

IJBHS 2008069/4401

## Nasal carriage of *Staphylococcus aureus* among students in Kano Nigeria

S.K. Abdulhadi\*<sup>1</sup>, A.H. Hassan<sup>2</sup> and A. Da'u<sup>3</sup>,

<sup>1</sup> Department of Pathology, Murtala Muhammad Specialist Hospital, P.M.B. 3200, Kano, Nigeria.

<sup>2</sup> Department of Pathology, Sir Sunusi Specialist Hospital, Kano Nigeria

<sup>3</sup> Department. of Medical and Health. Ministry of Health, Kano, Nigeria.

(Received November 14, 2008)

**ABSTRACT:** One hundred nasal swabs collected from 60 (60%) males and 40 (40%) females' students of Kano State institutions were examined for *Staphylococcus aureus* using blood agar, mannitol salt agar and Macconkey agar. Thirty nine (39%) of the 100 students were found to carry *Staphylococcus aureus* in their nasal cavity. Out of the 39 positive cases, 24 (61.5%) were males while 15 (38.5%) were females. The students in the age range of 17 – 20 years accounted for a greater percentage of carriage of 57.5% and 53.3% for the male and female populations, respectively. Results show that while sex was not a notable factor in *Staphylococcus aureus* carriage, age was ( $p \leq 0.05$ ).

**Key Words:** Carriage rate, *Staphylococcus aureus*, Nasal swabs, students.

### Introduction

The bacterium, *Staphylococcus aureus*, has been implicated as the cause of several human diseases of which endocarditis, bronchopneumonia and fatal specimens are amongst them (Ikeh *et al*, 1993). The occurrence and isolation of the bacterium from the urine of healthy individuals occur at a rate of 30 - 60% and vary with different age groups locations and occupations of individuals (Burnett *et al*, 1976; Osuide *et al*, 1996). The human body gets colonized by the organism early in life either intermittently or persistently (Talib *et al*, 1976). 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 carriers (Daniel, 1997). In past one deemed, several word have been done by researchers in Nigeria on the carriage rate of *Staphylococcus aureus* amongst students, new born babies, staff and even workers in a feed and flour mill (Iroegbu *et al*,... 1985; Osuide *et al*, 1999 Eneweani and Ikeunobe, 1998). In the paper we report the results of researchers on the carriage rate of *Staphylococcus aureus* in the nasal cavity of students of Kano state, Nigeria.

---

\*To whom correspondence should be addressed.

## Materials and Methods

### Sample collection and isolation procedure

Two (2) nasal swabs were collected from each of 100 (60 males and 40 females) students randomly selected from various institution of Kano, Nigeria, sterile cotton swab sticks were employed for sampling. The swab specimens were inoculated on blood agar (Oxoid) and MacConkey agar (Oxoid) and incubated at 37°C for 24 hours under aerobic condition. Suspected colonies were subcultured. Gram stained and examined inter completely. Colonies containing gram positive cocci were tested for coagulase production first by slid agglutination method (Doen, 1982) and then by the tube techniques for those that tested negative. Further characterization to establish the identity of isolate included beta hemolysin production, catalase tests (Cowan and Steel, 1974; Mcfaddin, 1981).

*Statistical analysis:* The Chi square ( $X^2$ ) statistical parameter was used to ascertain whether sex and age play prominent roles in the carriage rate of the organism among the students.

## Results

Thirty nine (39.0%) of the 100 students sampled were found to carry *Staphylococcus aureus* in their nasal cavity. The carriage rate (prevalence) in males was (61.5%) while it was (38.5%) in females (table 1). The frequency of isolation of *Staphylococcus aureus* based on the distribution was 17 – 20 (54%) 21-24 (34%) > 25 – 28 (27%) (Table 2.) The 39 *Staphylococcus aureus* isolate varied in their reaction to some of the biochemical and carbohydrate fermentation tests carried out. While only 36 (92.%) were positive of the slide coagulate production test. All of them eventually were positive for the tube coagulate test. Additionally, only 34 (87.2%) of the organisms were beta hemolytic or produced beta haemolysin. All the isolate fermented mannitol and lactose, though only 31 (79.5%) and 27 (69.2%) fermented maltose and sucrose respectively (Table 3).

Table 4 depicts the division of the isolate into biotypes based on their ability to ferment maltose and sucrose. Biotype 1 represents the 14 strains that were able to ferment sugars. Biotype II represents the 10 strains that only fermented maltose but not sucrose. Biotype III those 5 strains fermented sucrose but not maltose. Biotype represent those 3 strains that neither fermented maltose nor sucrose (Table 4).

Table 1: Sex differences in the frequency of isolation of *Staphylococcus aureus* among students.

Sex	No. Samples	No. Positive	% Positive
Male	60	24	61.5
Female	40	15	38.5
Total	100	39	39.0

Table 2: Frequency of isolation of *Staphylococcus aureus* based on age.

Age Groups (Yrs.)	No. of Samples	No. Positive	% Positive
17 – 20	35	19	54
21 – 24	35	12	34
25 – 28	30	8	27
Total	100	39	39

Table 3: Biochemical and carbohydrate fermentation characteristics of the *Staphylococcus aureus* isolates.

Test	No. Examined	No. Positive	% Positive
Slide coagulase	39	36	92/0
Tube coagulase	39	39	100.0
Catalase	39	39	100.0
Beta haemolysin	39	34	87.2
Mannitol	39	39	100.0
Lactose	39	39	100.0
Maltose	39	31	79.2
Sucrose	39	27	69.2

Table 4: Distribution of *Staphylococcus aureus* into Biotypes based on their ability to ferment maltose and sucrose.

Biotypes	No. of Strains
I	14
II	10
III	5
IV	3

## Discussion

The nose with the mucous membrane that lines it represents a more specialized environment and is colonized by different micro organisms' among which is *Staphylococcus aureus*. In fact, *Staphylococcus aureus* has been found to be carried by significant percentage of human population and this species produce a powerful toxin capable of eliciting a vomiting response (Adams and Moss. 1995). According to pass workers between 30 – 60% general populations carry coagulase positive *Staphylococcus aureus* in the anterior part of their noses. While people with runny noses are responsible for transmission by hand contact (Williams. 1963; Burnett et Al. 1976; Ross, 1983). The nasal carriage rate of *Staphylococcus aureus*. In this study was 39% this is higher than what was reported by Nobel *et al.* (1976). Ogubi *et al.* (1977) and Osuide *et al.* (1996) in normal population. However, it agrees with the findings of Williams (1963). Burnet *et al.* (1977) and Claes *et al.* (1979) even though it is lower than that obtained by Laminkara *et al.* and amongst University of Ife students and Ireogbu *et al.* (1995). This high prevalence rate of *Staphylococcus aureus* among students is of clinical significance in view of the fact that the organism is a leading course of infection in Nigeria (Ikeh *et al.* 1993; *et al.* 1993). The high carriage rate may be due to cross contamination, which is common among humans (Burnet *et al.* 1979 and Osuide *et al.* 1996). The carriage rates among males and females were comparable with 60% and 40%, respectively which shows that sex is not a notable factor in carriage (Osuide *et al.* 1996). The present study are finding of Novel *et al.* (1964, 1967) and Enweani and IKEunobe (1998) that *Staphylococcus aureus* nasal isolation decrease with increase in age of the human population (Table 2) but contrast with findings of Iroegu *et al.* (1995). A significance higher prevalence of the organism among the different age groups ( $X^2 = 9.04$ ;  $P < 0.05$ ) and ( $X^2 = 6.2$ ;  $P < 0.5$ ) for males and females respectively was observed. This decrease in the carriage rate of

*Staphylococcus aureus* as the group age be attributed be attributed to the hygiene level of the individuals involved.

This study has, therefore, revealed prevalence of *Staphylococcus aureus* in among students in Kano State. It has shown the relatively higher prevalence of the organisms among the younger students which calls for improvement in personal hygiene and behavior among students.

ACKNOWLEDGEMENT: The authors which to thank the staffs and management of Decent medical laboratories for providing the laboratory facilities for technical assistance.

## References

- Adams, M. and Moss, M.O (1995). *Food Microbiology*, 2<sup>nd</sup> edition. Royal Society of Chemistry, Cambridge. Pp 431 – 457.
- Burnett, G. W., Henry, W. S. and Schuster, S. G (1976). Staphylococci and Staphylococcal infections. In: *Oral Microbiology and infectious Disease*, 1<sup>st</sup> Edition. The Williams and Wilkins Co. Baltimore, Pp 405 – 415.
- Claes, H. and Wahlo, S (1979). *Staphylococcus aureus* nasal colonization. *J. Med. Cambrige* 83: 437 – 443.
- Cowan, S. T and Steel, K. T (1974). *Manual for the Identification of Medical Bacterial*. 2<sup>nd</sup> edition. Cambridge University Press, London. Pp. 22 -122.
- Daniel, S. O (1977). Epidemiological Study of nosocomial infection at the Lagos University Teaching Hospitel *Publ. Hlth. London*. 91: 13 – 18.
- Doern, G. V (1982). Coagulase test, *J Clin Microbiol*. 15: 416 – 418.
- Enweani, I. B and Ikuenobe, E. C (1998). Carrier rate of pathogens of workers in feeds and flour Mill Ewu, Edo State. Nigeria. *Nig. J. Microbiol*. 12: 21 – 25.
- Ikeh, E. I., Adebayo, E. O., Okuonoghae, H. O and Igbogboja, I. S (1993). Bacteriology of chronic discgarging ears in children in Jos. *Nig. J. Med. Lab. Sci.*, 3: 27 – 30.
- Iroegu, C. U., Ejimofor, O. D., Okpala, C. N., Otti, N and Owuna, R (1995). Nasal carriage *Staphylococcus aureus* among hospital and non hospital populations in Nsukka, Nigeria. *Nig. J. Microbiol* 10: 1 -5.
- Lamikanra, A., Barbara, D. F., Omolabake, B. A and Paul, M. O (1985). Nasal carriage of *Staphylococcus aureus* in a population of health Nigerian students *J. Med. Microbiol* 19: 211 – 216.
- McFaddin, F. J (1981). *Biochemical Tests for Medical Bacteria*, 2<sup>nd</sup> edition. Williams and Wilkins Co., Baltimore.
- Novel, W. C., Williams, R. E. O., Jevons, M. P and Shooter, R. A (1964). Some aspects of nasal carriage of Staphylococci. *J. Clin. Path.* 17: 19 – 83.
- Novel, W. C., Valkenbug, H. A and Wolters, C. H. I (1967). Carriage of *Staphylococcus aureus* in random Samples of normal population. *J. Hjyg.* 65: 567 – 570.
- Nwobu, R. A. U., Agbonlahor, D. E., Egbohye, G. C. E., Ighosuah, E. O., Ohakwe, N. O and Obi, C. I (1993). The bacteriology of osteomyelitis cases seen in Lagos, Nigeria. *J. Med Lab. Set.* 3: 37 – 40.
- Ogunbi, O., Lasi, O., Adegbola, R and Usoma, K. C (1977). Proceedings of the first National symposium on nosocomial infection, Lagos University Teaching Hospital (LUTH), Pp 100 – 107.
- Osuide, M. I., Agbonlahor, D. E., Imarenenzor, C. F and Odemena (1983). *Staphylococcus aureus* Students of Edo State University, Ekpoma. *J. Med Lab Sci.* 5: 65 – 68.
- Ross, F. C (1983). *Introductory Microbiology*. 1<sup>st</sup> edition. Charles Merrill Publishing Co. Columbus, Ohio, USA.
- Talib, V. T., Sengupta, S. R., Jhala, H. I and Sharma, K. D (1976). Some observations on neonatal Staphylococcal carriage with special reference to hospital environment. *Indian Pediatr.* 13: 89 – 96.
- Williams, R. E. O (1963). Healthy carriage of *Staphylococcus aureus*, its prevalence and importance *Bact. Rev.* 27: 56 – 71