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Methicillin Resistant *Staphylococcus aureus*:Prevalence and Current Antibiotic Susceptibility Pattern from Various Clinical Samples at a Tertiary Care Hospital.

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I. Introduction:

Staphylococcus aureus is an important human pathogen causing wide spectrum of infections such as skin and soft tissue infections ,endovascular infections, pneumonia, septic arthritis, endocarditis, osteomyelitis and sepsis(1).It is considered as an important etiological agent of nosocomial or community acquired infection leading to serious infections (2).In recent years there is an increase in number of these bacteria showing resistance to Methicillin. Methicillin resistant staphylococcus aureus (MRSA) was first reported in 1961(2).It is a great cause of concern for clinicians as it was considered as the first line of choice in the treatment of staphylococcal infections. Resistance to methicillin implies resistance to Macrolides,Lincosamides, Aminoglycosides,Glycopeptides and all Beta lactam antibiotics (3).Methicillin resistance in *Staphylococcus aureus* is mediated by the mec A gene which codes for an additional penicillin binding protein PBP2 or PBP2a.

Now MRSA has become an endemic in India(4).The incidence of MRSA varies from 25 percent in western part of India to 50 percent and above in southern India (4)Various independant risk factors for MRSA has been reported which include immunesuppression, hemodialysis, peripheral malperfusion,old age,chronic kidney disease long hospital stay,Inadequate antibiotic treatment,indwelling devices,diabetes,decubitus ulcer.(5)

II. Materials And Methods

The present study was conducted between March 2019-May2019 over a period of three months .A total of 1489 samples such as sputum, pus, blood, body fluids, urine ,throat, ear, nasal and vaginal swabs were collected aseptically from various patients attending out patient and inpatient departments and they were processed as per the standard protocol. Gram staining was done from samples and later they were inoculated into Blood agar, MacConkey agar, Nutrient agar(Hi media laboratories Pvt Ltd) Mumbai. Bacterial colony showing typical characteristics of Gram positive cocci were subjected to gram staining, catalase,coagulase test and different biochemical tests as per the standard procedures. Antimicrobial susceptibility testing was done by the Kirby-Bauer's disc diffusion technique using CLSI guidelines(6). Antibiotics tested include Penicillin(10 units),Gentamicin(10µg),Cotrimaxazole(1.25/23.75µg),Ciprofloxacin(5µg),Erythromycin(15µg),Clindamycin(2 µg),Vancomycin(30µg),and Linezolid(30µg).Inoculum was prepared by putting isolated colony in saline from blood agar plate. Turbidity of the suspension was compared with 0.5 Mc Farland standard.All discs were put on a Mueller Hinton agar plate as per CLSI guidelines, *Staphylococcus aureus* ATCC 25923 was used as the quality control strain for disc diffusion.

III. Detection Of MRSA

MRSA was detected by using 30 µg of cefoxitin disc and /or oxacillin 1µg as per CLSI guidelines. Confirmation of methicillin resistance was done by inoculating on a HiCromeRapid MRSAagar plate(MP 1974Hi media) and the results were interpretated after 48 hours of incubation at 35°C.Greenish yellow colour colony indicates MRSA strain.

IV. Results

Among the 1489 Samples processed 349 number of isolates were *staphylococcus aureus.* Out of which 190 were MRSA. Among the 190 isolates of MRSA 119 were isolated from male patients and 71

number from female patients(Table-1).*Staphylococcus aureus* was more commonly isolated from blood samples followed by skin and soft tissue infections(Table-2). Antibiotic susceptibility testing results showed most of the staphylococcus aureus were remained sensitive to Amikacin, Co-trimaxazole, Azithromycin.There was no resistance documented against vancomycin and Linezolid(Table-3). Resistance to antibiotics among MRSA strains was more than that in Methicillin sensitive *Staphylococcus aureus* strains

Table-1 Age wise distribution of MRSA

	Number of Isolated *staphylococcus aureus* strains	Number of MRSA detected
MALE	232	119(51%)
FEMALE	117	71(60%)
TOTAL	349	190(54.4%)

Table-2 Isolation rate of MRSA from different samples

SAMPLES	Number of *Staphylococcus aureus* isolated	No of MRSA
PUS	70	37(52%)
URINE	60	20(33%)
BLOOD	137	104(75%)
STERILEBODY FLUIDS	25	9(37%)
RESPIRATORY SAMPLES	28	8(44%)
OTHERS	29	12(34%)
TOTAL	349	190(57%)

Table-3 Antibiotic sensitivity pattern of Staphylococcus aureus strains to different antimicrobial agents

Antibiotics	Resistant	Sensitive
PENICILLIN	89%	11%
METHICILLIN	54%	46%
AMIKACIN	18%	82%
CIPROFLOXACIN	58%	42%
ERYTHROMYCIN	85%	15%
AZITHROMYCIN	29%	71%
CLINDAMYCIN	49%	51%
COTRIMAXAZOLE	32%	68%
LINEZOLID	0	100
VANCOMYCIN	0	100

V. Discussion

MRSA is an important pathogen which needs strict monitoring as it can easily spread from health care workers to patients and from one patient to other. Methicillin resistance shown by staphylococcus aureus has been linked to acquisition of exogenous gene (*mecA)* Which is part of the staphylococcal cassette chromosome *mec(SCCmec)* C types(1-VII) and is under the control of mecI(a repressor) and mecR1 (a transducer)(5).

This study was done to find out prevalence of MRSA from various clinical samples and their antimicrobial resistance pattern.

In our study *Staphylococcus aureus* isolation rate from 1489 samples was 349.Among the 190 isolates of MRSA 119(62%) were isolated from males and 71(37%) from females showing higher rate of isolation in males which is comparable with a study by Mathan Raj et al(7).In our study Isolation rate of MRSA was around 57% in concordance with other studies done by Narasing etal and also similar to the studies done from India and USA.(3,8,9).In Europe the prevalence of MRSA varies, ranging from 0.4% in Sweden to 48.4%in Belgium (10).MRSA strains isolated more in number from blood stream infections followed by skin and soft tissue infections which is in concordance with study done in Iran where most of the isolates were from blood samples(11,12).Studies have shown that the prevalence of MRSA is not uniform in different parts of India(13). Among the various antibiotics tested Amikacin,Azithromycin and Cotrimaxazole showed less resistance pattern and all the isolates were sensitive to Linezolid and Vancomycin Which is similar to the study done by Soumya kaup et al in Tumkur.(14).

VI. Conclusion

Treatment of multi drug resistant MRSA is problematic for clinicians as the choice of antibiotics in such cases is very limited. Routine screening of MRSA and determining the complete antibiotic susceptibility pattern of the isolates must be done to treat the infections effectively.

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