Prevalence of Methicillin Resistant Staphylococcus aureus in Children

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ABSTRACT

Background: Methicillin resistant Staphylococcus aureus (MRSA) has been reported world wide and is becoming a clinical threat. These strains are responsible for out break of nosocomial infection. MRSA strains in the Hospital are difficult to eradicate because of the multidrug resistance. This study was done to assess the prevalence of methicillin resistant Staphylococcus aureus (MRSA) in pediatric patients visiting Kanti children’s Hospital.

Methods: The study was conducted in the Department of Microbiology, Kanti children’s Hospital, and Kathmandu, Nepal during the period of February 2004 to July 2004. A total of 210 clinical samples including pus/ swabs from eye, ear, throat, vaginal, burn and wound were collected from admitted and Out –patients. All the collected samples were processed using standard protocols and analyzed for the presence of Staphylococcus aureus. All identified Staphylococcus aureus isolates from different clinical samples were subjected to in-Vitro antimicrobial susceptibility test by Kirby-Bauer disc diffusion method.

Results: A total of 210 clinical samples including pus/ swabs from eye, ear, throat, vaginal, burn and wound were collected from admitted and Out –patients. Among the 210 samples processed for the study, S. aureus isolates were obtained from 65 samples which constituted 45 (69.23%) were from outpatients and 20 (30.77%) were from hospitalized patients. Of 65 S. aureus isolates, 19 (29.23%) were found to be MRSA which constituted 13 (68.42%) from admitted patients and 6 (31.57%) from outdoor patients. Among the other antibiotics tested, 58.46%, 30.16%, 26.15% and 21.53% of S. aureus isolates showed resistant to ampicillin, cloxacinil, tetracclline and cinofloxacin respectively. All the MRSA isolates showed 100% resistant to ampicillin and cloxacinil, followed by cotrimoxazole (92.1%), tetracclline (40.5%) and cinofloxacin (34.7%). However, 100% isolates of MRSA were sensitive to vancomycin.

Conclusion: Vancomycin seemed to be the only antimicrobial agent 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 and routine testing of other newer antibiotics like teicoplanin should be carried out.

Key words: multidrug resistant, prevalence, Staphylococcus aureus

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The study was conducted in the Department of Microbiology, Kathmandu University Hospitals, KMC, Kathmandu, Nepal to study the prevalence of methicillin-resistant Staphylococcus aureus (MRSA) in our hospital. All clinical samples were collected from inpatients and outpatients during the period from January to July 2004. All the clinical samples were inoculated and incubated at 37°C for 24 hours. Colonies from the same sample were subjected to in vitro antimicrobial susceptibility test by Kirby-Bauer disk diffusion method.

### RESULTS

Of the 65 S. aureus isolates, 19 (29.23%) were found to be MRSA which constituted 13.19% from admitted patients and 3.27% from outpatients. Among the other antibiotics tested, 28.6%, 20.8%, 12.9%, 6.8%, 4.4%, 2.9%, 0.8%, and 0.8% of the MRSA isolates were sensitive to amoxicillin, ampicillin, trimethoprim, ciprofloxacin, tetracycline, clindamycin, chloramphenicol, and vancomycin, respectively. (Table 3).

### DISCUSSION

Our findings showed that 19 (29.23%) isolates of S. aureus were methicillin resistant. Other antibiotics were used in this study were cefotaxime, ceftriaxone, aztreonam, gentamicin, amikacin, imipenem, vancomycin, and teicoplanin.

### METHODS

The antibiotic used in this study were methicillin resitant Staphylococcus aureus (MRSA) isolates. Antibiotics susceptibility pattern of Staphylococcus aureus isolates was determined by using Staphylococcus aureus ATCC 29213 as reference strain.

### INTRODUCTION


dMethicillin-resistant Staphylococcus aureus (MRSA) is an important cause of nosocomial infections. MRSA is an emerging problem in the healthcare setting. In the last decade, as one of the most important nosocomial pathogens, infected and colonized patients provide the primary reservoir and transmission. The risk factors which contribute to hospitalization, intravenous catheterization and prolonged hospitalization, intravenous catheterization caused by MRSA are excessive antibiotic usage. The risk factors which contributed to infection with MRSA is further complicated by the increased and incidence of MRSA in intensive care unit. Therefore, the prevalence of MRSA and their antimicrobial resistance is of increasing concern.

The study was conducted in the Department of Microbiology, Kathmandu University Hospitals, KMC, Kathmandu, Nepal to study the prevalence and antibiotic susceptibility pattern of methicillin-resistant Staphylococcus aureus (MRSA) in our hospital. All clinical samples were collected from inpatients and outpatients during the period from January to July 2004. All the clinical samples were inoculated and incubated at 37°C for 24 hours. Colonies from the same sample were subjected to in vitro antimicrobial susceptibility test by Kirby-Bauer disk diffusion method.

### Table 1. Isolates of S. aureus in admitted and outpatients of different age groups

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No. of samples</th>
<th>No. of S. aureus isolates</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9 months</td>
<td>15</td>
<td>2</td>
<td>21%</td>
</tr>
<tr>
<td>10-12</td>
<td>22</td>
<td>4</td>
<td>18%</td>
</tr>
<tr>
<td>2-5</td>
<td>14</td>
<td>3</td>
<td>21%</td>
</tr>
<tr>
<td>6-9</td>
<td>18</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>10-12</td>
<td>5</td>
<td>2</td>
<td>40%</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>43</td>
<td>72%</td>
</tr>
</tbody>
</table>

### Table 2. Antibiotics susceptibility pattern of Staphylococcus aureus isolates

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Sensitive Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>28.6%</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>20.8%</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>12.9%</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>6.8%</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>4.4%</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>2.9%</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>0.8%</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

The accuracy of the over all testing procedure was monitored by using Staphylococcus aureus ATCC 29213 as reference strain.
so as to interpret the resistant pattern of S. aureus in regard with MRSA in which higher percentage of S. aureus isolates were found to be resistant to ampicillin (58.46%) followed by gentamicin (36.92%), cloxacillin (30.16%), tetracycline (26.15%) and ciprofloxacin (21.53%).

It has been observed that ciprofloxacin was the most effective drug (78.46%) for S. aureus followed by tetracycline (73.84%). This finding was higher in comparison to the finding of Pokharel et al (13%), Fraise et al (17%) in Nursing homes in major UK city. Tanaka et al (22%) at Tottori University Hospital, Japan and Raibhandari et al (54.9%) in Kathmandu, Nepal.2-10 There might be several risk factors for acquisition of MRSA. Patients having a history of previous hospitalization, increased length of hospitalization, acutely ill in an ICU, chronic disease state, prior and prolonged antibiotics therapy, exposure to colonized or infected patient, presence of wound and use of invasive indwelling devices (including endotracheal tubes) are some of the important risk factors associated with the acquisition of MRSA. However, this finding was agreement with another study conducted by Lamichhane et al (31.43%) in Kathmandu, Nepal.11

The drug resistance of MRSA was highest with ampicillin (100%) and cloxacillin (100%) followed by cotrimoxazole (92.1%), tetracycline (40.5%) and ciprofloxacin (34.7%). However, all MRSA strains were sensitive to vancomycin.

A similar type of study in India showed that vancomycin and Ciprofloxacin were the most effective drug for Staphylococcus aureus.12 The study in Shiraz-Iran also found that vancomycin (100%) was the most effective drug followed by chloramphenicol (94%) and ciprofloxacin (87%) for treating MRSA infections.13

MRSA from different clinical samples at Kanti Children's Hospital showed 100% resistance to penicillin, ampicillin, cloxacillin, and cephalaxin. However, all the MRSA isolates were sensitive to vancomycin (100%) Lamichhane et al.11

Raibhandari et al also studied antibiotic sensitivity pattern of MRSA and found that 100% strains of MRSA at Bir Hospital were sensitive to vancomycin.10

Hence, vancomycin is the drug of choice for MRSA infection. Vancomycin seems to be the only antimicrobial agent 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 and routine testing should be carried out. Further, the regular surveillance of hospital associated infections including monitoring antibiotic sensitivity pattern of MRSA and formulation of definitive antibiotic policy may be helpful for reducing the incidence of MRSA infection.

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REFERENCES

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