

Prevalence of Nasal Carriage of *Staphylococcus Aureus* Among Students in Ramat Polytechnic, Maiduguri, Nigeria

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ABSTRACT

Staphylococcus aureus is the leading nosocomial pathogen in hospitals throughout the world. This study was aimed to determine the prevalence of nasal carriage of *S. aureus* among students at Ramat polytechnic. A total of one hundred and twenty nasal swab samples were collected from students in the department of Science Laboratory Technology (SLT), and were analyzed for the presence of *S. aureus* nasal carriage. Thirty two (32) isolates were yielded from culture, this include 12 (20%) from male and 20 (33.3%) from female. The carriage rate was higher in female than in their male counterpart, although no statistical difference ($\chi^2 = 2.0881$, $df = 3$, $P = 0.1485$). The antimicrobial test which were carried out on thirty two (32) different isolates of *S. aureus* against ten (10) commonly used antibiotics, had shown that some strain of the pathogens were resistant to almost all the antibiotics. *S. aureus* show highest resistant to Ampicillin (87.5%), followed by Amoxicillin (84.4%), Gentamicin (71.9%), Chloramphenicol (62.5%) and Cotrimazole (56.2%). Ciprofloxacin and Pefloxacin exhibit least resistant (18.7%), followed by Amoxiclavate (25%), Erythromycin (31.2%) and Cefotaxime (34.4%). Therefore, the school

managements are advice to provide conducive classes with well-ventilated windows so as to prevent transmission of this pathogen through aerosols.

Key Words:

Nasal; Carriage; *S. aureus* ; Students; SLT

INTRODUCTION

Staphylococcus aureus is an epidemiologically important pathogen that known for its nasal colonization. This opportunistic pathogen *S. aureus* is usually present in 20- 40% of the population. *Staphylococcus aureus* is the leading nosocomial pathogen in hospitals throughout the world (Ravi *et al.*, 2011). It has also been documented that the carriage of *Staphylococcus aureus* by some individuals makes them more prone to skin infections and operational complications caused by the organism to non carries (Daniel, 1977; Abdulhadi *et al.*, 2008). *Staphylococcus aureus* is recognized worldwide as a common cause of infection in humans and animals. It produces a spectrum of exotoxins and other determinants of virulence that contribute to its pathogenicity. *Staphylococcal* enterotoxins (SEs) are recognized as being the most important

virulence factors involved in cases of food poisoning in humans (Saranraj and Stella, 2011). *Staphylococcus aureus* skin and soft-tissue infections are very frequent in the community, and most respond rapidly to simple local treatment. Some become extensive or chronic. It has been shown that *S. aureus* nasal carriage is more frequent in chronic staphylococcal infections. Nasal decontamination with mupirocin can prevent relapses of chronic furunculosis (Durupt *et al.*, 2011). Although a variety of studies have examined the prevalence of nasal carriage of *S. aureus* among general population, but only little or no study had been conducted among students in Nigeria. Therefore, this study was aim to determine the prevalence of nasal carriage of *S. aureus* among students at Ramat polytechnic Maiduguri, Nigeria.

MATERIAL AND METHOD

Study Area

The study was conducted in Ramat polytechnic, Maiduguri, Borno state, Nigeria. The state is located in the Northeastern part of the country lies in latitude 10⁰N and 13⁰E. It shares international boundaries with the Republic of Niger to the north, Chad to the north-east and Cameroon to the east. Within the country, it shares national boundaries with Adamawa to the South, Yobe to the West and Gombe to the South-west. The state has an area of 69,435 square kilometers, about 7.69% of the total land area of the country. Base on the 2006 census figure, the state has a population of 4,151,193 with population density of approximately 60 inhabitants per square kilometer (NPC, 2006).

COLLECTION OF SAMPLES

One hundred and twenty (120) students of the department of Science laboratory Technology, Ramat polytechnic Maiduguri

were used in this study. After informed consent of each student was obtained who are willing to participate in the study. Also questionnaire was administered were administered to all students who volunteered for the study. The data consist of student's age and sex which were considered as risk factors for the infection. Then the nasal swabs were collected from the anterior nares of the nostril of the nostril with a sterile swab stick moistened with normal saline. The swabs were inoculated into variety of culture media. This includes Nutrient agar, Blood agar, MaCconkey agar, Baired park agar and Mannitol salt agar. Then the plates were incubated under aerobic condition for 24- 48hours at 37⁰C. The *S. aureus* was identified using standard method of identification based on morphology and biochemical characteristics.

ANTIMICROBIAL SUSCEPTIBILITY

All the isolates of the *S. aureus* strain were tested against different antimicrobial agents using agar diffusion method according to guideline established by National Committee Laboratory Standard (NCCLS, 2001).

ANTIBIOTICS USED AGAINST STAPHYLOCOCCUS AUREUS ISOLATES

The susceptibility pattern of *S. aureus* to the commonly used antibiotics was determined and the concentration of each antibiotic to the isolates are; Amoxicillin (30μ), Ampicillin (10μ), Ciprofloxacin (10μ), Amoxiclave (25μ), Erythromycin (5μ), Pefloxacin (10μ), Chloramphenical (20μ), Cotrimazole (25μ), Cefotaxime (30μ) and Gentamicin (10μ) using agar diffusion method as recommended by National Committee Laboratory Standard (NCCLS, 2001).

STATISTICAL ANALYSIS

The data was subjected to statistical analysis using statistical package (R version 2.13.1) to determine any significant relationship between infection rate, age and gender. The Pearson chi-square test was employed to determine the relationships between the demographic data with *S. aureus* nasal carriage and P value < 0.05 was considered significant at 95% confidence interval.

RESULT

A total of one hundred and twenty nasal swab samples were collected from students in the department of SLT, Ramat polytechnic, Maiduguri and were analyzed for the presence of *S. aureus* nasal carriage. Thirty two (32) isolates were yielded from culture, this include 12 (20%) from male and 20 (33.3%) from female as shown in Table 1. The carriage rate was higher in female than in their male counterpart, although no statistical difference ($\chi^2 = 2.0881$, df= 3, P= 0.1485).

The distribution of *S. aureus* in nasal cavity among different aged group was shown in Table 2. There was more prevalent among student with aged 17- 19 (34.8%), followed by 20- 23 (22.4%) and 24- 26 (20.8%), although no statistical significant difference was recorded among the different aged group as shown in Table 2. The result of antimicrobial test which were carried out on thirty two (32) different isolates of *S. aureus* against ten (10) commonly used antibiotics, had shown that some strain of the pathogens were resistant to almost all the antibiotics. *S. aureus* show highest resistant to Ampicillin (87.5%), followed by Amoxicillin (84.4%), Gentamicin (71.9%), Chloramphenical (62.5%) and Cotrimazole (56.2%) as shown in Table 2. Ciprofloxacin and Pefloxacin exhibit least resistant (18.7%), followed by Amoxiclave (25%), Erythromycin (31.2%) and Cefotaxime (34.4%) as shown in Table 2.

Table 1: Distribution of *Staphylococcus aureus* nasal carriage among different sex group

Sex	Total	Positive	Positive (%)
Male	60 (50.0)	12	20
Female	60(50.0)	20	33.3
Total	120(100)	32	26.7

$$(\chi^2 = 2.0881, df = 3, P = 0.1485)$$

Table 2: Distribution of *Staphylococcus aureus* nasal carriage among different age group

Age (year)	Number of Samples	Positive	Positive (%)
17 – 19	46(38.3)	16	34.8
20 – 23	49(40.8)	11	22.4
24 – 26	24(20.0)	5	20.8
>27	2(1.7)	0	0
Total	120(100)	32	26.7

$(\chi^2 = 6.3655, df = 3, P = 0.09512)$

Table 3: Resistance and Sensitivity pattern of different isolates of *Staphylococcus aureus*

Antibiotics	Sensitivity (%)	Resistant (%)
Amoxicillin	5.0 (15.6)	27 (84.4)
Ampicillin	4.0 (12.5)	28 (87.5)
Ciprofloxacin	26 (81.3)	6.0 (18.7)
Amoxiclave	24 (75.0)	8.0 (25.0)
Erythromycin	22 (68.8)	10 (31.2)
Pefloxacin	26 (81.3)	6.0 (18.7)
Chloramphenical	12 (37.5)	20 (62.5)
Cotrimazole	14 (43.8)	18 (56.2)
Cefotaxime	21 (65.6)	11 (34.4)
Gentamicin	9.0 (28.1)	23 (71.9)

DISCUSSION

The results of this study showed that nasal carriage of *S. aureus* among SLT students at Ramat polytechnic, Maiduguri, was 26.7%. This value is lower than what reported by Abdulhadi *et al.* (2008) among different student in Kano metropolis, it also lower than the result obtained by Laminkara *et al.* (1985) and Ireogbu *et al.* (1995) among University of Ife students. The result of this study also lowers than the report of Ravi *et al.* (2011) among undergraduate medical students. However the finding of this study is similar to the result of Kingdom *et al.* (1983) who reported the prevalence of 29.1% among undergraduate students, also similar to the findings of Olsen *et al.* (2005) who reported the prevalence of 25.7%. Implication of this finding s is that despite the *Staphylococcus aureus* is a microflora of the anterior nares, sometimes it may produce toxin capable of eliciting vomiting in some percentage of human population (Abdulhadi *et al.*, 2008). With respect to gender, the numbers of females (33.3%) implicated with nasal carriage of *S. aureus* is greater than males (20.0%). This results is inconsistent with the report of Abdulhadi *et al.*, (2008) who showed that male nasal carriage of *S. aureus* is higher than their counterpart females among students population in Kano metropolis. Also, disagree with Olsen *et al.* (2005) and Chatterjee *et al.* (2009), who reported the prevalence of nasal carriage *S. aureus* higher in male than their counterparts female. However, there is no significant difference between sex and the prevalence of the nasal carriage *S. aureus* (Table 1). In relation to different age groups, student between age 17- 19years (34.8%) showed higher prevalent, followed by 20- 23years (22.4%) and 24- 26(20.8%), while prevalent rate of 0.0% was recorded among aged group >27years. The results of the present study is similar to the work of Abdulhadi *et*

al., (2008) who reported higher prevalence among 17- 20 years, followed by 21- 24 years and 25- 28 years. However, there is no significant relationship between the prevalence of *S. aureus* nasal carriage with different age groups (Table 2). The presence of *S. aureus* might be attributed due to fact that school is an environment where many people with different social and economic background came together; sometimes the class may be overcrowded which enhance the transmission of this pathogens from one another through sneezing or coughing.

The result of sensitivity and resistant pattern of different isolates of *S. aureus* revealed that the different strain of the pathogens exhibited higher rate of resistance to penicillin group (amoxicillin and ampicillin), followed by gentamicin (71.9%) and chloramphenicol (62.5%), while they exhibit moderate resistant to cotrimazoles (56.2%). However, lower rate resistant was recorded in ciprofloxacin and pefloxacin (18.7%), followed by amoxiclave (25.0%), erythromycin (31.2%) and cefotaxime 934.4%). Similar observation made Rongpharpi *et al.* (2013) who reported that *S. aureus* exhibited lower resistant rate to ciprofloxacin followed by amoxiclave and cefotaxime (Table 3).

CONCLUSION

The results of present study pinpointed the prevalence of *S. aureus* nasal colonization among Science Laboratory Technology students at Ramat Polytechnic Maiduguri. The overall prevalence rate is 26.7%, the number of females (33.3%) implicated with nasal carriage of *S. aureus* is greater than males (20.0%). Also, higher prevalence was recorded among age group 17- 19years. Therefore, the school managements are advice to provide conducive classes with well-ventilated windows so as to prevent

transmission of this pathogen through aerosols.

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