Research Article

SUPERBUG METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) - CAN WE CATCH UP WITH THIS? *Pallavi Sayal, Kanwardeep Singh and Pushpa Devi

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ABSTRACT

MRSA is a major cause of nosocomial infections worldwide. The MRSA prevalence from several centres in India, reported range from 20-80%. Serious endemic and epidemic MRSA infections occur globally as infected and colonised patients in the health care settings are the reservoirs. Transient hand carriage by the health care workers is the predominant mode for patient-to -patient transmission. In the face of increasing resistance and new threats such as community-acquired methicillin-resistant S. aureus (CA-MRSA), there is a need to re-emphasize the role of personal and institutional hygiene and of well-known methods for preventing bacterial transmission within an individual, among family and household members, within the community and within hospitals.

Keywords: Staphylococcus aureus, Nosocomial Infections

INTRODUCTION

The widespread use of antimicrobial agents, in combination with insufficient infection control measures, is the main driver of the current pandemic of antimicrobial resistance in human pathogens. Methicillin resistant *Staphylococcus aureus* (MRSA) is an important nosocomial pathogen causing significant mortality and morbidity. It is associated with a wide spectrum of infections ranging from mild skin and soft tissue infections to life threatening sepsis. MRSA is a resistant variant of *Staphylococcus aureus* which has evolved an ability to survive treatment with beta lactam antibiotics which includes penicillin, methicillin and cephalosporins and to various other groups of antimicrobial agents. They are often referred to as superbugs (Moreillon *et al.*, 2005). A significant concern now is the spreading of MRSA in the community, possibly because of antibiotic pressure and transfer from hospital settings (Chastre, 2008). Accurate and rapid identification of MRSA and their antimicrobial susceptibility profile is therefore necessary for the selection of appropriate therapy (Mohanasoundaram and Lalitha, 2008). This study was carried out to determine the prevalence of MRSA and their susceptibility pattern to various antimicrobial agents.

MATERIALS AND METHODS

280 *Staphylococcus aureus* isolated from a total of 4840 exudative specimens (like pus, wound swab ear swab, body fluids) blood, respiratory secretions. The study was approved by the Institute Ethical committee. The clinical details of the patients were recorded on pre printed performa along with informed consent. Two samples were taken , first at the time of admission and another after 48 hours, samples were cultured on MacConkey agar and blood agar and incubated overnight aerobically at 37° C. *Staphylococcus aureus* strains isolated from cultures of specimens from patients who have been hospitalised for more than 48 hours were included in the study. Isolates were characterised by their morphology on Gram staining, growth characteristics and was identified by conventional microbiological techniques (Collee *et al.*, 2006), and were subjected to susceptibility testing by disc diffusion technique according to the Clinical Laboratory Standards International(CLSI) guidelines with quality controls (*Staphylococcus aureus* ATCC 25923) (Wayne, 2006). Methicillin resistance was screened by disc diffusion method using 30µg cefoxitin disk (Hi Media). The diameter of the zone of inhibition was measured and interpretation was done in accordance with the CLSI guidelines (Wayne, 2006). Since *Staphylococcus aureus* can be a coloniser (Moreillon *et al.*, 2005), special emphasis was laid on the

International Journal of Basic and Applied Medical Sciences ISSN: 2277-2103 (Online) An Open Access, Online International Journal Available at http://www.cibtech.org/jms.htm 2014 Vol. 4 (1) January-April, pp. 56-58/Sayal et al.

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clinical significance of all the isolates. This was done by correlating with Gram stained smear examination and ascertaining significance with the clinical history.

RESULTS AND DISCUSSION

Results

In our institute prevalence of hospital acquired MRSA in Intensive care unit (ICU) was found to be 23.89% in 2010 followed by 29.78% in 2011 and 33.58% in our present study. These MRSA isolates were associated with a high degree of co-resistance to other groups of antimicrobial agents as compared to Methicillin sensitive staphylococcus (MSSA) (Figure 1). Our study documents majority of MRSA appears to be hospital acquired.

Gradual increase in prevalence of MRSA in our institution shows that infection control policies have not been followed by the hospital staff. Clinical and para-clinical personal are not aware of the magnitude of the issue. So the Microbiology department took initiative and made them aware of problems associated with MRSA and likely possibility of spread of hospital acquired MRSA strains into the community. We educated para-medical staff regarding proper hand washing and emphasised them to follow the strict protocols for six months. After six months of intense training the staff we again took samples from the patients admitted in ICU as per above mentioned protocols and found prevalence of MRSA has decreased from 33.58% to 29.12%.



Figure 1: Resistance of MRSA and MSSA strains to individual antimicrobial agents

Commerically available (Hi media) antibiotic discs included penicillin (2IU), cephalexin ($30\mu g$), gentamycin ($10\mu g$), amikacin ($30\mu g$), erythromycin ($30\mu g$), ciprofloxacin ($5\mu g$), vancomycin ($30\mu g$), and linezolid ($30\mu g$). Interpretation was done as per CLSI standards (Wayne, 2006).

Discussion

MRSA is a major cause of nosocomial infections worldwide. The MRSA prevalence from several centres in India, reported range from 20-80% (Mohanasoundram and Lalitha, 2008; Mulla *et al.*, 2007). Serious endemic and epidemic MRSA infections occur globally as infected and colonised patients in the health care settings are the reservoirs. Transient hand carriage by the health care workers is the predominant

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mode for patient-to -patient transmission (Moreillon *et al.*, 2005). In the face of increasing resistance and new threats such as community-acquired methicillin-resistant S. aureus (CA-MRSA) (Grundmann *et al.*, 2006), there is a need to re-emphasize the role of personal and institutional hygiene and of well-known methods for preventing bacterial transmission within an individual, among family and household members, within the community and within hospitals. In hospitals, handwashing practices, which have been shown to be the leading intervention for limiting the spread of nosocomial infections, should be improved to meet recommended guidelines. Increased awareness to control spread of infections and initiatives to reduce inappropriate use of antimicrobial drugs should be implemented, especially in high-risk groups such as immunodeficient persons, children, and elderly persons.

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