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PREVALENCE AND ANTIMICROBIAL SUSCEPTIBILITY PROFILE OF METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS IN TERTIARY CARE HOSPITAL AT JAIPUR

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ABSTRACT Staphylococci are common human commensal and one of the leading cause of infections in human beings. Before the antibiotic era , invasive staphylococcal infections were fatal. Methicillin resistant S. aureus (MRSA) is strain of S. aureus bacterium that is resistant to a large group of antibiotics called the beta-lactams Now a days, MRSA is the main research area in most developed countries due to increased mortality and morbidity. Approximately 20-30% of healthy persons are persistent carriers of S. aureus and 60% are intermittent carriers with high colonization rates among high risk groups including hospital patients and children. In the present study, prevalence and antimicrobial susceptibility pattern of MRSA was reported. A total of 225 samples of Staphylococcus aureus were taken in the present study. Various clinical samples included in the study were pus swab, pus, blood & urine. Out of total 225 Staphylococcus aureus, 88 (39.11%) samples were found to be MRSA. The maximum isolation of MRSA was from pus swabs and pus. So, the present study indicates that there is high incidence of MRSA infections in MGMC&H and also these strains are resistant to most of the antibiotics.

KEYWORDS : MRSA, Pus Swab, Staphylococcus aureus, Resistant.

INTRODUCTION

Staphylococcus aureus is one of the leading cause of infections in humans.This pathogen is responsible for a wide variety of infections ranging from superficial, systemic and life threatening infections like endocarditis, septic arthritis, subcutaneous or visceral abscess. MRSA is resistant variant of Staphylococcus aureus which has acquired resistance to beta-lactam antibiotics like penicillin, cephalosporins and other antimicrobial agents. They are referred as "Super Bugs". From the year of the use of methicillin, methicillin resistant Staphylococcus aureus (MRSA) were reported worldwide and reached epidemic due to lack of awareness, indiscriminate use of antibiotics, prolonged hospital stay, receipt of antibiotics **(Anupuraba et al, 2003).** MRSA commonly causes hospital acquired infections so ofter resistance to most of the antibiotics is one of the most important challenge for antimicrobial therapy **(Dominique et al, 2002).** The development of resistance to multiple antibiotics and control of disease transmission by MRSA isolates in hospitals/ communities have been recognized as the major challenges as the bacterial population that expresses the resistance phenotype varies according to the environmental conditions **(Qureshi et al., 2004).** Serious MRSA infections occur globally in the hospitals and cause life threatening sepsis, endocarditis & osteomyelitis. Therefore the prevalence and current antimicrobial profile of MRSA is an important factor in selection of appropriate treatment of these infections So, the present study was undertaken to determine the antimicrobial susceptibility pattern of MRSA from different clinical specimens and carrier screening samples.

MATERIAL AND METHODS

The present study was carried out on 225 strains of staphylococcus aureus isolated from various clinical specimens submitted to Bacteriology Laboratory of Mahatma Gandhi Medical College & Hospital, Jaipur. The various clinical specimens included were Pus swab, pus, blood ,urine, sputum, ear swab etc.

Staphylococcus aureus were characterized by their morphology on gram staining , colony characteristics and coagulase production.

All the samples were processed aseptically. Subsequently, the clinical specimens were inoculated on blood agar plates (aerobic with 5% Co2), MacConkey agar and incubated at 37ºC for 24 hours. The colonies of Gram-positive cocci in clusters were further confirmed using biochemical reactions. All strains were further tested for the production of free coagulase enzyme using tube coagulase test based on standard methods **(Betty *et al.,* 2002).** *Staphylococcus aureus* ATTC-25923 of known coagulase production was included as control strain.

Testing for methicillin resistance was performed using the cefoxitin disc diffusion method recommended by the Clinical and Laboratory Standard Institute (CLSI, 2010). The isolates were considered methicillin resistant if zone of inhibition was 10 mm or less. Antibiogram was performed by modified Kirby Bauer Disc Diffusion method as per CLSI Standards against the following antibiotics-penicillin (10 units), amikacin (30µg), vancomycin (30µg), gentamicin (10µg), ampicillin (10µg), cefuroxime (30µg), cefotaxime (3µg), chloramphenicol (30 µg), erythromycin (15µg), oxacillin (1.0µg), co-trimoxazole (1.25/23.75 µg), clindamycin (2µg) and ofloxacin (10µg).

RESULTS & DISCUSSION

In the outdoor patients, the methicillin resistant Staphylococcus aureus isolation rate was 16.92% and in the indoor patients the isolation rate was 48.12% as shown in Table-1. Out of total 225 Staphylococcus aureus, maximum MRSA were found in pus swab sample (37.5%) followed by pus (30.68%), blood (15.9%), urine, throat swab, sputum (3.4%), wound swab (2.27%), ear swab, pleural fluid & semen (1.13%) as represented in Table-2

The antibiotic resistance pattern of methicillin resistant Staphylococcus aureus was 100% for Penicillin and 73% for Erythromycin. 67% were resistance to Clindamycin, 65% to cotrimaxazole and 32.9% to gentamycin They were also resistant to tetracycline, rifampicin, ciprofloxacin, linezolid and Cefoxitin as shown in Table 3. During the last few decades Staphylococcus aureus has been reported to be a major hospital acquired infection from all over the world and tertiary care hospitals. MRSA also expresses resistance against many more antibiotics, so patients are difficult to manage and create therapeutic problems . From the last few years, beta-lactamase resistant staphylococci and methicillin resistant staphylococci are being isolated in a increasing number from various clinical specimens submitted to the Microbiology Department, MGMC& H, Jaipur. Methicillin resistant Staphylococcus has emerged as an important agent of hospital infection in more sensitive areas like burn unit, ICU, immunocompromised patients & HIV. The important reservoirs of MRSA in hospitals are infected or colonized patients and transient hand carriage on the hands of health care and co workers is the major mode of transmission in causing invasive infections in the hospitalized patients. In different countries, the proportion of MRSA varied from 0.4% to 48.4% **(Sader et al, 2010).** In the present study prevalence was highest in pus swab and pus samples. These findings were in agreement with **Mehta etal (1998)** who also found the same observations in his study. In the present study, all strains were sensitive to vancomycin. All the strains were reported as resistant against Penicillin. This is due to injudicious use of these antimicrobial agents.

Vancomycin showed 100% sensitivity and can be used as a drug of choice against multi resistant MRSA infection. Vancomycin is considered inferior to β-lactams for the treatment of MSSA bacteraemia and endocarditis (Liu et al., 2011). Vancomycin which showed 100% sensitivity and so may be used as the reserved drug of choice for treating multidrug-resistant MRSA infections

Table 1 Distribution of Methicillin Resistant Staphylococcus aureus isolated from Indoor & Outdoor patients

	Total number of Staphylococcus aureus	Methicillin Resistant Staphylococcus aureus	Percentage
Outdoor	65	11	16.92
Indoor	160	77	48.12
Total	225	88	39.11

Table 2 Distribution of Methicillin Resistant Staphylococcus aureus according to various clinical specimens

S. No	Clinical Sample	No of Staphylococcus aureus	MRSA Strains	% of MRSA
1	Pus Swab	100	33	37.5
2	Pus	35	27	30.68
3	Blood	39	14	15.9
4	Urine	10	3	3.4
5	Throat Swab	10	3	3.4
6	Sputum	10	3	3.4
7	Wound Swab	15	2	2.27
8	Ear Swab	2	1	1.13
9	Pleural Fluid	2	1	1.13
10	Semen	2	1	1.13
	Total	225	88	39.11

Table 3 Resistance to Individual Antimicrobials in Methicillin Resistant Staphylococcus aureus

S.No	Antibiotic	Resistance %
1	Penicillin	**100**
2	Ertythromycin	**73**
3	Clindamycin	**67**
4	Cotrimoxazole	**65**
5	Gentamycin	**32.9**
6	Tetracycline	**12.5**
7	Rifampicin	**93**
8	Ciprofloxacin	**79**
9	Linezolid	**52**
10	Cefoxitin	**100**
11	Vancomycin	**0**

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