Full Length Research Paper

Incidence and antibiotic susceptibility pattern of *Staphylococcus aureus* amongst patients with urinary tract infection (UTI) in UBTH Benin City, Nigeria

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Staphylococcus aureus is one of the most widely spread human pathogen. Considering the havoc it causes on life and subsequently on the economy, it became necessary to determine its incidence and antibiogram in our environment for adequate control and treatment. Records of microbial cultures and antibiotic sensitivity test results of suspected cases of urinary tract infection (UTI) of the University of Benin Teaching Hospital (UBTH) Benin City from January 1st to 31st December, 2005 were retrieved and statistically analyzed. Two thousand, one hundred and twelve (2,112) early morning mid-stream, urine samples were cultured and seven different microbial agents were isolated and identified. *Staphylococuus aureus* was found to be the most common organism isolated presenting 22.8%, closely followed by *Klebsiella* spp. (10.1%), *Escherichia coli* (8.2%), *Proteus mirabilis* (4.8%), *Enteronacter* spp. (4.4%), *Pseudomonas aeruginosa* (2.0%) and *Candida albican* (1.0%). No growth was recorded in 46.6% of cultures. The occurrence of *S. aureus* was found to be significantly higher (65.8%) in females compared to males (34.2%) (P>0.05). 35% of cases were observed between the ages of 21 to 30 years and the majority were female (46.7%). The *S. aureus* strains were sensitive to augmentin (83%), oxfloxacin (75.9%), nitrofurantion (63.5%) and gentamycine (50.2%). *S. aureus* was found to be highly resistant to tetracycline (80.9%), naladixic acid (79.3%) and contrimoxazole (87.3%). It was observed that *S. aureus*, among other organisms isolated, is the leading cause of UTI in our environment. Augmentin and oxfloxacin could be the drug of choice in the treatment of *S. aureus.*

Key words: Microbial agents, *Staphylococcus aureus*, significance level, resistance, urinary tract infection.

INTRODUCTION

Staphylococcus aureus belongs to the genus Staphylococcus, which has more than 20 species. Microscopic examination of its morphology in Gram's stain reveals *S. aureus* to be Gram positive cocci, appearing as singles, paired, clusters or in chains (Cheesbrought, 2000). *S. aureus* is an opportunistic pathogen affecting both immunocompetent and immunocompromised individuals, frequently resulting in high morbidity and with complications which constitute problems to health care institutions (Odugbami and Coker, 1987). Duguid et al. reported *S. aureus* as the causative agent of wide variety of disease of supporative infections such as boils and, wound infections, superficial infection such as skin pustule, subcutaneous and sub-mucosa obscesses, ostemyelitis, bronchopneumonia and food poisoning, a common cause of vomiting and diarrhea. It is the commonest cause of infection in hospitals and is most liable to infect newborn babies, surgical patients, old and malnourished persons, and patients with diabetes and other chronic diseases (Duguid et al., 1978). It is also the leading cause of urinary tract infection (UTI) (Akerele and Ahonkhai, 2000; Abdul and Online, 2001).

Urinary tract infection (UTI) is a heterogeneous disease, which can be divided into several types of infection, such as acute, uncomplicated bacterial pyelonephritis, complicated UTI, recurrent cystitis and asymptomatic bacteriuria (Graninger et al. , 1992). The urinary tract is

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Table 1. Distribution of isolates from urine samples of patients with suspected cases of urinary tract infection UTI (%).

Age (years)	C. albicans	E. coli	Klebsiella spp.	P. mirabilis	P. vulgaris	S. aureus	P. aeruginosa	No Growth
0-10	4 (19.0)	28 (16.1)	48 (22.5)	28 (27.7)	22 (23.6)	90 (18.7)	16 (37.2)	200 (20.3)
11-20	2 (9.5)	14 (8.04)	10 (4.7)	12 (11.9)	10 (10.7)	62 (10.7)	2 (4.7)	136 (30.8)
21-30	9 (42.8)	50 (28.7)	70 (32.9)	18 (17.8)	31 (33.3)	160 (33.3)	14 (32.6)	330 (33.5)
31-40	1 (4.8)	32 (18.4)	45 (21.1)	16 (15.8)	16 (17.2)	100 (20.7)	3 (6.9)	116 (11.8)
41-50	0 (0)	14 (8.04)	6 (2.2)	14 (13.9)	7 (7.5)	22 (4.6)	4 (9.3)	100 (10.2)
> 50	5 (23.8)	36 (20.7)	43 (20.7)	13 (12.9)	7. (7.5)	48 (9.9)	4 (9.3)	103 (10.4)
Total	**21 (0.99)**	**174 (8.2)**	**213 (10.1)**	**101 (4.8)**	**93 (4.4)**	**482 (22.8)**	**43 (2.0)**	**911 (42.9)**

generally a hostile environment for bacteria and except for the distal urethra it is usually sterile. Infection results when the bacteria virulence factor overcomes the numerous host defence mechanism (Graninger et al., 1992).

Treatment of infections caused by S. aureus can be one of the gratifying experiences in clinical practice. Survey of resistant patterns of microbes to drugs has shown a rise in the incidence of microbial resistance to most prescribed antibiotics. Therefore this study is aimed at determining the incidence of S. aureus in UTI cases and also to document the antibiotic sensitivity pattern in our environment, with the view to suggesting the most appropriate empirical antibiotics that could be of use.

MATERIAL AND METHODS

Laboratory records of all the requests for microbial culture and antibiotic sensitivity test of urine samples of patient with suspected cases of urinary tract infection UTI at the University of Benin Teaching Hospital from January 1st to December 31st 2005 were retrieved and statistical analysis was carried out on the data using chi-square test and 0.05% confidence limit. All the samples cultured were early morning mid stream urine and catheterized urine (CU) collected in sterile containers and subjected to routine processing. Criteria for isolation and identification of the organisms were carried out according to the method described by Lannette et al. (1980). Susceptibility test were performed by Stoke's disc diffusion technique (Stoke and Rigway, 1980); the sensitivity pattern was scored simply as either sensitive or resistant.

RESULT

Out of the 2,122 urine samples cultured, seven different microbial agents were isolated and identified in culture with S. aureus being the most prevalent organism (22.8%), closely followed by Klebsiella spp. (10%)). Escherichia coli (8.2%), Proteus mirabilis (4.8%) Proteus vulgaris (Candida albicans (1.0%) and Pseudomonas aeurginosa (2.0%) while (42.9%) showed no bacterial or fungal growth (Table 1). Table 2 depicts the relationship between sex and age of patients with S. aureus infection. Out of 482 isolates of S. aureus from the total sample, the female presented 65.8% while the males account for 34.2%. The highest number of S. aureus 33.2% was found in the age group of 21 to 30 years. The females

within that age group had 46.7% S. aureus infection, while the lowest is from the age group of 41 to 50 years.

Table 3 shows the antibiogram result of the S. aureus isolates. Among the eight different antibiotic discs used, S. aureus was found to be most sensitive to augmentin (83%) closely followed by oxfloxacin (79.9%), and these are apparently suitable for the treatment of S. aureus induced UTI.

DISCUSSION

It has been documented that S. aureus is one of the most widely spread human pathogens. This could be as a result of its minimal growth requirements, ability to survive long in most unfavourable environments and to find a susceptible host. The high incidence (22.8%) of S. aureus recorded in this study (Table 1) could be due to the virulent nature of the organism, which gives it the ability to overcome body defence mechanisms and resistance to antibiotics. The results from this study seem to support the statement made independently by Sule Odu (1991) and Akerele and Ahonkhai (2000) that S. aureus is the most frequent organism isolated from cultures. It also agrees with the results of a similar work previously carried out by Ahmed and Kudi (2003), where as high as 37.8% incidence of S. aureus among other organisms was recorded in cases of otitis media in Gombe.

Similarly, S. aureus was incriminated as the highest organism (34.4%) that was isolated from endocervical swab in Gombe as reported by Audu and Kudi (2004). The findings in this study suggest that S. aureus is the leading entiologic agent in urinary tract infection in our environment. It constituted as high as 65.8% of cases in women suspected of UTI compared to men (34.2%) (Table 2). This agrees with Abdul and Online (2001) who reported that UTI is common among women in Ilorin and S. aureus among other organism was found to be the most frequent isolate. Urinary tract is suppose to be sterile but the fact that this study shows high incidence of S. aureus in women than men could be due to the proximity between the genital tracts and the urethra/anus, which perhaps facilitate autotransmission as earlier suggested by Audu and Kudi (2004).

Table 2. Age and sex distribution of *S. aureus* isolated from urine samples of patients with suspected cases of urinary tract infection UTI (%).

Age (years)	Male (%)	Female (%)	Total (%)
0–10	48 (29.1)	40 (12.6)	80 (16.6)
11–20	26 (15.8)	42 (13.2)	63 (13.1)
21–30	39 (23.6)	148 (46.7)	190 (35.3)
31–40	34 (20.6)	60 (18.9)	94 (19.5)
41–50	15 (9.1)	10 (3.2)	25 (5.2)
> 50	37 (22.4)	17 (5.4	50 (10.4)
Total	165 (34.2)	317 (65.8)	482 (82.8)

Table 3. Antibiogram of *S. aureus* isolated from urine samples of patients with suspected cases of urinary tract infection UTI (%).

Antibiotics	No sensitivity (%)	No. Resistance (%)
Augnmentin	400 (83.0)	82 (17.0)
Oxfloxacin	366 (75.9)	116 (24.1)
Nitrofurantoin	306 (63.5)	176 (36.5)
Tetracycline	92 (19.1)	309 (80.9)
Co-trimoxazole	61 (12.7)	421 (87.3)
Amoxycillin	284 (58.9)	198 (41.1)
Naladixic acid	100 (20.7)	382 (79.3)
gentamycine	242 (50.2)	240 (49.8)

N = 482.

In contrast to a similar study on children hospitalized for non-infective urinary tract diseases however, Olowu and Oyetungi (2003) reported *Klebsiella* spp*.* as the most frequent organism isolated, closely followed by *S. aureus* presenting 31.5%. Okonofua (1995) also reported *E. coli* as the most frequent organism isolated in urine samples suspected of UTI in Ile-Ife..

In general, as high as 35% incidence of *S. aureus* was observed among the ages of 21 to 30 years (Tables 1 and 2). And women in the same age group accounted for 46.7%, (Table 2). It can be speculates that this is the sexually active and also the child-bearing age group. The study therefore supports the report of Krieger (1986) that there is high rate of bacterial infection among sexually active women of childbearing age.

The sensitivity pattern of *S. aureus* in this study is 83.0 79.9, 63.5, 58.9 and 50.2% to augmentin, ofloxacine, nitrofurantion amoxicillin and gentamycin, respectively, while *S. aureus* isolates are 87.3, 80.9 and 79.3% resistant to co-trimoxazole, tetracycline and naladixic acid, respectively. Sensitivity patterns of *S. aureus* to antibiotics recorded by other workers shows similarity except in few cases. In the study carried out by Egah et al. (1999) on antimicrobial susceptibility pattern of *S. aureus* in Jos, 87.5 and 67.5% were reported as sensitive to cefuroxine, erythromycin and augmentin, respectively, while resistance was recorded against tetracycline and ampicillin. Also Olowu and Oyetunyi (2003) showed *S. aureus* as being 60% sensitive to gentamycin and resistant to naladixic acid co-trimoxazole. Ahmed and kudi (2003) in one of their works on chronic suppurative otitis media in Gombe documented *S. aureus* as 89 and 61% sensitive to gentamycin and cephaloxin, respectively, and resistance to co-trimoxazole and penicillin. Shittu and Mandara (1999) in slight contrast to this study, reported *S. aureus* as 100% sensitive to genta-mycin and cephalosporin, and resistant to augmentin and nitrofurantoin. These differences in sensitivity pattern of *S. aureus* could be attributed to environmental factors such as the misuse and abuse of antibiotics among the general population, which has favoured the emergence of resistance strains just as it could be the case in other organisms in any particular region or community.

This study observed that *S. aureus* is the commonest etiologic agent of UTI in Benin City, Nigeria. The drug of choice that could be considered in the treatment of UTI are augmentin, ofloxacin, nitrofurantoin and gentamycin. *S. aureus* was found to be highly resistant to co-trimoxazole and nalidixic acid. There is need for a national antibiotic policy and also a surveillance scheme.

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