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Antibiotic Sensitivity Pattern of MRSA Isolated from Blood Cultures from Children

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Present study was undertaken to determine antibiotic sensitivity pattern of MRSA isolated from blood cultures from paediatric patients. A total number of 900 blood culture samples collected over a period of four years were taken into account. Out of 370 Staphylococcal isolates 125 isolates were found to be MRSA[33.7%]. The sensitivities of MRSA to various antibiotics were determined by disc diffusion method which showed the sensitivity pattern as to Vancomycin (100%), Linezolid (96%), Amikacin (67.2%), ciprofloxacin (16%), Cefuroxime (08%) and amoxicillin (7.2%). Findings presented in this study indicated hundred percent sensitivity to Vancomycin and a high level of resistance to widely used therapeutic agents.

Key words: MRSA, blood cultures, antibiotic sensitivity, children.

Blood culture is the gold standard for the diagnosis of septicemia even today.A wide variety of bacteria can produce septicemia.One of the major pathogens causing blood poisoning is Staphylococcus species,particularly MRSA. Methicillin-resistant Staphylococcus aureus (MRSA) are bacteria that are resistant to penicillinase-stable semisynthetic penicillins such as Methicillin, Nafcillin, Oxacillin and Cloxacillin. Blood stream infections are very common in the pediatric age group and these are one of the common causes of morbidity and mortality in neonates and children. The rate of blood stream infections in children is about 20-50% in developing countries[1], the blood stream infections constitute one of the most serious situations and, as a result, timely detection and identification of blood stream pathogen is important[2].

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1st case of MRSA was reported in England [Jovens 1961] Number of MRSA in USA has increased significantly.A 2007 report in Emerging Infectious Diseases, a publication of CDC , estimated that number of MRSA infections in Hospitals is doubled nationwide [1,27,000 in 1999 to 2,78,000 in 2005] and at the same time deaths increased from 11,000 to more than 17,000 [Klein *et al.* 2005] Present study includes antibiotic sensitivity pattern of MRSA isolated from blood cultures from paediatric patients.

MATERIALS AND METHODS

Total number of 900 blood specimens collected with aseptic precautions from Vitthal Nursing Home, Dharwad, Karnataka [during the period of Jan 2006 to Dec.2009] were included in the present study. Blood was collected in BHI blood culture bottles and incubated at 35ºC for 7 days.Culture bottles were discarded when there was no growth.Subcultures were done on selective and non-selective media like Nutrient agar, Mc Conkey's agar,Mannitol salt agar and

Staphylococcus agar. As recommended by NCCLS, the isolates of staphylococci were tested for Oxacillin susceptibility by agar screen method using 6 µg/ml Oxacillin.The isolated pathogens were identified by standard identification methods [biochemical and selective media identification]. All media and antibiotic discs were purchased from Hi media laboratories pvt.ltd.[Mumbai,India]

Antibacterial susceptibility testing

Susceptibility testing was performed by Kirby-Bauer technique (Bauer *et al*., 1966). The test organism was uniformly seeded over the Mueller-Hinton agar surface and exposed to a concentration gradient of antibiotic diffusing from antibiotic-impregnated paper disk into the agar medium. The isolate was then incubated at 35°C for 16–18 hours. Organisms sensitive to the antibiotic were inhibited from growing in a circular zone around the antibiotic impregnated paper disk. A comparison of the inhibition zone diameter that was produced by a control strain was used to interpret the antimicrobial sensitivity. Grades of sensitivity recognized are sensitive, intermediate and resistant by comparison of zone of inhibition as indicated[3-5].

Drugs tested against Gram-positive cocci were: Vancomycin(100%), Linezolid (96%). amikacin (31%), ciprofloxacin (16%), Cefuroxime (11%), amoxicillin(6.25%).

RESULTS

A total number of 900 blood culture samples collected over a period of four years were taken into account. Out of nine hundred samples no growth was observed in 245 cases. [27.2%] *Staph. aureus* could be grown in 370 cases [41%]. Other blood isolates were Klebsiella species, coagulase negative staphylococci, *Escherichia coli* and *Pseudomonas* species which were not included in the present study.

Out of 370 *Staphylococcal* isolates 125 isolates were found to be MRSA.[33.7%]

The sensitivities of methicillin resistant staphylococci to various antibiotics were as follows:

Vancomycin (100%), Linezolid (96%), Amikacin (67.2%), ciprofloxacin (16%), cefuroxime (08%), amoxicillin (7.2 %).

Table 1. Antibiotic-sensitivity of MRSA isolates

Drug	No. of cases Sensitive	% of Sensitive Isolates
1. Vancomycin	125	100%
3. Linezolid	120	96 %
4. Amikacin	84	67.2%
5. Ciprofloxicin	20	16%
6. Cefuroxime	10	08 %
7. Amoxycillin	9	7.2 %

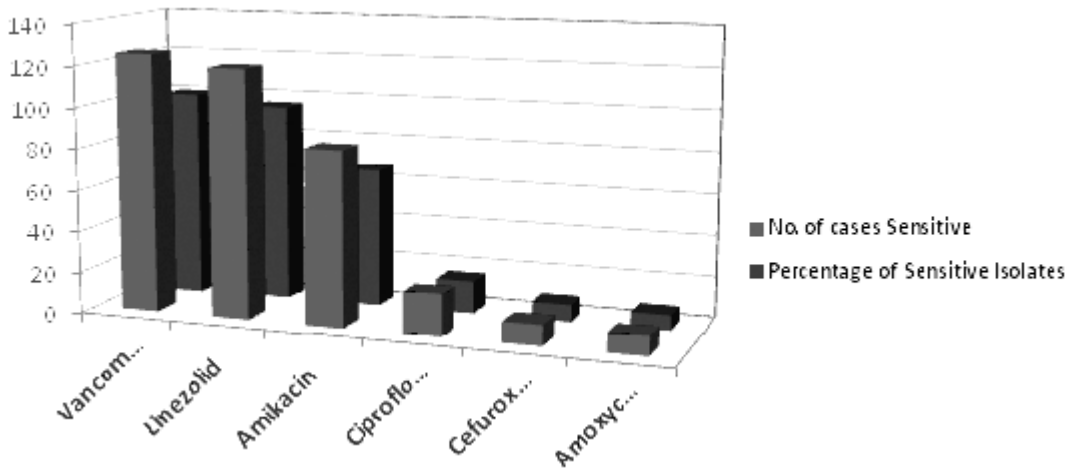

Fig. 1.

DISCUSSION

MRSA is a major nosocomial pathogen causing significant morbidity andmortality[6]. MRSA is a global phenomenon with a prevalence rate ranging from 2% in Netherland and Switzerland, 70% in Japan and Hong Kong[7,8]. In this study, the prevalence of MRSA was found to be 33.7 %and the prevalence and antibiotic susceptibility patterns of MRSA isolates obtained from blood cultures from children of less than 12 years were determined.

In the present study out of 370 Staphylococcal isolates 125 isolates were found to be MRSA[33.7%] Similar observation was made by Mehta, who in his study on control of MRSA in a tertiary care center, had reported an isolation rate of 33% from pus and wound swabs[9].

In ourstudy all the strains showed susceptibility to Vancomycin andmost of them were susceptible to linezolid. The significant and clinical relevant observation of this study is the moderate resistance shown by MRSA toAmikacin. Resistance to quinolones (ciprofloxacin) was high (84%) in this study which goes in par with the study done by Lahari Sakia et al.,where the resistant rate was(87.5%) in Assam[10].

Most of the strains were found to be resistant to cefuroxime and amoxicillin in the current study.

Vancomycin appeared to be the antimicrobial agents which showed 100% sensitivity and may be used as the drug of choice for treating multidrug resistant MRSA infections.However, regular monitoring of Vancomycin sensitivity should be carriedout.

CONCLUSION

1. There is a need for surveillance of MRSA and its antimicrobial profile.
2. The degree of resistance or sensitivity of MRSA towards commonly used antibiotics is recognized to be diverse from region to region and Vancomycin was the only antibiotic found to give uniform sensitivity (100%).
3. Our study enables epidemiologists to understand the nature of MRSA isolates in this part of India.

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