

PREVALENCE OF METHICILLIN RESISTANT *STAPHYLOCOCCUS AUREUS* AMONGST HEALTH CARE WORKERS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To determine prevalence of methicillin resistant *Staphylococcus aureus* amongst Health Care Workers in a Tertiary Care Hospital Southern Punjab.

Study design: Descriptive cross sectional.

Place & duration of study: The study was carried out at department of microbiology, Cantonment Military Hospital, Bahawalpur from 1st Jan 2016 through 1st July 2016.

Materials and Methods: The study was a descriptive cross sectional. A total of 150 Health care workers were selected for the study from different units of the hospital. Swabs from nose and axilla of the health care workers were included in the study. Identification of isolates was done by standard biochemical profile of the organisms. The antimicrobial susceptibility of culture positive isolates was performed by disk diffusion method using cefoxitin as recommended by Clinical Laboratory Standard Institute guidelines (CLSI) [13].

Results: Out of the total 150 Health care workers 33(22%) were MRSA positive. The culture positive isolates revealed that 12 (36%) MRSA were from axillary region while rest 21(64%) from nose (ant nares). The highest carriage rate for MRSA was amongst the nurses 15(46%) followed by OT staff 9(27%), civilian staff 3(9%), outdoor patient departments staff 3(9%) and doctors 3(9%).

Conclusion: MRSA is quite prevalent among the health care workers. There is a need of developing awareness amongst the health care professionals about the acquisition of the pathogen and its eradication as it poses a threat to the immuno-compromised patients admitted in hospitals.

Key words: Antibiotic susceptibility, Health care workers, Methicillin Resistant *Staphylococcus aureus*.

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INTRODUCTION

Staphylococcus aureus is the most common nosocomial pathogen. Normally healthy adults carry this potential pathogen as persistent nasal carriers in about 20% of the individuals whereas 60% harbour this organism intermittently and play a key role in the epidemiology and pathogenesis of infection [1]. Methicillin Resistant *Staphylococcus aureus* (MRSA) is very common and has spread worldwide in last two decades. They include community acquired MRSA and hospital acquired MRSA infections [2]. The indigenous sources i.e axilla and nasal carriage of MRSA (hospital and community acquired) increases the risk for surgical site infections, foreign body infections and bacteremias [3].

One of the studies revealed the hospital acquired

strain of MRSA which harbored the nares of the nurse and was present in two different neonatal nurseries [4]. Staphylococcal nasal carriage rate, both MSSA and MRSA, in health care workers (HCWs) from Rawalpindi and other areas in Pakistan is also variable [5,6]. The transmission of the nosocomial MRSA from the health care worker to the patients is much higher [7].

Coagulase negative staphylococci (CoNS), found as normal flora in anterior nares can become pathogenic, in the immuno-compromised host. CoNS are the most common cause of hospital acquired blood stream and indwelling catheters infections. Methicillin-resistant CoNS (MRCoNS) are found to be an important cause of endemic and epidemic nosocomial infections worldwide [8].

Persistent nasal carriers are source of infections to patients and outbreaks of different staphylococcal infections [9,10]. With the passage of

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time MRSA have been found to be the leading cause of hospital acquired infections worldwide since the discovery of first isolate of MRSA which was discovered in 1960s [11]. Several studies have been carried out in different areas of the world which proved that elimination of the carriers from anterior nares, reduces the chances of *S. aureus* infections. Otherwise it has potential to develop widespread antimicrobial resistance [12]. The objective of our study was to determine the prevalence of the staphylococci in anterior nares and axilla of HCWs in a tertiary care hospital in Bahawalpur.

MATERIALS AND METHODS

A total of 150 specimens from nose and axilla of HCW were included in this study. Non-probability consecutive sampling was done. All HCW undergoing any treatment were excluded from the study.

Data collection procedures: Specimens from nose and axilla were inoculated on blood agar (Mast Diagnostics, UK) and incubated aerobically at $35^{\circ}\text{C} \pm 2$ for 24 hours. After identification of Gram positive cocci by colony morphology, Gram staining and biochemical reactions, the isolates were screened for MRSA with cefoxitin 30 μg disc (Oxoid, UK) by Kirby-Bauer disc diffusion technique according to Clinical Laboratory Standards Institute (CLSI) guidelines. The isolates with cefoxitin zone diameter more than 22mm were confirmed as MRSA [13].

According to CLSI guidelines, inoculum of bacterial suspension (0.5 McFarland standards) was inoculated on Mueller-Hinton agar (MAST Diagnostics, UK) followed by application of cefoxitin 30 μg (Oxoid, UK). The plates were incubated aerobically at $35^{\circ}\text{C} \pm 2$ for 24 hours (Figure-1). Zone of inhibition around the discs were interpreted as per CLSI guidelines [13]. ATCC 5923 of staphylococcus aureus was used as control stain. The data was analyzed using SPSS version 21. The

prevalence of organisms was determined and expressed.

RESULTS

Out of the total 150 health care workers 33(22%) were MRSA positive. The culture positive isolates revealed that 12 (36%) MRSA were from axillary region while rest 21(64%) from nose (anterior nares). The highest carriage rate for MRSA was amongst the nurses 15(46%) followed by OT staff 9(27%), civilians 3(9%), outdoor patient departments 3(9%) and doctors 3(9%).

All isolates taken from nose and axilla were tested against Cefoxitin to determine either they are MRSA or normal flora of an individual. The age of HCWs ranged from 20 to 50 years, with large number around 30 years of age. The prevalence of MRSA isolates is shown in Figure-2.

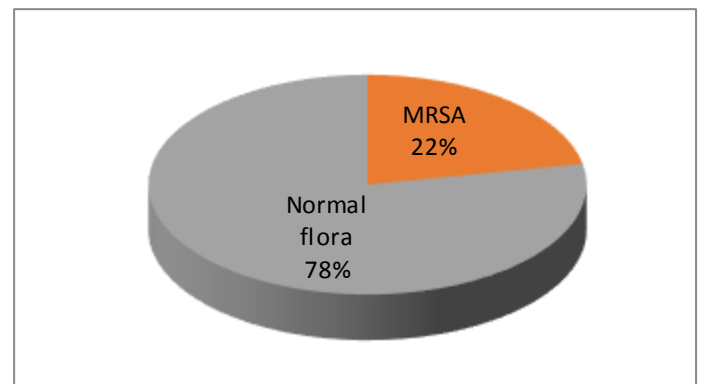


Figure-1: Percentage of MRSA isolates (n=150).

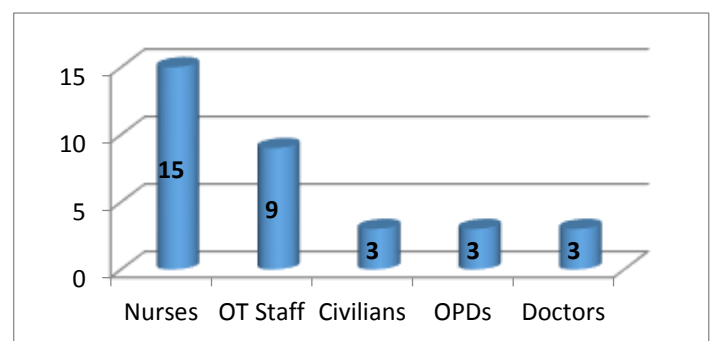


Figure-2: Prevalence of MRSA isolates amongst HCW (n=150).

DISCUSSION

Staphylococcal infection is the most frequent bacterial infection encountered in clinical practice. Screening of the health care workers for MRSA is

one of the fundamental in controlling the spread of infections to the patient admitted in hospitals [14]. MRSA prevalence and its antimicrobial profile is used for appropriate antimicrobial empirical treatment [15]. In our study 72 % were male and 28% were females, the likely reason for this big difference is the fact that, population group under study has male predominance because of the military setup. Majority of isolates taken from staff were from between the ages 20 to 50 years. The analysis of the data showed that MRSA may be encountered in any age group.

Our study showed that 22% of the health care workers were the carriers of MRSA which is in contrast with the study carried out at Holy Family Hospital, Rawalpindi, during the period from May 2007 to April 2008 in which only 1.2 % of the health care workers were MRSA carriers [16]. Slightly varying carrier rate was observed from 14% in Pakistan to 40% in a neighboring country like India [17,18]. This difference is because of differences in geographical distribution, quality, size of samples and different culture methods used for the detection of MRSA.

In our study 46% of the MRSA were from the nurses followed by OT staff 27%. Literature review from a study carried out in India in 2011 showed similar trends of nasal carriage of MRSA where 31% of nurses were the carriers of this organism.¹⁹ The reason for this is the frequent interaction of nurses and OT staff with the patients of MRSA and lack of awareness about this hazardous organism. This trend of large carriage rate in HCWs working in different wards, staff in operation rooms and delivery rooms is alarming as they can be a source of MRSA transmission to neonates and immune-compromised patients.

Every effort should be made to control the spread and to eradicate MRSA in hospitals. It can be achieved through surveillance, use of barrier nursing, hand hygiene and proper washing and isolation of the colonizers. Further, there is an edge in eradication of

the MRSA from the health care workers through effective hospital infection control policies. Decolonization of this microorganism is also very effective in controlling the spread through Mupirocin ointments and triclosan shampoos are very effective in limiting this hazardous agent and has shown excellent results [20].

Our study does have limitations. One major limitation is that Mupirocin was not tested. This is done not by choice but due to non-availability of mupirocin discs for susceptibility testing.

CONCLUSION

MRSA is definitely a big problem for a developing country like Pakistan. Every effort should be made not only to limit its spread to the HCW's and their family members but also to limit the vicious circle and spread to immune-compromised patients. There is a need to develop awareness amongst the health care professionals regarding the standard precautionary measures aimed at the acquisition and transmission of these multi drug resistant pathogens.

AUTHORS CONTRIBUTION

Faisal Hanif, Inam Ullah Khan, Muhammad Fayyaz: Are from Microbiology department and help process the samples.

Muhammad Ahmed Khan: From ENT department helped to collect various samples from hospital.

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