Methicillin-resistant *Staphylococcus aureus* in Clinical Samples of hospital located in Kathmandu Valley, Nepal

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ABSTRACT

Methicillin resistant *Staphylococcus aureus* is a major nosocomial pathogen and usually shows resistant to several antibiotics. Therefore the knowledge of current trend of MRSA and their antimicrobial profile is necessary. The main object of this study was to trace out the prevalence of MRSA from clinical isolates of tertiary hospital. During six months study, a total of 21 *S. aureus* isolates isolated from 630 specimens from pus and urine. Identification of *S. aureus* was confirmed by standard method. Antibiotic sensitivity test of isolates was done by Kirby Bauer's disc diffusion method. The overall prevalence of MRSA was 62.0% (13/21). MRSA infection was higher in outpatients (69.2%) than in inpatients (30.7%). The maximum isolates isolated from pus (64.7%). Isolates showed high resistance towards the co-trimoxazole and methicillin but 100.0% sensitive towards vancomycin. The high prevalence of MRSA found in this study might be due to hospital based specimen.

Keywords: methicillin resistance *Staphylococcus aureus*, antibiotic sensitivity test, patient

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INTRODUCTION

Methicillin was developed partly to solve the problem of Staphylococcus aureus being resistant to penicillin [1]. However, in 1961 methicillin resistant S. aureus (MRSA) were first reported in the UK [2]. They are now recognized globally as most important nosocomial pathogens [3] and also able to spread into community as well [4].

MRSA strain has developed resistance against the commonly used antibiotics (such as penicillins and cephalosporin). The development of such resistance does not cause the organism to be more intrinsically virulent than strains of S. aureus that have no antibiotic resistance but resistance does make MRSA infection more difficult to treat with other types of antibiotics and thus more dangerous [5]. In addition, emergence of resistance to vancomycin also have been reported, drug which is used for treatment of MRSA infections. Therefore, there is important to study the antibiogram of MRSA in hospital setting so that result of such studies helps to minimize irrational use of vancomycin when other antibiotics would cure an infection [6].

The percentage of hospitals isolation MRSA has varied throughout the world. In UK, 44.0% of S. aureus isolated from health care system are MRSA [7] and in Japan 60.0-70.0% of S. aureus are MRSA in inpatients [8]. Similarly, developing countries like Nepal there is an increasing trend; 29.1%-68.0% [9, 10, 11, 12]. Therefore, this study focused to determine the frequency MRSA and their antibiotic sensitivity pattern in a tertiary hospital of Kathmandu Valley.

MATERIALS AND METHODS

Sample Collection

During February- July (2010) a total of 630 clinical specimens (pus and urine) were collected and labeled. The samples were analyzed immediately.

Sample Processing and Bacterial Identification

Specimens were inoculated into MacConkey agar, Blood agar and incubated at 37^0 C for 24 hours. Then observed the colony characters and suspected colony was selected for Gram staining. Gram +ve cocci in clusters colony were processed for tests such as catalase (+ve), coagulase (+ve), VP (+ve) and mannitol fermenter were identified as S. aureus.

Antibiotic Susceptibility Testing

All the identified isolates of S. aureus were undertaken in-vitro antibiotic susceptibility test by using Kirby Bauer's disc diffusion method on Mueller Hinton agar with 24 hours incubation at 37^0 C The antibiotics used were Cefixime (5mcg/disc), Methicillin (30mcg/disc), Co-trimoxazole (25mcg/disc), Ofloxacin (5mcg/disc), Tetracycline (30mcg/disc), Gentamycin (10mcg/disc), Erythromycin (15mcg/disc), and Vancomycin (30mcg/disc). Interpretation was done as per recommendation of Clinical and Laboratory Standards Institute guidelines (CLSI).

RESULTS

Out of 21 S. aureus isolates, 13 (62.0%) were found to be methicillin resistant. Of these 64.7% were from pus 50.0% from urine (Table 1). A total of 13 MRSA isolates, 69.2% and 30.7% were isolated from outpatients and inpatients respectively (Table 2). Results of antibiotic sensitivity test showed the resistance pattern of S. aureus to different antibiotics includes co-trimoxazole (61.9%), cefixime (38.0%), gentamicin (38.0%), ofloxacin (23.8%), tetracycline (14.2%), erythromycin (14.2%) and vancomycin (0.0%) (Table 3).

Table 1: S.aureus and MRSA isolates from clinical specimens

Sample	S. aureus	MRSA (%)
Urine	4	2 (50.0%)
Pus	17	11 (64.7%)
Total	21	13 (62.0%)

Table 2: Distribution of S.aureus and MRSA isolates in and out patients

	S. aureus	MRSA (%)
Inpatient	8 (38%)	4 (30.7%)
Outpatient	13 (62%)	9 (69.2%)
Total	21	13 (62.0%)

Table 3: Antibiotic resistance pattern of S. aureus

Antibiotics	Resistance (%)
Methicillin	62.0
Co-trimoxazol	61.9
Cefixime	38.0
Gentamycin	38.0
Ofloxacin	23.8
Tetracycline	14.2
Erythromycin	14.2
Vancomycin	0.0

DISCUSSION

MRSA is a major nosocomial isolate in hospitals which is responsible for higher mobidity and mortality. In our study, MRSA was found to be 62.0%, which was in accordance with reports [7, 13-15]. On the contrary, some of the reports show an alarmingly high incidence of MRSA, ranges from 68.0%-80.0%. [9, 16, 17]. However, low prevalence rate of MRSA were also reported from international as well as national scenario [18-22]. The reason for variation in the percentage of isolation of MRSA might be due to from one region to another and also between different institutions in a given area [16]. In additional factors include indiscriminate use of

antibiotics [23], lack of awareness and failure to observe simple yet effective infection control precautions like strict patient isolation [24] and frequent hand washing by health care personnel [25].

In our study maximum (64.7%) isolation of MRSA has been from pus, which was almost accordance with reports [21, 26]. In the case of urine sample, MRSA isolates was found to be comparatively low [12, 19, 27] in comparison with our data, while Ahmad et al reported no MRSA. The difference in prevalence might be variation in practices and technique of diagnosis of sample.

The prevalence of MRSA was found to be higher in outpatient (69.2%, 9/13) than inpatient (30.0%, 4/13) which differs than data reported [21] in other hospital settings. This may be attributed to variation in sample size.

Research revealed that isolates were resistant to commonly used antibiotic except 100.0% sensitive towards vancomycin, which was similar with report [21, 28, 29]. Some reports reported high resistance pattern towards antibiotics [6, 9, 19]. The variations in resistance pattern of antibiotics might be due to the indiscriminate and empirical use of drugs, over utilization of antibiotics trying to sterilize the environment and also the inappropriate use of the antibiotics for treatment. In addition, free availability and self medication of antibiotics, lack of access to health facilities, inadequate public awareness, uncontrolled antibiotics use in agriculture, lack of adequate antimicrobial resistance surveillance and lack of updated national antibiotic polices and guidelines [30]. In this study, vancomycin seems to be the only antimicrobial agent which showed 100.0% sensitivity and may be used as the drug of choice for treating MRSA infections.

CONCLUSION

In Nepal Police Hospital this kind of determination of MRSA is not conducted till, where report showed a high prevalence of MRSA. Therefore, there is a need for surveillance of MRSA and definite antimicrobial policy may be helpful for reducing the incidence of these infections. In addition, regularly carrier pattern of health care workers should be conducted because they are directly responsible for causing NI.

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