



NASAL SCREENING OF DENTAL STUDENTS AS MRSA CARRIERS – AN INSTITUTIONAL STUDY

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ABSTRACT

Introduction: Injudicious use of antibiotics in clinical settings has developed resistant strains of micro organism known as MRSA. Nasal carriage of MRSA has been noted among professional as well as general population posing a significant threat of transmission including the dental professionals.

Objective: To detect the presence of MRSA in nasal swabs from dental students

Material and methods: This study was conducted on 100 dental students of our institution involving both undergraduates and post graduates. The nasal swabs were used to collect materials from anterior nares which were cultured on Mannitol salt agar. *Staphylococcus aureus* colonies grown on the agar plates were checked for MRSA positivity using Cefoxitin disc diffusion test.

Results: Among 100 students 4 students were found to be MRSA positive of which 3 were undergraduates and 1 post graduate.

Conclusion: It has been shown that MRSA has been found to be prevalent even among dental professionals due to their clinical exposure and hence emphasis should be placed on prevention of the lesions and control measures.

KEYWORDS : *Staphylococcus aureus*, MRSA, Mannitol salt agar, Cefoxitin disc diffusion test.

INTRODUCTION:

Every day microbes are transferred between people at home, in the workplace and in the community through air, water, inanimate objects etc. Aerosolization of blood and saliva during dental procedures is common. Transmission to dental personnel and patients occurs if infection control measures fail. *Staphylococcus aureus* is a Gram positive bacteria found on the skin and upper respiratory tract. It is a normal commensal as well as a potent pathogen. Literature has suggested that approximately 30% of the human population is colonized with *S.aureus*. *Staphylococcus aureus* causes infections ranging from mild local infections of skin to severe lethal systemic infections such as sepsis and toxic shock syndrome.¹

Based on its sensitivity to antibiotics, *Staphylococcus aureus* can be classified into two types Methicillin sensitive *Staphylococcus aureus* (MSSA) and Methicillin resistant *Staphylococcus aureus* (MRSA). MRSA are superbugs which have developed resistance to many antibiotics. MRSA can be community associated (CA-MRSA) or Health care associated (HA-MRSA). CA-MRSA cause infections in apparently healthy individuals leading to a persistent, serious disease with high rate of transmission than HA-MRSA.²

HA-MRSA emerged along with penicillin resistant *S.aureus* way back in 1960 but spread to community almost 3 decades later in 1990.³ It is known to be prevalent among population in health care institution, hospitals and nursing homes and is a main cause of nosocomial infections with high mortality rates. MRSA normally colonize in the anterior nares and can act as a source for endogenous infections as well as transmission resulting in community spread. Such a transmission from patients to doctors, doctors to patients and patients to patients can be expected in a dental care institution.⁴

These facts promoted us to evaluate the presence of MRSA among dental students as they could pose a potential risk for nosocomial transmission and the outcome may be useful for understanding the importance of screening for MRSA among dental students of our institution.

Aim:

- To detect nasal MRSA in dental students

Objectives:

- To detect the presence of *Staphylococcus aureus* in nasal swabs from dental students
- To confirm the presence of MRSA among these *Staphylococcus aureus* positive dental students by antibiotic disc diffusion test

MATERIALS AND METHODS:

Our current study was an institution based cross sectional study conducted among 100 dental students of our dental college. We selected healthy students 58 from undergraduates and 42 postgraduates. 58 undergraduates and 42 postgraduates students were selected in our study. Students from III & IV BDS, interns and postgraduates were selected since they were exposed to clinical practice. Undergraduate students who were not exposed to clinical postings, students with history of recent infections and students with recent history of antibiotic medication were excluded from our current study.

Sample collection and processing:

Samples were collected from anterior nares of the participants using clean sterile moist swabs. The swabs were rotated in clockwise direction using slight pressure, 2-3 times so as to ensure adequate collection of samples. Same procedure was repeated in the other nostril using the same swab. The collected samples were inoculated immediately onto culture plates containing Mannitol salt agar. The culture plates were incubated overnight at 37°C and looked for the presence of *Staphylococcus aureus* colonies. *S. aureus* colonies were represented as yellow colored colonies with yellow zones. To confirm the presence of MRSA in the *S.aureus* colonies, cefoxitin disc diffusion test was performed. For that, the colonies were lawn cultured on Mueller Hinton agar plates and a cefoxitin in disc of 30 mg was placed on the center of each plates. After overnight incubation at 37°C, the zone of inhibition around the antibiotic discs were measured. In our study, the zone of inhibition with diameter \leq 19mm were taken as

MRSA positive.

RESULTS:

Our institutional study was conducted on 100 students including both undergraduates and post graduates. We noted that among 58 undergraduates, 9 (16%) were positive for *Staphylococcus aureus* presence in their anterior nares whereas 49 (84%) were negative. Among 42 postgraduates, 9 (21%) were positive for *Staphylococcus aureus* presence in their anterior nares whereas 33 (79%) were negative (Chart 1). Cefoxitin disc diffusion test conducted on 9 undergraduate students showed zone of inhibition ranging from 16mm to 27mm and on 9 post graduate students zone of inhibition ranged from 17mm to 30mm [Table 1]. A zone of inhibition of ≤ 19 mm was considered to be MRSA positive according to which 3 out of 9 undergraduates were MRSA positive (33.33%) and 1 among 9 postgraduate was MRSA positive (11.11%) (Chart 2). Overall 4 out of 100 students of our dental college were found to be MRSA positive.

Table 1: showing Zone of inhibition represented as mm on cefoxitin disc diffusion test

cefoxitin disc diffusion test (Zone of inhibition in mm)	
Undergraduates 9 (16%)	Postgraduates 9 (21%)
24mm	22mm
20mm	30mm
18mm	27mm
16mm	25mm
24mm	30mm
27mm	26mm
18mm	17mm
27mm	25mm
24mm	28mm
Zone of inhibition ≤ 19mm MRSA +ve	

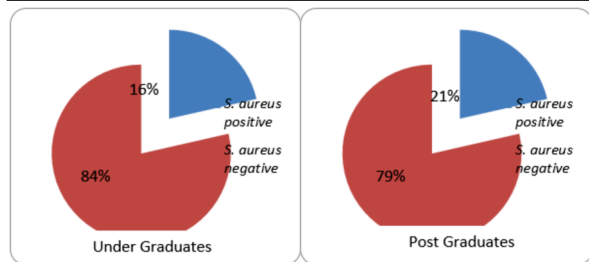


Chart 1: showing Staphylococcus positivity among undergraduates and post graduates

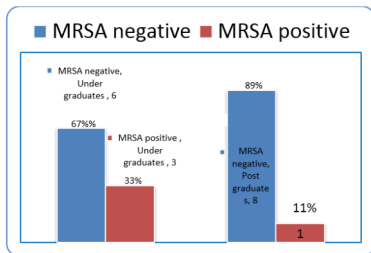


Chart 2: Bar graph representing MRSA positive and MRSA negative students among undergraduates and post graduates.

DISCUSSION

Nosocomial infections like MRSA pose a potential threat in nursing homes which is attributed to increase in micro organisms with multidrug resistance.^{5,6}

Such resistant strains of micro organisms are no longer limited to medical professional and medical setup but are encountered by all health care providers including dental professionals. MRSA is known to colonize in the nostrils of exposed persons including dentists and hence can act as a reservoir of MRSA transmission to others or to self.⁷ Interestingly, the distinction between the healthcare-associated (HA)-MRSA and CA-MRSA is gradually fading owing to the acquisition of multiple virulence factors and genetic elements.³

Studies by Yoo YJ, 2018 has shown that the prevalence of nasal MRSA has been higher among dental professional when compared to general population. The mode of transmission of MRSA may be from dentist to

patients, patients to dentist or patients to patients due to contact of contaminated areas, surfaces, instruments like air and water syringes, dental chair seat, arm rest, dental chair push buttons, light handles, aerosols, splatter etc.⁸ MRSA may survive upto 12 days on abiotic surfaces.

Anterior nares are the most common site for colonization of MRSA followed by any part of the body like skin, throat, groin, armpits, perineum etc.⁹ The prevalence of MRSA is tough to ascertain as they vary largely throughout the world with various prevalence rates. However, literature has suggested a higher prevalence of MRSA in Asians owing to low economic status and misuse of antibiotics.¹⁰

The current study was undertaken to assess the prevalence of MRSA among dental students of our institution which included undergraduates and post graduates.

We found in our study that 4% of the study population were MRSA positive. We also found that the percentage of MRSA positive individuals were more among undergraduates than post graduates. The higher occurrence of MRSA among undergraduates is suggested as higher rates of clinical exposure. These findings are similar to Roberts MC 2011 but contrast to the findings of Hema N 2017 where they showed higher prevalence of MRSA among post graduates.^{1,11}

We also noted that among 4 MRSA positive undergraduates, 2 were from III BDS, one student was postgraduate and 1 was an intern. This finding of ours contrast with previous studies of Roberts MC 2011 where they have shown that increase in prevalence of MRSA was noted in final year students suggesting that increased clinical exposure may increase the chances of acquiring MRSA.¹¹ However in our study we presume that the higher occurrence of MRSA among III BDS students may be due to their additional exposure to medical hospital as part of their curriculum.

It is a known fact that mere presence of MRSA does not indicate an active disease process but mark them as a potential transmitter. Carriers of MRSA who are apparently healthy show no risk of developing a serious disease process. In a healthy patient it does not warrant any necessary treatment but timely screening of dental professionals must be advised. Simple steps of hygiene measures like washing hands after contact with patients and instruments, use of gloves and mouth masks will decrease the chances of acquiring MRSA.

All the 4 MRSA positive students of our study were found to be in good health hence we opted to counsel them thoroughly regarding MRSA colonization, transmission, complication, prevention of transmission and control measures. We also insisted that they should consult a physician in any event of development of symptoms.

CONCLUSION

MRSA has been found to be prevalent not just among medical professionals but also among dental professionals. The results of our study have provided a good basis for describing the potential of transmission of MRSA by dental students. This emphasizes on the fact that awareness of MRSA is highly mandatory especially to students exposed to clinical settings. We opine that conducting the same study with a larger population including all the students, staff, and health care workers of our institution may help us ascertain the actual prevalence of MRSA in our institution.

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