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NASAL CARRIAGE OF ANTIBIOTICS RESISTANT *Staphylococcus aureus* AMONG MEDICAL STUDENTS OF OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, SOUTH-WEST, NIGERIA.

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ABSTRACT

The nose is a recognized source of *Staphylococcus aureus* which is a common pathogenic microbe in humans which cause different infections in hospitals as well as in the community. This study determined the nasal carriage and the antibiotic resistance profile of *Staphylococcus aureus* among the female medical students of Obafemi Awolowo University (OAU), Ile-Ife, Osun State, Nigeria. Eighty nasal samples, collected from 20 students were screened for mannitol fermentation, coagulase and catalase syntheses and Gram staining. Antibiotics resistance profile of the isolates was investigated using disc diffusion method. Out of the 80 samples screened, 25 isolates tested positive for mannitol fermentation and Gram staining. Twenty isolates tested positive for coagulase and catalase syntheses confirming them to be *Staphylococcus aureus* while five tested negative to coagulase and catalase syntheses. Eleven students were intermittent carriers of *S. aureus*, seven were non-carriers while two were persistent carriers of *S.aureus* during the period of investigation. Antibiotic sensitivity test revealed that all the 20 isolates were sensitive to streptomycin and ciprofloxacin,19 isolates showed resistance to cefotaxime and 9 isolates showed multiple resistance to co-amoxiclav, ampicillin, cloxacillin and cefotaxime while 1 isolate showed multiple resistance to co-amoxiclav, cloxacillin, cotrimoxazole and partially resistant to cefotaxime. In conclusion, there was detection of multiple antibiotics resistant *Staphylococcus aureus* among female medical students of OAU who frequently visit teaching hospital for their clinical trainings; this could lead to a major challenge in the management of staphylococcal infections in the hospital and the development of both community acquired and nosocomial infections.

Keywords: *Antibiotic resistant, Community acquired, Nasal, Nosocomial*

INTRODUCTION

Staphylococcus aureus is found at different parts of human and animal's body such as the gastrointestinal tract, axilla, nasal cavities, skin, rectum and vagina. *Staphylococcus aureus* penetrates from a cutaneous commensal site into the nasal mucosa and into epithelial cell ligands e.g cytokeratin and loricrin (Schmidt *et al*., 2015). About 20-30% of the general population of humans are asymptomatic permanent carriers of Staphylococcus aureus in their noses while twenty (20) to sixty (60) percent are intermittent carriers (Sakr *et al*., 2018).

Staphylococcus aureus is known for nasal colonization and one of the major causes of both nosocomial and community acquired infections (Von Eiff *et al*., 2001). *Staphylococcus aureus* is responsible for the numerous infectious diseases such as infective endocarditis, bacteremia, osteomyelits, fatal pneumonia, surgical infections, skin infection, tissue infections, intravenous catheter related infections, septicaemia, morbidity in patients and post-operative wound infections in hospital as well as in the community (Humphreys, 2012; Walsh *et al*., 2017).

There are three main approaches to the eradication of *Staphylococcus aureus* in the nasal cavity of the carriers, and these include (i) the local application of antibiotics which is of low efficacy leading to emergence of resistance (Mullighan *et al*., 1993); (ii) administration of systemic antibiotics which is also limited by rapid emergence of resistant strains ; iii) bacterial interference i.e active colonization of *Staphylococcus aureus* strain 502A which competes for the binding sites in the nose (Albrecht *et al*., 2015).

The rate of infections caused by *Staphylococcus aureus* is increasing; therefore the multidrug resistant strains are also increasing simultaneously. The mechanism of resistance of *Staphylococcus aureus* can be intrinsic or acquired; the intrinsic mechanism is classified into three aspects which include excessive production of β-Lactamase, efflux systems and outer membrane permeability (Anuj *et al*., 2019). The acquired antibiotic resistance can be categorized into resistance by mutations, acquisition of resistance genes, biofilm mediated resistance and persisted cells in antibiotics resistance (Haaber *et al*., 2017; Kanwar *et al*., 2017; Foster, 2017; Craft *et al*., 2019; Kime *et al*., 2019; Saxena *et al*., 2019; Vestergaard *et al*., 2019; Yang *et al*., 2019). This study sought to investigate the nasal carriage and the antibiotic resistance profile of *Staphylococcus aureus* isolated from the female medical students of Obafemi Awolowo University (OAU), Ile-Ife.

SIGNIFICANCE OF STUDY

The multiple-drug resistance of *Staphylococcus aureus* could pose a serious problem in the management of infections caused by *S. aureus* in the hospital environment; and this could lead to the development of both nosocomial and community acquired infections. Different studies have been carried out on nasal carriage of *Staphylococcus aureus* among various groups such as babies, adults, school children, undergraduates in OAU, Osun State, South-West and other states within Nigeria; but not so much attention has been given to the medical students especially the clinical students who visit the teaching hospital frequently in the course of their training in Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria. Hence, there is need for intermittent testing on hospital workers and those who frequently visit the hospital. Also proper treatment should be given to the identified carriers to prevent the evolution of both community acquired and nosocomial diseases.

METHODOLOGY

Description of Study Population

The study population for the investigation consisted of 20 female medical students of Obafemi Awolowo University (0AU) Ile- Ife, Osun State, Nigeria. The study area is Obafemi Awolowo University, a Federal university with a teaching hospital situated in Ile-Ife. Ile-Ife, Osun State, South-Western, Nigeria lies within latitude 40o 278o, longitude of 7o 1000o and has Ibadan (40 miles/ 64 km west), Ilesha and Ondo as borders. The samples were collected over a period of four weeks.

Collection of samples

Samples were taken from the subjects while in the hall of residence using sterile cotton tipped swab sticks moistened in sterile saline. Each swab stick was inserted into the subject's anterior nares and they were transported immediately to the laboratory in a Styrofoam box (Ako-nai *et al*., 1991).

Isolation and Identification of Isolates

Each retrieved swab stick and the control (sterile swab stick which was not introduced into the anterior nare) were later applied into nutrient broth and incubation was done at 37 ^{O}C for 24 hours. Samples from the incubated nutrient broth were taken with sterile loop and then streaked on the mannitol salt agar (MSA). This was incubated at 37 ^{O}C for 24 hours and observed for a change in colour to yellow, which indicated mannitol fermentation (Ako-nai *et al*., 1991; Damen *et al*., 2018).

Gram Staining Technique

Colonies were picked from the mannitol salt agar plates using sterile loop and subcultured on nutrient agar for Gram Staining. A loopful of the distinct colonies was picked from the nutrient agar plates using a sterile loop and place on different glass slides; the smeared glass slide were heat-fixed for two seconds; upon removal the slides were stained generously with crystal violet for one minute and afterward rinsed with sterile water; iodine was introduced to the rinsed slides generously as a mordant and allowed to stay for one minute; these slides were afterward decolourized with acetone and rinsed with sterile water; the decolorized slides were counterstained with safranin and was allowed to stay for sixty seconds before washing; these slides were allowed to dry before viewing under the microscope (Olowo-okere *et al*., 2021).

Coagulase Test (Tube Method)

Human plasma collected from the blood blank was prepared and sterilized; a specific amount (1.8mL) of was added to 0.2mL of the sterilized plasma; Two sterilized tubes were labelled and a diluted plasma of 0.5mL quantity was dispensed into the one labelled test (T) and also into the tube labelled negative control (N); five drops of 0.1mL each of the broth cultures(24 hours old) and the sterile broth was added to the tubes labelled T and N respectively; and the tubes were shaken in order to get a mixture and was incubated for one hour at 37oC; the tubes were later investigated for clotting after one hour and thereafter at every thirty minutes interval for six hours (Lamikanra *et al*., 1985).

Catalase Test

Colonies were picked from the nutrient agar plate with a sterile inoculating loop and placed on deMan, Rogosa and Sharpe (MRS) agar plates. The plates were inoculated at 30°C for 24 hours. A drop of 3% hydrogen peroxide was applied to a loopful of the isolates on a clean grease-free slide. Positive catalase activity was shown by effervescence, while no effervescence indicated absence of the enzyme (Otusanya *et al*., 2023).

Antibiotic Resistance Testing of the Isolates

Mueller-Hinton agar was prepared according to the manufacturer's instruction, 38g of Mueller-Hinton agar powder was added to 1000mL distilled water and this was sterilized by autoclaving at 121°C for 15 minutes; sterile Mueller-Hinton agar was poured into sterile plates and were left to set. Pure isolates were then picked from the stocks (in the Bijou's bottles) and inoculated into sterile Mueller-Hinton broth in labelled test tubes using sterile inoculating needles, and this was allowed to incubate for about 5 minutes. With a sterile swab stick, inoculums from the incubated broth was spread on the Mueller-Hinton agar and commercially prepared antibiotic discs of 10 units, Co-amoxiclav (30mcg) Cloxacillin (5mcg), Cotrimoxazole (25mcg), Ceftriaxone (30 mcg), Ampicillin (10mcg), Streptomycin (10mcg), Gentamycin (10mcg), Cefotaxime (30 mcg), Erythromycin (5mcg), ciprofloxacin (10mcg) was placed on Petri dishes containing nutrient agar plates aseptically and were incubated for 18 hours at 35oC . The resistance/susceptibility of the isolates were measured via their zone of inhibition (diameter) to the antibiotics used and this was recorded in millimetre. The plates were then incubated at 35 ^{O}C for 16 hours to 18 hours. The diameter of the zone of inhibition to each antibiotic was then measured and recorded in millimetres and compared with the standard table (Alli *et al*., 2022).

STATISTIAL ANALYSIS

Comparative resistant rates for *Staphylococcus aureus* strains were statiscally analyzed by test and results were considered significant at 95 confidence level.

RESULTS

Thirteen students (65%) were found to carry *S. aureus* and seven (35%) were non-carriers. two (15.4%) out of the thirteen carriers carry *S.aureus* persistently while eleven (84.6%) were intermittent carriers.

As shown in Table 1 below, the growth of *Staphylococcus* spp. from selected medical students over a period of four week. The positive (+ve) sign denotes growth which was identified based on the fermentation of mannitol salt by changing the red colour to yellow and the negative sign (-ve) denotes no growth i.e the red colour of mannitol salt agar remained after incubation. Twenty five out of the eighty samples grew on the mannitol salt agar while there was no growth recorded in the control samples. Table 2 shows that 25 isolates tested positive to Gram staining.

Table 3 shows that 20 out of the 25 isolates that grew on MSA were positive to coagulase and catalase syntheses, confirming them to be *Staphylococcus aureus* while five isolates tested negative to both tests. Table four reveals that all the 20 isolates were sensitive to streptomycin and ciprofloxacin,19 isolates showed resistance to cefotaxime and 9 isolates showed multiple resistance to co-amoxiclav, ampicillin, cloxacillin and cefotaxime while 1 isolate showed multiple resistance to co-amoxiclav, cloxacillin, cotrimoxazole and partially resistant to cefotaxime.

Table 1: Isolation and Identification of *Staphylococcus* spp. in selected medical students of OAU using mannitol fermentation on MSA

S/N	Isolates	MSA Test	S/N	Isolates	MSA Test	S/N	Isolates	MSA Test	S/N	Isolates	MSA Test
1	M_1B_1	-ve	21	M_2B_1	+ve	41	M_2O_1	-ve	61	M_3FU_1	-ve
2	M_1B_2	-ve	22	M_2B_2	-ve	42	M_2O_2	-ve	62	M_3FU_2	-ve
3	M_1B_3	+ve	23	M_2B_3	-ve	43	M_2O_3	-ve	63	M_3FU_3	+ve
4	M_1B_4	+ve	24	M_2B_4	-ve	44	M_2O_4	+ve	64	M_3FU_4	+ve
5	M_1D_1	-ve	25	M_2E_1	-ve	45	M_2TO_1	+ve	65	M_3S_1	-ve
6	M_1D_2	-ve	26	M_2E_2	-ve	46	M_2TO_2	-ve	66	M_3S_2	-ve
7	M_1D_3	-ve	27	M_2E_3	-ve	47	M_2TO_3	+ve	67	M_3S_3	-ve
8	M_1D_4	-ve	28	M_2E_4	-ve	48	M_2TO_4	-ve	68	M_3S_4	-ve
9	M_1T_1	-ve	29	M_2K_1	-ve	49	M_3B_1	-ve	69	M_3T_1	-ve
10	M_1T_2	+ve	30	M_2K_2	-ve	50	M_3B_2	-ve	70	M_3T_2	+ve
11	M_1T_3	+ve	31	M_2K_3	-ve	51	M_3B_3	-ve	71	M_3T_3	-ve
12	M_1T_4	-ve	32	M_2K_4	-ve	52	M_3B_4	-ve	72	M_3T_4	+ve
13	M_1TO_1	+ve	33	M_2L_1	+ve	53	M_3F_1	+ve	73	M_3TO_1	+ve
14	M_1TO_2	+ve	34	M_2L_2	-ve	54	M_3F_2	-ve	74	M_3TO_2	+ve
15	M_1TO_3	+ve	35	M_2L_3	-ve	55	M_3F_3	-ve	75	M_3TO_3	+ve
16	M_1TO_4	+ve	36	M_2L_4	-ve	56	M_3F_4	-ve	76	M_3TO_4	+ve
17	M_2A_1	-ve	37	M_2LA_1	-ve	57	M_3FO_1	-ve	77	M_1Y_1	-ve
18	M_2A_2	-ve	38	M_2LA_2	-ve	58	M_3FO_2	-ve	78	M_2Y_2	-ve
19	M_2A_3	-ve	39	M_2LA_3	+ve	59	M_3FO_3	+ve	79	M_3Y_3	-ve
20	M_2A_4	-ve	40	M_2LA_4	+ve	60	M_3FO_4	-ve	80	M_4Y_4	-ve
	Control	-ve									

M_1-Medicine Part One,M_2-Medicine Part Two,M_3-Medicine Part Three,M_4-Medicine Part Four
M_1TO_4-The level, name and the week in which the isolate was collected

Table 2: Characterization of Isolates using Gram Staining Technique

S/N	Isolates	Gram Test	S/N	Isolates	Gram Test	S/N	Isolates	Gram Test	S/N	Isolates	Gram Test
1	M_1B_1	N.D	21	M_2B_1	+ve	41	M_2O_1	N.D	61	M_3FU_1	N.D
2	M_1B_2	N.D	22	M_2B_2	N.D	42	M_2O_2	N.D	62	M_3FU_2	N.D.
3	M_1B_3	+ve	23	M_2B_3	N.D	43	M_2O_3	N.D	63	M_3FU_3	+ve
4	M_1B_4	+ve	24	M_2B_4	N.D	44	M_2O_4	+ve	64	M_3FU_4	+ve
5	M_1D_1	N.D	25	M_2E_1	N.D	45	M_2TO_1	+ve	65	M_3S_1	N.D
6	M_1D_2	N.D	26	M_2E_2	N.D	46	M_2TO_2	N.D	66	M_3S_2	N.D
7	M_1D_3	N.D	27	M_2E_3	N.D	47	M_2TO_3	+ve	67	M_3S_3	N.D
8	M_1D_4	N.D	28	M_2E_4	N.D	48	M_2TO_4	N.D	68	M_3S_4	N.D
9	M_1T_1	N.D	29	M_2K_1	N.D	49	M_3B_1	N.D	69	M_3T_1	N.D
10	M_1T_2	+ve	30	M_2K_2	N.D	50	M_3B_2	N.D	70	M_3T_2	-ve
11	M_1T_3	+ve	31	M_2K_3	N.D	51	M_3B_3	N.D	71	M_3T_3	+ve
12	M_1T_4	N.D	32	M_2K_4	N.D	52	M_3B_4	N.D	72	M_3T_4	+ve
13	M_1TO_1	+ve	33	M_2L_1	+ve	53	M_3F_1	+ve	73	M_3TO_1	+ve
14	M_1TO_2	+ve	34	M_2L_2	N.D	54	M_3F_2	N.D	74	M_3TO_2	+ve
15	M_1TO_3	+ve	35	M_2L_3	N.D	55	M_3F_3	N.D	75	M_3TO_3	+ve
16	M_1TO_4	+ve	36	M_2L_4	N.D	56	M_3F_4	N.D	76	M_3TO_4	+ve
17	M_2A_1	N.D	37	M_2LA_1	N.D	57	M_3FO_1	N.D	77	M_1Y_1	N.D
18	M_2A_2	N.D	38	M_2LA_2	N.D	58	M_3FO_2	N.D	78	M_2Y_2	N.D
19	M_2A_3	N.D	39	M_2LA_3	+ve	59	M_3FO_3	+ve	79	M_3Y_3	N.D
20	M_2A_4	N.D	40	M_2LA_4	+ve	60	M_3FO_4	N.D	80	M_4Y_4	N.D

M_1-Medicine Part One,M_2-Medicine Part Two,M_3-Medicine Part Three,M_4-Medicine Part Four
M_1TO_4-The level, name and the week in which the isolate was collected, N.D-Not Determined

Table 3: Characterization of Isolates using Coagulase and Catalase Tests

S/N	Isolates	Co-Ca Tests	S/N	Isolates	Co-Ca Tests	S/N	Isolates	Co-Ca Tests	S/N	Isolates	Co-Ca Tests
1	M_1B_1	N.D	21	M_2B_1	-ve	41	M_2O_1	N.D	61	M_3FU_1	N.D
2	M_1B_2	N.D	22	M_2B_2	N.D	42	M_2O_2	N.D	62	M_3FU_2	N.D.
3	M_1B_3	-ve	23	M_2B_3	N.D	43	M_2O_3	N.D	63	M_3FU_3	+ve
4	M_1B_4	-ve	24	M_2B_4	N.D	44	M_2O_4	+ve	64	M_3FU_4	+ve
5	M_1D_1	N.D	25	M_2E_1	N.D	45	M_2TO_1	+ve	65	M_3S_1	N.D
6	M_1D_2	N.D	26	M_2E_2	N.D	46	M_2TO_2	N.D	66	M_3S_2	N.D
7	M_1D_3	N.D	27	M_2E_3	N.D	47	M_2TO_3	+ve	67	M_3S_3	N.D
8	M_1D_4	N.D	28	M_2E_4	N.D	48	M_2TO_4	N.D	68	M_3S_4	N.D
9	M_1T_1	N.D	29	M_2K_1	N.D	49	M_3B_1	N.D	69	M_3T_1	N.D
10	M_1T_2	+ve	30	M_2K_2	N.D	50	M_3B_2	N.D	70	M_3T_2	+ve
11	M_1T_3	+ve	31	M_2K_3	N.D	51	M_3B_3	N.D	71	M_3T_3	-ve
12	M_1T_4	N.D	32	M_2K_4	N.D	52	M_3B_4	N.D	72	M_3T_4	-ve
13	M_1TO_1	+ve	33	M_2L_1	+ve	53	M_3F_1	+ve	73	M_3TO_1	+ve
14	M_1TO_2	+ve	34	M_2L_2	N.D	54	M_3F_2	N.D	74	M_3TO_2	+ve
15	M_1TO_3	+ve	35	M_2L_3	N.D	55	M_3F_3	N.D	75	M_3TO_3	+ve
16	M_1TO_4	+ve	36	M_2L_4	N.D	56	M_3F_4	N.D	76	M_3TO_4	+ve
17	M_2A_1	N.D	37	M_2LA_1	N.D	57	M_3FO_1	N.D	77	M_1Y_1	N.D
18	M_2A_2	N.D	38	M_2LA_2	N.D	58	M_3FO_2	N.D	78	M_2Y_2	N.D
19	M_2A_3	N.D	39	M_2LA_3	+ve	59	M_3FO_3	+ve	79	M_3Y_3	N.D
20	M_2A_4	N.D	40	M_2LA_4	+ve	60	M_3FO_4	N.D	80	M_4Y_4	N.D

M_1-Medicine Part One,M_2-Medicine Part Two,M_3-Medicine Part Three,M_4-Medicine Part Four
M_1TO_4-The level, name and the week in which the isolate was collected, N.D-not determined,Co- Coagulase; Ca-catalase

Table 4: Antibiotic Susceptibility/Resistance Profile of *S. aureus* Isolates

S/N	ISOLATE	AG	S	CPX	PN	CXL	SXT	CRO	GN	E	CTX
1	M_1T_2	R	S	S	R	R	R	S	S	S	S
2	M_1T_3	S	S	S	R	R	R	S	S	S	S
3	M_1TO_1	R	S	S	R	R	S	S	S	S	R
4	M_1TO_2	R	S	S	R	R	R	S	S	S	S
5	M_1TO_3	R	S	S	R	R	R	S	S	S	I
6	M_1TO_4	R	S	S	R	R	R	S	S	S	I
7	M_3T_2	R	S	S	R	R	R	S	S	S	I
8	M_2TO_1	R	S	S	R	R	R	S	S	S	S
9	M_2L_1	R	S	S	R	R	S	S	S	S	I
10	M_2O_4	R	S	S	R	R	R	S	S	S	I
11	M_2LA_3	R	S	S	S	S	R	R	R	S	R
12	M_2LA_4	R	S	S	R	R	R	S	S	S	R
13	M_2TO_3	R	S	S	R	R	S	I	S	I	R
14	M_3F_1	R	S	S	R	R	S	S	S	S	R
15	M_3TO_1	R	S	S	R	R	S	S	S	S	S
16	M_3TO_2	R	S	S	R	R	S	S	S	S	S
17	M_3TO_4	R	S	S	R	R	S	S	S	S	S
18	M_3FO_3	R	S	S	R	R	S	S	S	S	R
19	M_2FU_3	R	S	S	R	R	R	S	S	S	S
20	M_3FU_4	R	S	S	R	R	S	S	S	S	R

M_3FU_4- The level, name and the week in which the isolate was collected, S-Susceptible. R-Resistance, I-Intermediate susceptible, AG-co-amoxiclav, S-streptomycin, CPX-ciprofloxacin, PN-ampicillin, CXL-cloxacillin, SXT- cotrimoxazole, CRO-ceftriaxone, GN-Gentamycin, E-erythromycin,CTX-Cefotaxime, Zone of inhibition (>15mm = Resistance,10-15mm = Intermediate susceptibility and <10mm=susceptibility)

DISCUSSION

This study investigated the presence of *Staphylococcus aureus* in the anterior nares of female medical students of OAU; to know the pattern in which they present; and to know the antibiotic susceptibility of each of the isolates. This

agrees with the report that many studies have been carried out in different categories of people ranging from medical students (both clinical and pre-clinical), hospital patients (both out and in patients) and staff, healthy visitors and blood donors (Kluytmans *et al*., 1997). From the eighty samples, twenty-five isolates fermented mannitol salt by changing the red colour to yellow while fifty-five samples tested negative. Twenty out of the twenty-five isolates tested positive for coagulase, catalase syntheses while five isolates tested negative to the two tests. All the twenty-five isolates were Gram-positive. The results of coagulase and catalase tests confirmed twenty isolates to be Staphylococcus aureus.

Thirteen students (65%) were found to carry *S. aureus* and seven (35%) were non-carriers. two (15.4%) out of the thirteen carriers carry *S. aureus* persistently while eleven (84.6%) were intermittent carriers because their carriage was not consistent during the four weeks of investigation. Two students (10%) out of the thirteen carriers carry *S.aureus* persistently due to the fact that their carriage was consistent during the four weeks of investigation, this is in agreement with a report by Sakr *et al*. (2018) that about 20% to 30% of the general population are permanently and asymptomatically carriers of S. aureus in their nose while a population between 20% to 60% intermittently carry *S. aureus* (Kluytmans *et al*., 1997; Wertheim *et al*., 2005). The risk of occurrence of antibiotics-resistant *S. aureus* in the nose varies between the intermittent and persistent carriers and this difference helps in the treatment strategies, thereby leading to reduction in the risk of antibiotics resistance and cost of treatment (Klein *et al*., 2017).

The antibiotics sensitivity result showed that all twenty isolates (100%) of *S. aureus* were sensitive to streptomycin and ciprofloxacin, 19 out of the 20 isolates (95%) were sensitive to cefotaxime; 9 isolates (45%) were resistant to co-amoxiclav, ampicillin, cloxacillin and cefotaxime while 1 isolate was resistant to co-amoxiclav, cloxacillin, cotrimoxazole and partially resistant to cefotaxime. This result is in agreement with a former report multiple drugs resistance in microorganisms especially MRSA has drawn massive awareness from both local and international experts (Klein *et al*., 2017). Also, the result is similar to Otusanya *et al*. (2023) who reported that the antibiotic sensitivity pattern observed in isolates of S. aureus was sensitive to pefloxacin, zinnacel, and ciprofloxacin.

CONCLUSION

Staphylococcus aureus is a significant human pathogen which can lead to the evolution of infectious diseases in hospitals and communities. There was detection of multiple antibiotics resistant *Staphylococcus aureus* among female medical students of OAU who frequently visit teaching hospital for their clinical trainings; this could lead to a major challenge in the management of staphylococcal infections in the hospital and the development of both community acquired and nosocomial infections.

Also, in this study, about 15.4% and 84.6 % of the study population were found to be persistent carriers and intermittent carriers, respectively. This populace serves as reservoirs and ready disseminators of *S. aureus* in the hospital environment, if not properly treated. Proper treatment should be given to the carriers to prevent them from being risk factors for the evolution of both acquired and nosocomial infections.

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