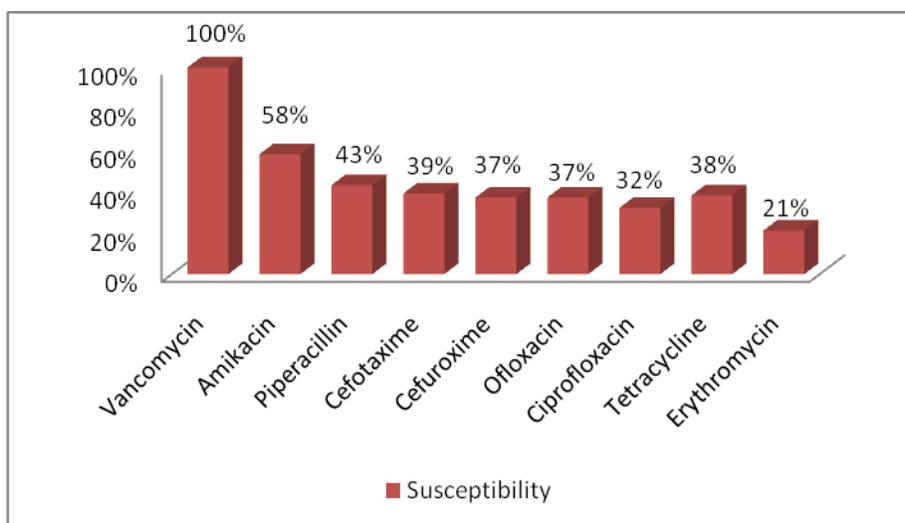


Figure 1: Antibiotic susceptibility pattern of MRSA isolates

All the MRSA strains were found to be sensitive to vancomycin.

DISCUSSION

MRSA is one of the established nosocomial pathogenic organisms with higher mortality and morbidity. MRSA is found to emerge from infected patients, hospital staffs and health care workers [6]. It is found to be resistant to many routinely used antibiotics in practice. In olden days, MRSA were found to be prevalent in intensive care units. But nowadays, it is becoming common in any clinical department. In our study, MRSA were found to be more in surgical wound infections especially from general surgery and orthopaedics department. Our study

included 160 pus samples, out of which *S. aureus* was isolated from 63 samples. *S. aureus* was found to be the most common organism isolated from pus cultures in our study. Coagulase negative *Staphylococcus* was the next common organism isolated (16.9%) followed by *Pseudomonas* (12.5%), *E. coli* (9.4%) and *Klebsiella* (9.4%). Forty two samples showed no growth in culture. MRSA were found to be prevalent in 28.6% of the *S. aureus* isolates. This is comparable to the previous literature [7, 8, 9, 10]. But the prevalence rate of MRSA (19.5%) was low in another study by Tahniwale *et al* [11] compared to our study. In contrast, few other studies show high prevalence rates of MRSA [12, 13].

The *S. aureus* isolates showed different antibiotic susceptibility pattern. Most of the MRSA strains were found to be multi drug resistant compared to the MSSA (Methicillin Sensitive *Staphylococcus aureus*) strains. In this study, the MRSA strains were found to be less sensitive to ofloxacin and ciprofloxacin (37% and 32%) and show relatively better susceptibility to amikacin (58%). This decrease in susceptibility to quinolones may be due to the indiscriminate use of these drugs. The MRSA strains show less susceptibility to cefotaxime (39%).

In our study, all the MRSA isolates were found to be susceptible to vancomycin, which may be used as the drug of choice for treating MRSA infections. This is similar to other studies by Kumari *et al*[14] and Arthy *et al*[15]. On the other hand, very few studies have showed decreased susceptibility of MRSA strains to vancomycin[16,17]. Hence Regular monitoring of the susceptibility to vancomycin and testing of newer drugs like teicoplanin is recommended.

CONCLUSION

MRSA is found to be more prevalent in the hospital setting. This not only creates lot of problems in treatment aspect, but also pressurizes the need for taking control measures to prevent the spread of MRSA strains in the community. Therefore, it is important to monitor the hospital and screen the samples for MRSA. Proper antibiotic policy must be evolved and adherent to. All clinical and para clinical faculties must be educated and trained regarding the control measures in preventing the spread of MRSA. Further multicentric studies are required for accurate assessment of the community prevalence of MRSA. Regular monitoring of vancomycin susceptibility is recommended. Testing of susceptibility to newer glycopeptides like teicoplanin helps in multidrug resistant cases.

REFERENCES

- [1] Neal J, Sharpe MD, Eugene H, Shively MD, Hiram C. American J Surg 2005; 189: 425-8.
- [2] Katayama Y, Zhang HZ, Hong D, Chambers HF. J Bacteriol 2003; 185: 5465-5472.
- [3] Jevons M. Br Med J 1961; 1: 124-125.
- [4] Salmenlinna S, Lyytikainen O, Vuopio-Varkila J. Emerging infectious diseases 2002; 8: 602-7.
- [5] Collier L, Balows A, Sussman M. Bacterial infections. Topley and Wilson's Microbiology and Microbial Infections. 9th Ed. Arnold publication 1998; vol 3: 231-56.



- [6] Nickersin EK, West TE, Day NP, Peacock SJ. Staphy-lococcus aureus disease and drug resistance in Lancet Infectious Diseases 2009; 9: 130-135.
- [7] Saikia L, Nath R Choudhary B, Sarkar M. Indian J Crit Care Med 2009; 13:156-8.
- [8] Rajaduraipandi K, Mani KR, Panneerselvam K, Mani M, Bhaskar M, Manikandan P. Ind J Med Microbiol 2006; 24: 34-8.
- [9] Mohanty S, Kapil A, Dhawan B, Das BK. Ind J Med Sci 2004; 58: 10-5.
- [10] Udaya SC, Harish BN, Umesh Kumar PM, Navaneeth BV. Indian J Med Microbiol 1997; 15: 137-8.
- [11] Tahnkiwale SS, Roy S, Jalgaonkar SV. Ind JMed Sci 2002; 56: 330-4.
- [12] Anupurba S, Sen MR, Nath G, Sharma BM, Gulati AK, Mohapatra TM. Indian J Med Microbiol 2003; 21: 49-51.
- [13] Vidhani S, Mehndiratta PL, Mathur MD. Indian J Med Microbiol 2001; 19: 87-90.
- [14] Kumari N, Mohapatra TM, Singh Y. J Nepal Med Assoc 2008; 47(170): 53-6
- [15] Arti Tyagi, Arti Kapil, Padma Singh. JIACM 2008; 9(1): 33-5.
- [16] Centres for Disease Control. MMWR 1997; 46: 765-6.
- [17] Hiramatsu K, Aritaka N, Manaki H. Lancet 1997; 350:1670-73.