Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Der Pharmacia Lettre, 2015, 7 (7):23-28
(http://scholarsresearchlibrary.com/archive.html)

ISSN 0975-5071
USA CODEN: DPLEB4

Staphylococcus aureus nasal carriage in diabetic patients in a tertiary care hospital

V. Alice Rani[1], P. Gayathri Devi[2], Girish[3], K. Saileela[3] and Indukapoor[1]

[1]Department of Microbiology, Malla Reddy Institute of Medical Sciences, Suraram X Roads
[2]Department of Microbiology, Mallareddy Medical College for Women, Qutbullapur, Hyderabad
[3]Department of Microbiology, Kamineni Medical College, Sreepuram Village, Narketpally Mandal, Nalgonda District

---

ABSTRACT

In humans Staphylococcus aureus colonization is mainly found in the anterior nares. Nasal carriage of Staphylococcus aureus is a potential source of infection and colonization often precedes infection .The main aim of this study is to evaluate the rate of nasal carriage of staphylococcus aureus(NCSA) in diabetic patients.Total 60 S.aureus strains obtained from diabetic patients were processed, in these 38 (63.33%) strains were S.aureus, remaining 22(36.67) were other organisms.

Key words: staphylococcus aureus, diabetic patients, NCSA

INTRODUCTION

Staphylococcus aureus is one of the most common causes of both endemic and epidemic infections acquired in hospitals, which result in substantial morbidity and mortality [(1)]. Staphylococcus aureus is a major human pathogen that causes a variety of infections in both healthy and immunocompromised individuals the infections associated with Staphylococcus aureus a lead to numerous complications and in some cases can result in death [(2)].

Staphylococcus aureus is an important pathogen in human disease and the cause of infections ranging from mild such as skin infections and food poisoning to life-threatening, such as pneumonia, sepsis, osteomyelitis and infective endocarditis[(3)].

Staphylococcus aureus the single most common organism recovered from surgical site infections and nosocomial pneumonias and the second most common cause of blood stream infections[(4)].

Staphylococcus aureus is also the most common pathogen isolated from nosocomial infections at other body sites like impetigo, cellulites, infected decubitus ulcers, burn wounds, soft tissues abscesses, local intravascular catheter related infections, peritoneal dialysis exit site infections and peritonitis, pleural empyema,ostiomyelites,septic arthritis, inusitis, parotitis, meningitis, conjunctivitis and post operative endopthalmitis[(4)]

Nasal carriage of Staphylococcus aureus plays a key role in Staphylococcal infections. The incidence of Staphylococcus aureus nasal carriage may increase under various conditions, such as in patients after surgery, patients receiving continuous ambulatory peritoneal dialysis, and patients receiving hemodialysis[(2)].

Staphylococcus aureus produces many toxins and is capable of developing resistance to all available antibiotics. In 1961 methicillin resistance was first noted and since the 1970's methicillin-resistant Staphylococcus aureus(MRSA) has become the main cause of nosocomial infections in many countries all over the world.Vancomycin are the last

resort antibiotic in these countries, however in 1997 a Vancomycin-resistant Staphylococcus aureus(VRSA) was also isolated[3].

Diabetics show a high rate of Staphylococcus aureus associated infections and thus nasal carriage of Staphylococcus aureus in diabetic patients should be considerably important. Unfortunately, however, there have been only a few studies on the rate of NCSA in diabetic patients [2].

MATERIALS AND METHODS

This study was carried out in our teaching hospital Kamineni Medical Sciences at Nalgonda District,Telangana State,India from Feb 2011 to sep 2011.

STRAINS: Total 60 Staphylococcus aureus strains obtained from diabetic patients were processed. All the samples were processed in the microbiology laboratory based on conventional methods with standard procedures and precautions (6).

DIAGNOSIS OF DIABETES:
Fasting Glucose level (FPG) ≥ 126mg/dl
Plasma Glucose level ≥ 200 mg/dl

INCLUSION CRITERIA : Diabetic Patients

EXCLUSION CRITERIA: HIV positive patients
Cirrhotic patients
Patients on anti-Staphylococcal drug treatment started within the last 1 month and patient having chronic renal failure.

NASAL SPECIMENS AND MICROBIOLOGIC PROCEDURES:
Collection of specimens:
Nasal swabs were collected for each subject using two sterile cotton wool swabs. Swabs were rotated three times clockwise and three times anticlockwise in the anterior nares of the nose.

Sample Transport: Samples collected are transported to the department laboratory in 10 mins and subjected to following various investigative procedures as detailed

PROCESSING:
Gram stain: 1st swab

Culture: 2nd swab
Preliminary identification of Staphylococcus aureus was done by colony morphology on Nutrient, Blood, Mannitol Salt agar, Gram stain findings, Catalase, Coagulase, Urease, Anaerobic Mannitol fermentation and Phosphatase test.

Antimicrobial susceptibility of all isolates was determined by Kirby-Bauer Disk diffusion method on Muller Hinton agar for the following antibiotics with their concentration given in parenthesis. Penicillin (), Oxacillin (1µg) Ciprofloxacin (5µg), Gentamicin (10 µg), Amikacin (30 µg), Erythromycin (15 µg) according to CLSI guidelines.

Antibiotics disks and media were obtained from Himedia, Mumbai,India.

Microscopy:
Smear was prepared and stained with Gram stain both positive and negative controls were used. For positive control ATCC staphylococcal aureus and for negative control ATCC E.coli were used.

Direct microscopy:
Culture: The swabs were immediately inoculated onto Mannitol Salt agar. The plates were incubated at 37˚c for 48 hours. All samples were cultured on Mannitol Salt agar colonies surrounded by yellow zones on Mannitol Salt agar after 24-48 hr of incubation at 37˚c were selected. Colonies with pink or red zones were excluded. All Mannitol positive colonies were subcultured on to 5% blood agar and Staphylococcal aureus isolates were defined as Catalase producing Gram-positive cocci that were positive for tube Coagulase. Cases in which nasal cultures were more than three colonies yielded for Staphylococcal aureus were considered as carriers [1].

Identification of Staphylococcal aureus was made on the basis of colony characteristics on Mannitol Salt agar, Gram staining, and a positive tube Coagulase test. The Staphylococcus aureus strains were identified as show in the table 1

Identification of Staphylococcal aureus:

Table: 1

phenotypic characteristics	staphylococcal aureus
Morphology	cocci
Gram stain	gram positive cocci in clusters
Catalase	+
Tube Coagulase	+
Anaerobic Mannitol fermentation	+
Urease	+
Salt Tolerance	+
Phosphatase production	+

RESULTS

A total of 60 diabetics were included in our study.

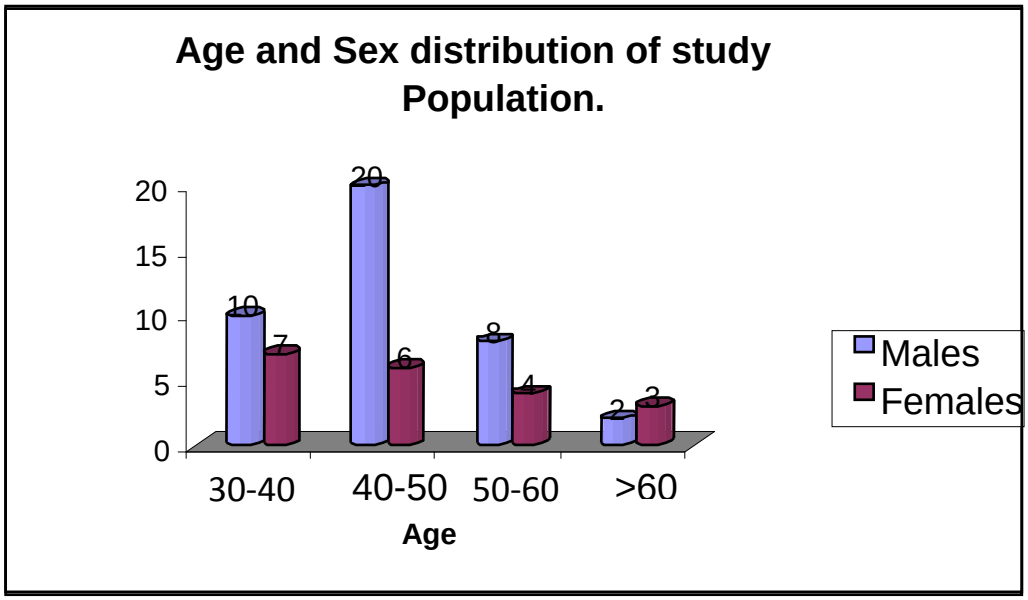

Figure:1 Age and Sex distribution of study population

Out of 60 diabetic patients from whom the swab was taken 38(63.33%) yielded staphylococcus aureus and from the remaining 22(36.67%) specimens other organisms like Coagulase negative staphylococcus aureus (CONS) was isolated.

Table :2 Total study population

Total No. of males	NCSA		Total No. of females	NCSA	
	Positive	Negative		Positive	Negative
40	26(65.0%)	14(35.0%)	20	12(60.0%)	8(40.0%)

Among 40 male diabetic patients 26 (65.0%) showed Staphylococcus aureus from nasal swabs and out of 20 female diabetic patients 12(60.0%) showed staphylococcus aureus from nasal swabs.

Distribution of NCSA positive male patients among non smokers, alcoholics and smokers, alcoholics.

Table:3 Nasal carriage of Staphylococcus aureus among the study population

Total No. of NCSA positive Males	Non smokers and alcoholics	Smokers and alcoholics
26(65.0%)	8(30.76%)	18(69.23%)

Among 26(65.0%) NCSA positive male patients8 (30.76%) are non smokers and alcoholics.18 (69.23%) are smokers and alcoholics.

Table: 4 Antibiotic sensitivity patterns of Staphylococcus aureus

Organisms	Total No.	P No. (%)	Ox No. (%)	Cip No. (%)	G No. (%)	Ak No. (%)	E No. (%)
S. aureus	38	10 (26.31)	31 (81.57)	25 (65.78)	32 (84.21)	35 (92.10)	36 (94.73)

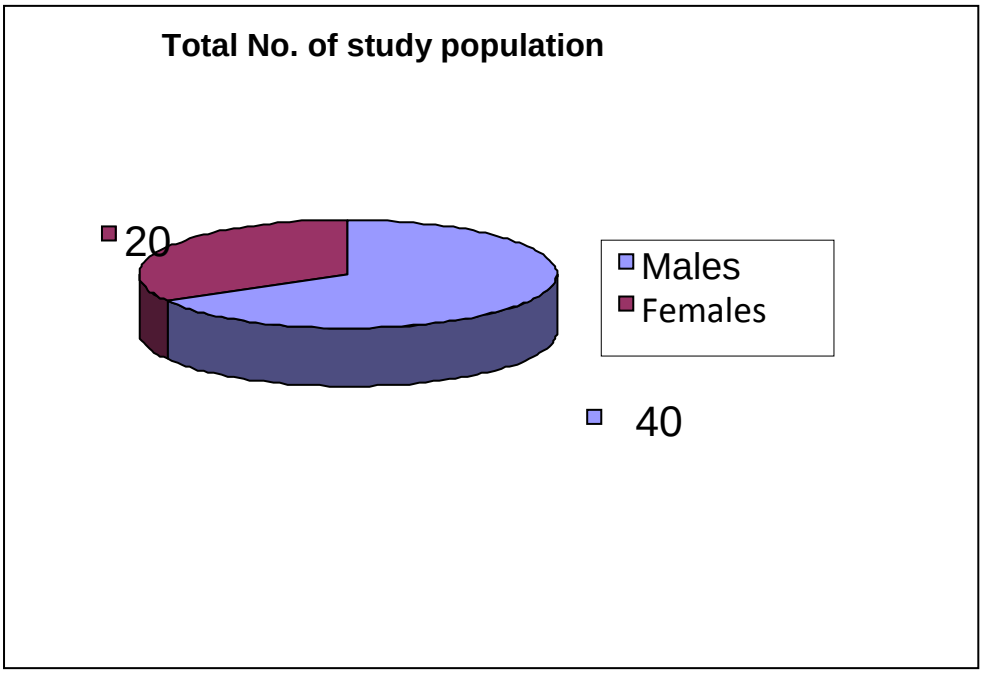

Figure:2 Total study population

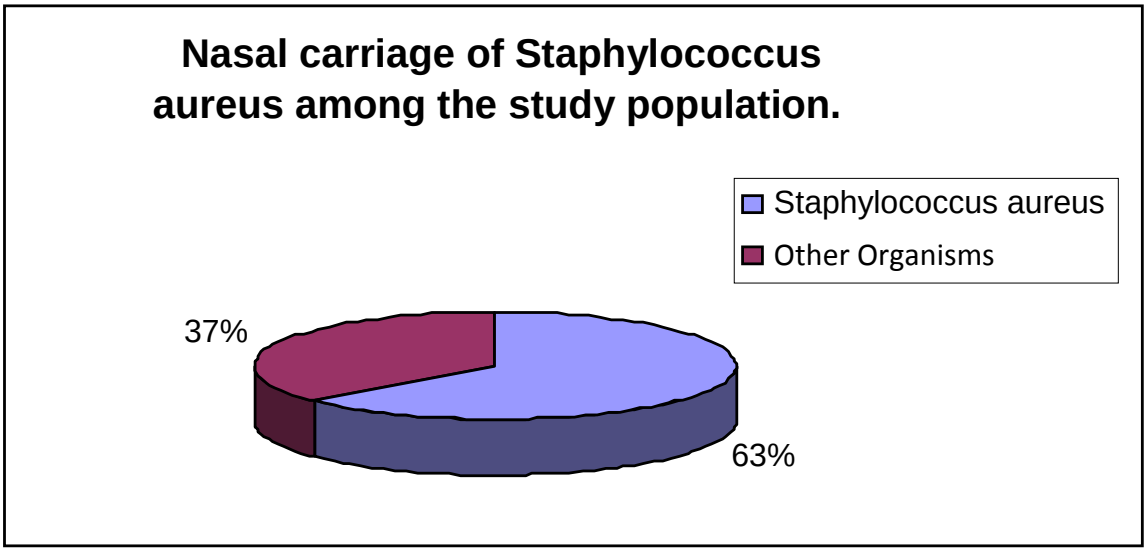

Figure:3 Nasal carriage of Staphylococcus aureus among the study population

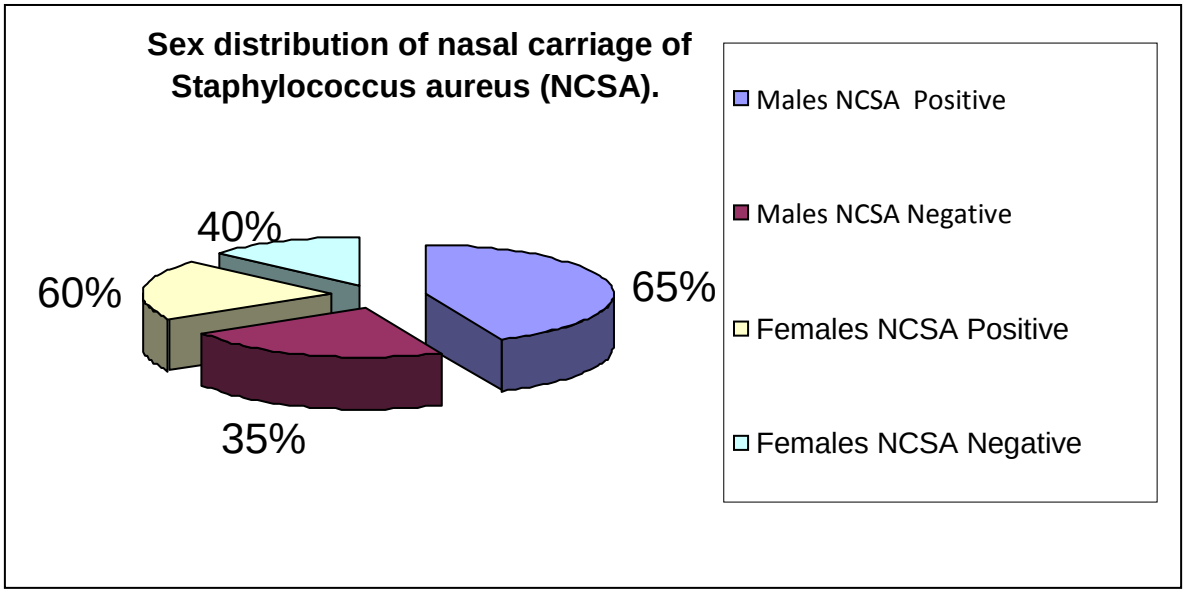

Figure:4 Sex distribution of nasal carriage of Staphylococcus aureus (NCSA)

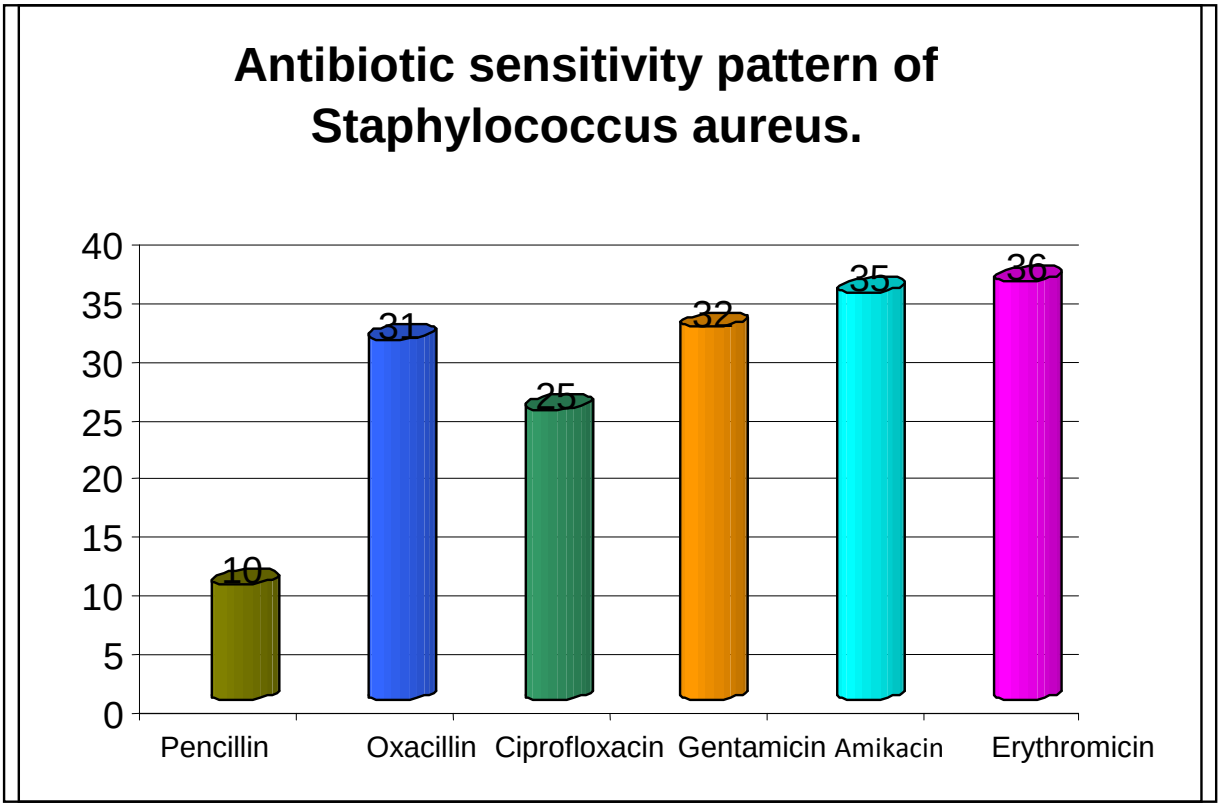

Figure:5 Antibiotic sensitivity pattern of Staphylococcus aureus

Table 5 MRSA isolates from NCSA patients

Total No. of NCSA positive samples	MRSA	
	Positive	Negative
38 (63.33%)	7(18.42%)	31(81.57%)

Among 38 (63.33%) isolates NCSA positive samples 7(18.42%) showed MRSA and 31(81.57%) not showed MRSA.

Table 6 Distribution of NCSA positive male patients among non smokers, alcoholics and smokers, alcoholics

Total No. of NCSA positive Males	Non smokers and alcoholics	Smokers and alcoholics
26(65.0%)	8(30.76%)	18(69.23%)

Among 26(65.0%) NCSA positive male patients8 (30.76%) are non smokers and alcoholics.18 (69.23%) are smokers and alcoholics.

DISCUSSION

Staphylococcus aureus remains among the most important nosocomial pathogens because of both the diversity and the severity of the infections caused by these organisms several studies have documented that these infections are most commonly caused by the patients own commensal flora. The original reservoir(s) from which patients acquire these isolates remains unclear. While some infected patients are colonized with staphylococcus aureus at the time of hospitalization, others likely become colonized, often with more highly antibiotic- resistant isolates, during their hospital stays.[6]

Infections associated with Staphylococcus aureus that frequently observed in diabetic patients and it is significant mortality and morbidity. NCSA rate is also found to be more in diabetic patients than the normal population. (2)

The present study Staphylococcus aureus was isolated from nasal swab of 38 (63.3%) diabetics which is higher than that reported by Chandler and Chandler (35.0%) and Singh and Rao which is (21.2%).

Table7 .NCSA positivity rates from the reported studies

Reference (no.)	Diabetics (n)	Carriage rate (%)
Chandler and Chandler	Diabetics (30)	35.0
Singh and Rao	Diabetics (33)	21.2
Ahluwalia et al	Type 1 diabetics(31) Type 2 diabetics (29)	67.7 44.8
Smith and O'Connor	Diabetic children(157)	76.4
present study	Diabetics (60)	63.33

MRSA isolates from NCSA positive diabetic patients 38 (63.33%) were 7 (18.42%) which is less than the findings of Rezvan Moniri et al who reported 52.6% (20 out of 38).

Antibiotic sensitivity pattern showed that the isolates were sensitive for Erythromycin, Amikacin and Gentamicin emerged as most effective first line antibiotics with (94.73%), (92.10%) and (84.21%) compared to findings of the Chong Seng Choi et al who reported Gentamicin (97.5%), Ciprofloxacin (86.4%) was found to be more effective than my study.

In my study Erythromycin (94.73%) was observed as most effective drug among all class of antibiotics tested and only two strains was found to be resistant to all first line antibiotics and they showed 100% sensitivity to Vancomycin and Cotrimoxazole which are second line drugs**.**

CONCLUSION

The present study shows a high rate of diabetic patients being carriers for Staphylococcus aureus in their nasal cavity and they have to be screened regularly to prevent serious infections with Staphylococcus aureus. In conclusion NCSA among diabetic patients is significant not only in terms of predisposing to subsequent infections but also to reduce cross transmission.

REFERENCES

[1] Christof Von Eiff, Karsten Becker, Konstanze Machka *N Eng J Med*, **2001** Vol. 344, No.1
[2] Ali Tamer, Oguz Karabay, Hasan Ekerbicer Jpn. *J. Infect. Dis.*, **2006** 59, 10-14,
[3] Jan L. Nouwen, Alex Van Belkum, Henri A. Verbrugh. *Journal of Medicine* **2001**: 59: 126-133.
[4] The Staphylococci**: 1997,** First Edition page no. 317.
[5] Chon Seng Choi, Chow Suet Yin. *J. Microbiol. Immunol. Infect.* **2006**; 39; 458-464.
[6] Christian Cespedes, Maureen Miller. *J. Clinical Microbiology* July **2002**, p. 2594-2597