

Assessing the Prevalence of *Staphylococcus Aureus*, Particularly MRSA, from Anterior Nares of Medical Students

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Abstract

Introduction: *Staphylococcus aureus* is a frequent cause of infections in both the community and hospital. Methicillin-resistant *Staphylococcus aureus* continues to be an important nosocomial pathogen and infections are often difficult to manage due to its resistance to multiple antibiotics.

Aims and objectives: Aim of the study is to determine the nasal carriage rate of *S. aureus* and also to detect the antimicrobial susceptibility patterns of the isolates, which include methicillin resistance among medical students

Inclusion criteria: Medical students who have just passed 1st yr and started attending clinical postings.

Exclusion criteria: History of antibiotic usage, students using nasal drops for any treatment, recent hospitalisation.

Materials and methods: Nasal swabs were collected, and isolation of *Staphylococcus aureus* was and they were identified using conventional culture methods. Routine antibiotic susceptibility test was performed by modified Kirby-Bauer disc diffusion method by using 0.5 Mc Farland standards. Methicillin resistance is detected by using cefoxitin disc as per CLSI guidelines.

Results: Of 91 samples the nasal carriage of *S.aureus* is seen in 18 students (19.7%), among them MRSA is identified in 3 students (11.1%). Overall prevalence of MRSA is 3 out of 91(2.1%).

Keywords: Antibiotic susceptibility testing, CLSI guide lines, Kirby-Bauer disc diffusion method, MRSA, Nasal carriage.

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Introduction

Staphylococcus aureus (*S. aureus*) is a key pathogen, which is implicated in nosocomial and community acquired infections. Infection caused by *S. aureus* can be endogenous, where the infectious organism is found in the patient's body, or exogenous, where the organism is transmitted from an external source (1). The incidence of community-acquired and hospital-acquired *S aureus* infections has been rising with increasing emergence of drug-resistant strains called methicillin-resistant *S aureus* (MRSA)(2). Methicillin-resistant *Staphylococcus aureus* (MRSA) strains were first identified in 1961, immediately after the introduction of methicillin in the clinical settings. Subsequently, an increase in the resistance to methicillin among the *S. aureus* isolates has been observed globally (3). Anterior nares are the most consistent site of colonization for *Staphylococcus aureus* (4). Because its primary habitat is moist squamous epithelium of the anterior nares, most invasive *S aureus* infections are assumed to arise from nasal carriage (2). The medical students being future

doctors, will be handling many types of patients within and outside the hospitals. Healthy carrier state of *Staph.aureus*, including MRSA among the medical staff, nurses and students is a major problem, as they can disseminate the same to the patients as well as to their colleagues working in the same hospital (5). Hence the present study aims at understanding the prevalence of the carrier state of *Staph.aureus* in the anterior nares of medical students who will come in contact with the patients at OPD, Wards, ICUs and in operation theatres.

Materials and Methods

This study was undertaken to investigate the nasal carriage rate of *S. aureus* and MRSA among medical students and to determine antibiotic susceptibility pattern of the isolates. A total of 100 nasal swabs were collected from the medical students using sterile cotton swabs (moistened with normal saline). A written informed consent was taken from all the students. The swab was introduced 2– 3 cm in the nasal cavity and rotated 4–5 times both clockwise and anticlockwise. Swabs were inoculated onto Mannitol salt agar (MSA), blood agar and incubated at 37 °C for 48 hrs. Colonies of *S.aureus* were identified by standard methods like colony morphology, Gram's staining, catalase test and tube coagulase test.

Table 1

| No. of students | 91 | Nasal carriage | Percentage | MRSA | Percentage | Overall % of MRSA |
|-----------------|----|----------------|------------|------|------------|-------------------|
| male | 41 | 11 | 26.8% | 01 | 9% | 2.4% |
| female | 50 | 7 | 14.0% | 01 | 14.2% | 2% |
| total | 91 | 18 | 19.7% | 02 | 11.11% | 2.19% |

Antibiotic susceptibility testing

The antibiotic susceptibility testing was performed by using the Kirby-Bauer disc diffusion method according to Clinical and Laboratory Standards Institute (CLSI) guidelines. The routine antibiotic susceptibility testing was done by using erythromycin-15µg, tetracycline-30µg, gentamicin-10µg, vancomycin-30µg, linezolid-30µg, penicillin 10 units, cotrimoxazole-25mcg, ciprofloxacin-5µg and clindamycin-2µg antibiotic discs procured from Hi-media Mumbai India. MRSA was detected by using cefoxitin-30 µg incubating at 35°C. Minimum inhibitory concentration (MIC) ≥ 22mm is considered as sensitive i.e. MSSA, Whereas MIC ≤ 21 mm considered as MRSA (6). The *S. aureus* strains ATCC 33591 (MRSA) were used as positive and ATCC 25923 (MSSA) were used as negative controls.

Results

Among 91 medical students 18(19.7%) students showed the nasal carriage of *S.aureus*. Out of 18 isolates 2(11.1%) are MRSA strains and resistance to penicillin, erythromycin, clindamycin, gentamicin, tetracycline, ciprofloxacin and cotrimoxazole was found in 18(100%), 4(22.2%), 7(38.8%), 14(77.77), 3(16.66), 4(22.2), and 11(61.1%) respectively. The overall MRSA percentage is (2.1%) i.e. 2 MRSA strains among 91 students.

Discussion

Nasal carriage of *S.aureus* is an important risk factor. The study detected nasal carriage of *S.aureus* 19.7%, which is nearly correlated with the study conducted by Chang-Sheng Chen et al which is 21.9%(7) and Ma XX, Sun DD et al which is 23.1 % (8). MRSA prevalence is 2.1% which is correlated with the work done by Namita Srivastava et al (9).

Conclusion

Awareness that healthy medical trainees can be reservoirs and contribute to the spread of these pathogenic bacteria will help us in understanding infection control especially during MRSA outbreaks. This study was conducted in medical students who have just started clinical postings. At present the aim of the study is to assess the prevalence of MRSA. The same

study will be conducted after 2 years to know whether chronic exposure to the hospital environment having any impact on prevalence of MRSA.

Conflicts of Interest: None

Source of Support: Nil

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