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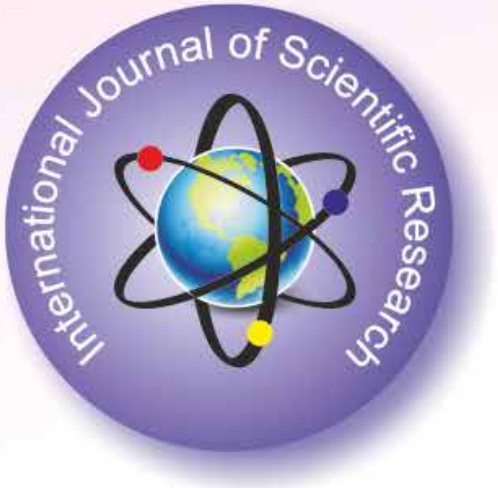

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Research Paper

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Prevalence And Antibiotic Susceptibility Pattern Of Methicillin-Resistant Staphylococcus Aureus In A Tertiary Care Hospital, Jamnagar, Gujarat.

Medical science

KEYWORDS : Prevalence, MRSA

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ABSTRACT

Methicillin resistantStaphylococcus aureus(MRSA) is an important nosocomial pathogen. The study was carried out to investigate the prevalence of MRSA and their rate of resistance to different antibiotics used for treatment. Identification of Staphylococcus aureuswas confirmed by standard methods and the antimicrobial susceptibility testing was performed by Kirby-Bauer disc diffusion method. Of the 191 isolates of Staphylococcus aureus, 58 isolates were identified as Methicillin Resistance Staphylococcus aureus (30.37%) and 7 were identified as Vancomycin Resistance Staphylococcus aureus (3.75%). During this study sensitivity of MRSA to linezolid is 93.10%, Ampicillin + Sulbactams(58.62%), levofloxacin (53.45%) ,Tetracycline (32.75%) , Lincomycin (29.31), Cotrimoxazole (13.80%) , Ciprofloxacin 10.34%, Roxythromycin (8.62%) and Gentamycin (2.74%). Findings presented in this study indicated a high level of resistance to widely used therapeutic agents. So, appropriate knowledge on the current antibiotic susceptibility pattern of MRSA is essential for appropriate therapeutic treatment. The study showed high prevalence of MRSA in hospital setting indicating need of good control measures such as proper hand hygiene and monitoring of susceptibility patterns of MRSA also help in preventing the spread of infections .

Introduction

Staphylococcus aureus is responsible for causing a variety of human infections, which may range from minor skin diseases to life-threatening infections.(1) Several mechanisms for the methicillin resistance seen in *S. aureus* have been detected. The most important is the production of a altered penicillin-binding protein (PBP) that has a low affinity for β-lactam antibiotics and whose effects are determined by several structural genes (*mec A*) (9,10). Other known mechanism of methicillin resistance is the hyper production of penicillinase enzyme (10,11). After the emergence of MRSA as a nosocomial pathogen in the early 1960s, there have been an increasing number of outbreaks of MRSA infections in hospitals reported from many countries. Methicillin-resistant *Staphylococcus aureus* (MRSA) is one of the most important nosocomial pathogens and has emerged as a serious threat to public health .(7)Life threatening sepsis and osteomyelitis caused by MRSA have also been reported.(8) Staphylococcus aureus infections usually respond to ß-lactam and related group of antibiotics but the emergence of *Methicillin-resistant S. aureus* (MRSA) has posed a serious therapeutic challenge.(2)Infected and colonized patients in hospitals mediate the dissemination of MRSA strains, and hospital staff is the main source of transmission.(3) The possible predisposing factors that increase the chance of emergence and spread of MRSA are prolonged and repeated hospitalization, indiscriminate use of antibiotics, lack of awareness of proper hygiene, intravenous drug abuse, and presence of indwelling medical devices.(4) MRSA strains are difficult to eradicate as they are multidrug-resistant(1) .Resistance has been reported to these drugs from various parts of the country.(5,6) The knowledge of prevalence of MRSA and their antimicrobial-susceptibility pattern is a must for appropriate treatment of these infections.

Material and Method:

Isolation and identification of clinical specimens

600 clinical specimens received at the microbiology laboratory in Gurugobindsingh hospital in Jamnagar, Gujarat during the period of January 2012 to May 2012. All samples were processed and inoculated on blood agar, nutrient agar and Macconkey agar. Out of all (600) samples, 191 staphylococci aureus were isolated. Staphylococi aureus were diagnosed by growth characteristics on Macconkey agar (pink colour colony), on Nutrient agar(large, circular, opaque colony) on Blood agar (greyish white colony), gram stain morphology(gram positive cocci in clusters), positive catalase test, positive coagulase test (slide & Tube coagulase test), growth on Mannitol salt agar & pigment characteristics (golden yellow).

Antibiotics susceptibility testing

The antibiotic susceptibility pattern of all the staphylococcal aureus strains were determined by modified Kirby Bauer disc diffusion method against the following antibiotics: Cotrimoxazole (25µg), Ampicillin-sulbactam (20µg), Tetracycline (30µg) cephalexin(30µg), Ciprofloxacin (5µg), Cloxacillin (1µg), Lincomycin (2µg), Gentamycin (10µg)and Linezolid(2µg). All tests were performed on Muller-Hinton agar and were interpreted after incubation for 24 h at 37°C. The zone diameters measured around each disk were interpreted on the basis of guidelines published by the Clinical and Laboratory Standards Institute (CLSI). S. aureus ATCC 25923 was used as a standard control strain.

Detection method for MRSA

Screening was performed according to CLSI guideline using cefoxitin disc (30 µg) diffusion testing method. From each strain, a suspension equivalent to 0.5 MacFarland was prepared. Then a swab was dipped and streaked on the surface of a Mueller-Hinton agar supplemented. After incubation for 24 h at 35°C .If the zone of inhibition is ≤21 mm in diameter the isolate was considered as a methicillin resistant.

Results: Of the 191 isolates of Staphylococcus aureus, 58 isolates were

identified as Methicillin Resistance Staphylococcus aureus (30.37%) and 7 were identified as Vancomycin Resistance Staphylococcus aureus (3.75%)

Table 1: Distribution of Staphylococcus From Various Clinical Specimens.

Clinical specimens	Number of isolates	MRSA	percentage
Urine	04	00	0%
Pus	132	43	32.58%
Sputum	02	01	50.00%
Fluids	02	00	0%
Blood Culture	47	11	18.97%
Miscellaneous	04	03	75%

Table 1 shows that out of 132 pus samples 43(32.58%) were MRSA positive, out of 47 blood culture 11(18.97%) were MRSA positive.

out of 4 miscellaneous samples 3 were MRSA positive and out of 2 sputum 1 (50.%) was MRSA positive.

Table 2: Frequency in percentage of sensitive strains of MRSA to various antibiotics

Ampicilin + Sullbactam (20mcg)	58.62%
Cotrimoxazole (20mcg)	13.80%
Tetracycline (30mcg)	32.75%
Cefotaxime (30mcg)	1.72%
Ciprofloxacin (5 mcg)	10.34%
Levofloxacin (5 mcg)	53.45%
Linezolid (30mcg)	93.10%
Roxythromycin	8.62%
Lincomycin (2mcg)	29.31%
Gentamycin (10mcg)	7.24%

Table 2 shows Linezolid has a maximum sensitivity of 93.10% followed by ampicillin+sulbactam 58.62%,levofloxacin 53.45%,Tetracycline32.75%,lincomycin 29.31%, cotrimoxazole 13.80%, ciprofloxacin 10.34%, roxythromycin 8.62%, gentamycin 7.24% and cefotaxime 1.72%.

Discussion:

MRSA is a major Nosocomial pathogen causing significant morbidity and mortality. The important reservoirs of MRSA in hospitals/institutions are infected or colonized patients and transient hand carriage is the predominant mode for patient-to-patient transmission. Methicillin was indicated for treatment of Staphylococcal infections due to penicillinase producing staphylococci. Methicillin resistant strains gradually evolved during last three decades which accounted for less than 0.1% of Staphylococcus aureus in 1960s. Since then MRSA have become well established as hospital acquired pathogen. In our study MRSA isolated were in majority form pus samples (74.13%),Followed by blood cultures (18.97%) ,miscellaneous 5.17% and from sputum 1.72%. In our study 30.37% of the total isolates of the Staphylococcus aureus were MRSA. In India, the incidence of MRSA shows a large variation, from 6.9% to 81%. Some studies have reported comparable prevalence: 54.8% in Uttar Prradesh, (Anupurba et al 2003)(4) , 52.9% in Assam (Assadullah et al 2003)(12). In contrast, other studies have reported entirely different prevalence: 80.89% in Indore (Verma et al 2000(13), 19.56% in Nagpur (Tahnkiwale et al 2002(14).The epidemiology of MRSA is gradually changing since its emergence was reported. Initially there were occasional reports but now it has become one of the established hospital acquired pathogen.. Antibiotic sensitivity results showed that all MRSA strains were significantly more resistant to antibiotics compared to Methicillin Sensitive Staphylococcus aureus(MSSA) isolates.The unavailability of vancomycin in many parts of the country and its high cost should make the physicians look for the alternatives. Therefore, regular surveillance of hospital-associated infections including antimicrobial susceptibility pattern of MRSA and formulation of a definite antibiotic policy may be helpful in reducing the burden of MRSA infections in the hospital.

CONCLUSION

The emergence of drug resistance in MRSA is worrisome in the present therapeutic scenario. A regular surveillance of hospital associated infection including monitoring antibiotic sensitivity pattern of MRSA is necessary

to controlling the spread in the hospital and strict antibiotic policy is of importance. According to this study, vancomycin and linezolid seems to be the only antimicrobial agents which shows higher sensitivity even with multidrug resistance. Vancomycin remains the first choice of treatment for MRSA and so vancomycin use should be limited to those cases where there are clearly needed.

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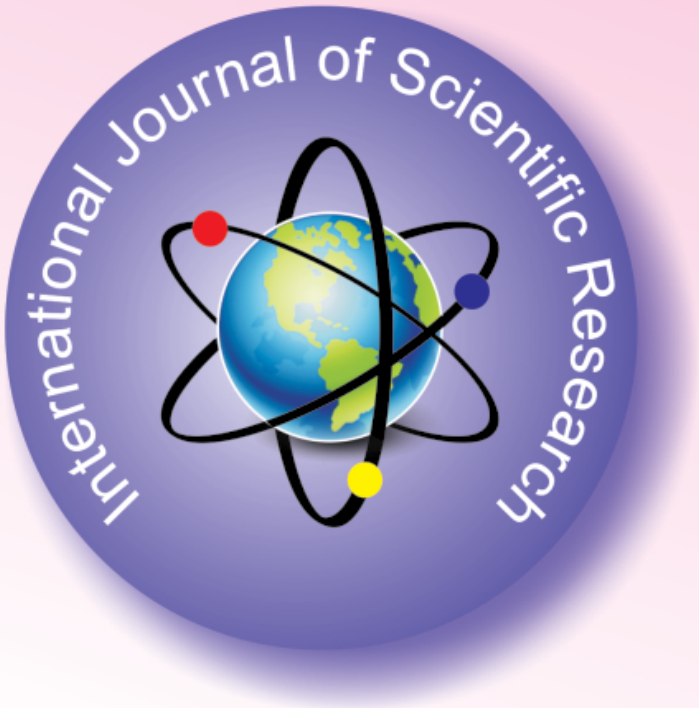

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