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Detection of MRSA in Medical and Nursing Students Not Exposed to Patient Care Environment

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ABSTRACT

Staphylococcus aureus is part of the normal flora of human skin and nasal passages. Healthcare workers comprise a unique population at risk for MRSA acquisition. We conducted a cross sectional study to determine the prevalence of S. aureus nasal carriers, and MRSA among preclinical medical and nursing students for chances of accusation of CA-MRSA. The present study involved 220 students, comprising of 120 medical and 100 nursing students respectively. Upon identification, the antibiotic susceptibility of the isolates was done followed with Chi-square analysis. The nasal carriage of MRSA among medical and nursing non-clinical groups were (6%) and (8%) respectively, even though they were unexposed to Hospital environment. The study enlightens that acquiring of MRSA is not a phenomenon associated only with the hospital environment, but people acquire the MRSA in the community even in higher proportions, proving that the threat of MRSA from unexpected corners and needs a careful watch on the prevention of MRSA related infections, in the Hospitals and Community.

KEYWORDS: Medical students, Staphylococcus aureus, Methicillin Resistant Staphylococcus aureus, Antibiotic resistance, Nasal carriage

Introduction

Staphylococcus aureus is a dynamic and adaptable bacterium that has an incredible talent to attain antibiotic resistance. Methicillin resistant *Staphylococcus aureus* (MRSA) strains had rapidly emerged during 1960 and became a major problem in hospitals immediately after the Methicillin was introduced in 1959.[1]It become a major nosocomial pathogen in community, hospitals, long term care facilities and tertiary care hospitals. Methicillin resistant *S.aureus* colonisation precedes infection, anterior nares being the ecological niches of *S. aureus.*

Till recent times these MRSA strains were restricted to hospitals only as Health care associated MRSA (HA-MRSA). But now these strains have also emerged in the community, called as Community associated MRSA (CA-MRSA). Its transmission is usually associated with a dermatological condition, diabetes mellitus, smoking, or sharing of closed livings. Sporadic reports of CA-MRSA infections have been appearing since 1980 but 1999 marked the beginning of an epidemic in USA. The numbers of both community-associated and health care-associated staphylococcal infections have increased in recent decades.[2,3]

Few studies have analysed whether this patient exposure creates a risk of MRSA carriage in medical and nursing students, especially in the Indian setting. To study these issues, we have evaluated MRSA carriage rates among first year medical, nursing students at our medical and nursing colleges. First year students were entirely based at a single college campus without hospital exposure. The present study aims at understanding the prevalence of the nasal carrier state of *S.aureus* and MRSA in the anterior nares of nonclinical Medical and Nursing students non-exposed to patient care areas.

Materials and Methods

The study was designed to investigate the nasal colonization of *S.aureus* and nasal carrier rate of Methicillin resistant *Staphylococcus species* in nonexposed control group (first year) medical and nursing students after Institutional Ethical committees' permission.

The study was conducted over a period of one year from January 2012 to 2013 in the Department of Microbiology. A total of 220 nasal swabs were collected from both medical (120swabs) and nursing nonclinical groups (100 swabs). Healthy medical and nursing students who were not suffering from any upper respiratory tract infection and not received any antibiotics for the past 15 days were selected for the study. Informed consent obtained from all the volunteers.

Collection and Processing of nasal swab

Sterile cotton wool swabs moistened with sterile normal saline were used to collect the specimen from the anterior nares. The swabs were rubbed very well by rotating 5 times over the inner wall of the ala and nasal septum and immediately processed for culture and isolation. Swabs were cultured on Chrome agar (Biomerux) and then incubated at 37^{0}C for 24hrs. All the swabs were analyzed for presence of Methicillin resistant S*taphylococcus species* using standard microbiological techniques.[4] Staphylococcus aureus ATCC-25923 of known coagulase producing standard strain was included as control strain. Repeat swabs were collected from the Methicillin resistant *Staphylococcus* positives for confirmation.

Susceptibility testing

Methicillin resistance was tested using Mueller- Hinton agar with 4% NaCl with cefoxitin disc (30 µg) by Kirby-Bauer disc diffusion method. Plates were incubated at 37^{0}C for 24 hrs. A zone size of 23-29 mm was considered sensitive as per CLSI 2012 guidelines.

Results

Out of 220 nasal swabs processed *S.aureus* colonization was identified in (39%). Prevalence rate of MRSA from medical non clinical were (6%). The prevalence rate of MRSA in nursing non clinical groups were (8%) (Table -1). The mean ages of participants were 19 years (range 18–20 years) with a male-to-female ratio of 2:4.

Table-1.
Total number of nasal carriers of MRSA in nonexposed groups

Students	Total Swabs- 220	MRSA Positive (%)
Medical students	120	7 (6 %)
Nursing students	100	8 (8%)
Both Groups	220	15 (6.8%)

Discussion

Most invasive infections are assumed to originate from nasal carriage. Hence, it is imperative that nasal carriage due to *S.aureus* strains should be prevented. Although nasal carriage of *S.aureus* is harmless in healthy individuals, they can become carriers who could pose the risk of spreading infections to the community at large. The present study shows that the prevalence rate of nasal carrier state of *S.aureus* among the healthy preclinical Medical and nursing students are found to be 39%. "CA-MRSA" defined as a patient without previous exposure to Hospital environment[5].A higher nasal carriage rate of *S.aureus* by female subjects aged over 20 years, than by male subjects has been reported showed similar study in a survey of Nigerian students in the study of. [6]

Adesida et al.2007 Nigeria have reported 14% Medical students carrying *S.aureus* in their nose, compared to 22.0% seen among the Medical and Nursing students from Japan Uemura et al.,2007.[7,8] Santhosh *et al* 2007 reported nasal colonization rate of 23.7% among Malaysian pre-clinical students studying in India who have yet to be exposed to healthcare environment.[9] So due to the prevalence of nasal carriers of *S.aureus,* awareness could have been triggered in the medical and nursing students to follow precautionary measures such as washing hand after touching the nose.

Conclusion

The prevalence of nasal carriage of *S. aureus* is high and increasing in the community settings apart from the people attending the hospital. The study proves that MRSA is no longer acquired in the Hospitals alone. Studies on nasal carriage of MRSA is too important in the community ,since carriage plays a key role in the epidemiology and pathogenesis of community associated diseases and its spreading makes the venerable population getting infected with MRSA strain prevailing in the community as CA-MRSA, apart from HA-MRSA. This perhaps is the more worrying trend due to the potentially significant population with CA-MRSA, and emphasizes the need for significantly increased health care precautions, including the hand washing and there is a need to reassess antibiotic policies for use within and outside the hospital environment and regular monitoring of the antimicrobial susceptibility status to be practiced at every level to prevent the spread of MRSA even in our social settings.

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Conflict of Interest-Nil

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