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SCREENING FOR METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS AND DETECTION OF mecA GENE BY PCR AMONG THE HEALTH CARE WORKERS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background : Methicillin Resistant *Staphylococcus aureus* (MRSA) is recognized worldwide as a major nosocomial pathogen in hospitals. MRSA strains may spread readily in hospitals from colonised or infected persons. Screening for MRSA carriers among this population is necessary for nosocomial infection control.

AIMS & OBJECTIVES : The aim of the study was to determine the prevalence of MRSA and detection of mecA gene among the Health Care Workers (HCWs). The objective of the study was to screen HCWs for *Staphylococcus aureus* carriage and detection of mecA gene.

MATERIALS & METHODS : A total of 100 HCWs were screened for *Staphylococcus aureus* carriage. Using pre-moistened sterile cotton swabs, specimens collected from the anterior nares, palms and web spaces were cultured & identified by conventional methods for *Staphylococcus aureus*. The antimicrobial susceptibility test was performed. *Staphylococcus aureus* isolates were screened for methicillin resistance by Oxacillin (1 µg) disc diffusion, Oxacillin screen agar (6 µg/ml) and Cefoxitin (30 µg) disc diffusion & confirmed by detection of mecA gene by PCR.

RESULTS : Out of the 100 HCWs, 23 % were found to be *Staphylococcus aureus* carriers. The overall MRSA carrier rate was 10 %. Out of 10 MRSA carriers, 7 were from nasal and 3 were from web spaces . All 10 MRSA were detected by Oxacillin screen agar and Cefoxitin disc diffusion as against 8 MRSA by Oxacillin disc diffusion method. Male HCWs harboured statistically significant MRSA. All 10 MRSA isolates were positive for mecA gene by PCR.

CONCLUSION : Our study concludes that MRSA was prevalent in 10 % of HCW's and anterior nares was the commonest site. Male HCWs were predominant carriers of MRSA.. Cefoxitin disc diffusion method can be used as an alternative to the technically demanding PCR.

Keywords : Methicillin Resistant *Staphylococcus aureus* (MRSA), Health Care Workers (HCW's).

INTRODUCTION

Methicillin is an antibiotic derived from Penicillin, which has been used as a drug clinically since 1960[1]. Indiscriminate use of methicillin has led to resistance in *Staphylococcus aureus* [2,3]. Methicillin Resistant *Staphylococcus aureus* (MRSA) is recognized worldwide as a major nosocomial pathogen [4,] . MRSA is due to expression of the mecA gene. Presence of abnormal PBP-2a which has low affinity to beta-lactam antibiotics, is responsible for the resultant resistance to Staphylococci [1,5]. MRSA strains may spread readily in hospitals from colonised or infected persons. Colonised employees are generally asymptomatic, although they are a potential reservoir of infections acquired by patients. [6,7] Although, MRSA strains have not been shown to be more virulent than *Staphylococcus aureus*,[6,8] very high mortality rates have been reported from several centres. [6,9] Screening for MRSA carriers among this population is necessary for nosocomial infection control[7]. The most effective preventive tool is rapid confirmation of MRSA existence, followed by efficient execution by infection control measures. The aim of the study was to determine the prevalence of MRSA and detection of mecA gene among the Health Care Workers (HCWs). The objective of the study was to screen HCWs for MRSA carriage by Oxacillin disc diffusion (1 µg), Oxacillin screen agar (6 µg / ml), Cefoxitin (30 µg) disc diffusion method and mecA gene detection by PCR technique.

MATERIALS & METHODS

A total of 100 HCWs were screened for *Staphylococcus aureus* carriage. Using premoistened sterile cotton swabs, specimens were collected from the anterior

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Cefoxitin disc diffusion sensitivity reported by K.B Anand et al [20] and by Annie Felten et al[21] shows 96.8 %, 100 % and 96.4 %, 100 % respectively. In our study, both Oxacillin screen agar and Cefoxitin disc diffusion methods showed 100 % sensitivity (Table.1). However, Oxacillin screen agar generally does not detect borderline resistant strains, especially when these strains have heterogeneous resistance nature. [22] The conventional culture technique for MRSA diagnosis is common and inexpensive. However, such techniques are time consuming, taking 48 - 72 hrs and standardization is difficult [1]. Since 1980, molecular techniques have been performed in MRSA diagnosis, these techniques display the highest level of sensitivity and allow simultaneous detection of *Staphylococcus aureus* and the mecA gene [23]. Also, because molecular techniques can utilize collected samples directly, the time required is also much shorter than for standard diagnostic techniques [24]. Similar to previous studies, our study also detected mecA gene from all MRSA isolates. Results of Cefoxitin disc diffusion test is in concordance with the PCR for mecA gene and thus the Cefoxitin disc diffusion method is very suitable for detection of MRSA and the test can be an alternative to PCR for detection of MRSA in resource constraint settings. Prevention of MRSA infection merits discussion as once introduced in a hospital, MRSA are very difficult to eradicate. Whether the eradication of MRSA carrier state will lead to a decreased rate of MRSA infection is yet to be documented. Local therapy with Mupirocin ointment has been shown to eliminate MRSA nasal colonisation in both patients and hospital personnel, but recolonisation often occurs after therapy is discontinued. It is possible that long term intermittent therapy with Mupirocin may be more effective in suppressing or eradicating MRSA colonisation.[8]

CONCLUSION

Our study concludes that MRSA was prevalent in 10 % of HCWs and anterior nares is the commonest site for MRSA carriage. Male HCWs (13.78%) were predominant carriers of MRSA. Cefoxitin disc diffusion shows 100 % sensitivity in comparison to mecA gene detection by PCR. Hence, Cefoxitin disc diffusion method can be used as an alternative to the technically demanding PCR. Since nasal carriage of MRSA in HCWs is asymptomatic, screening is extremely advantageous to prevent transmission and occurrence of nosocomial MRSA infections.

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