Klebsiella has taken lead among uropathogens in University of Benin Teaching Hospital, Benin City, Nigeria-An observation

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Abstract: Against the background of reports of changes in the prevalence of uropathogens, this study aimed to determine the prevalence of asymptomatic bacteriuria among out-patients of a tertiary hospital, the most prevalent uropathogen, and the distribution of uropathogens among both genders. Clean–catch midstream urines were collected from 1,011 out–patients consisting of 412 males and 599 females. Significant bacterial isolates were identified in the urine samples using standard techniques. Female patients had significantly higher prevalence of asymptomatic bacteriuria ($p < 0.05$). *Klebsiella* sp was the most common uropathogen (33.3%) as well as in both genders of patients. Other pathogens recovered includes *Escherichia coli* (32.3), *Staphylococcus aureus* (17.6%), *Candida albicans* (7.5%)), Coagulase negative *staphylococcus* (3.9%), *Proteus* sp (3.2%), *Enterococcus faecalis* (1.1%), Pseudomonas (0.7%) and Providencia sp (0.4%). An overall prevalence of (27.6%) of asymptomatic bacteriuria was found and *Klebsiella* sp was the predominant uropathogen in both genders of out–patients. [New York Science Journal 2010;3(11):61-64]. (ISSN: 1554-0200).

Keywords: prevalence of asymptomatic bacteriuria; out-patient; uropathogen

INTRODUCTION

Urinary tract infections (UTI) are among the most common conditions causing individuals to seek medical care (Aiyegoro *et al*., 2007). They are also among the most common bacterial infections in humans, both in the community and hospital settings occur in all age groups, in both genders, and usually require urgent treatment (Orret *et al*., 2006). Urine is the most received and processed specimen in a clinical microbiology laboratory (3) and *Escherichia coli* has been reported as the most prevalent aetiological agent (Aiyegoro *et al*.,2007;Orret *et al*.,2006;Boyko *et al* .,2005;Hynierwicz *et al*.,2001). In 2003, *Pseudomonas aeruginosa* was reported as the predominant isolate causing asymptomatic UTI among residents of Zaria, Nigeria (Ehinmidu, 2003). Against this background, this study reports on the rising incidence of *Klebsiella* sp as a major pathogen of urinary tract infection among out–patients attending various clinics in university of Benin teaching hospital in Benin City, Nigeria.

Materials and methods

Study population

The study was carried out at the University of Benin Teaching Hospital; Benin City, Nigeria from February to June 2010. A total of 1,011 patients were studied. The study subjects were out–patients attending various clinics. Exclusion criteria included signs and symptoms of UTI, antibiotic usage within one week and large fluid in–take prior (less than one hour) before clinic attendance. Verbal informed consent was obtained from all patients prior to specimen collection. Approval for the study was given by the Ethical Committee of the University of Benin Teaching Hospital.

Specimen collection and processing

Clean–catch midstream urine was collected from each patient into a sterile screw–capped universal container, containing a few crystals of boric acid as preservative. The specimens were mixed, labeled and transported to the laboratory for processing. A loop-full (0.001mL) of well mixed un-centrifuged urine was streaked onto the surface of blood agar and cystine lactose electrolyte deficient (CLED) medium

(M6: Plasmatec Laboratories, United Kingdom). The plates were incubated aerobically at 370C for 24 hours and counts were expressed in colony forming units (CFU) per milliliter (mL). A count of ≥ 105 CFU/mL was considered significant to indicate asymptomatic bacteriuria. Ten mL of each well-mixed urine sample was centrifuged at 2000g for 5 minutes. The supernatant was discarded and a drop of the deposit was examined microscopically at high magnification for pus cells, red blood cells, epithelial cells, casts, crystals yeast-like cells and *Trichomonas vaginalis*. Pus cells ≥ 5 per high power field were considered significant to indicate infection. The isolates were identified by standard microbiological methods (Cowan and Steel, 1974). Statistical analysis was by the Chi (X2) square test. A p value of<0.05 was deemed statistically significant.

RESULT

A total of 279 microbial isolates were recovered and *Klebsiella sp* was the most predominant isolate (table 1). Table 2 shows the distribution of uropathogens among gender. With the exception of *Pseudomonas* sp, *Enterococcus faecalis* and *Providencia* sp females had a higher prevalence of uropathogens (p<0.05).

Table 1: Microbial isolates from urinary tract infections among out-patients in UBTH

Microbial Isolates	No of isolate	%
Escherichia coli	90	32.3
Staphylococcus aureus	49	17.6
Proteus sp	9	3.2
Klebsiella sp	93	33.3
Coagulase negative		
Staphylococcus	11	3.9
Enterococcus faecalis	3	1.1
Pseudomonas sp	2	
Providencia sp	1	0.4
Candida albicans	21	7.5
	279	

Table 2: Gender related prevalence of uropathogens among outpatients in UBTH

	No of Isolates	males (%	females (%)
Escherichia coli	90	19(6.8)	71(25.8)
Staphylococcus aureus	49	22(44.9)	27(55.1)
Proteus sp	9	4(44.4)	5(55.6)
Klebsiella sp	93	21(22.6)	72 (77.4)
Coagulase negative			
Staphylococcus	11	1 (9.1)	10 (90.9)
Enterococcus faecalis	3	2 (66.7)	1 (33.3)
Pseudomonas sp	2	0 (0)	2(100)
Providencia sp	1	1(100)	0(0)
Candida albicans	21	2(9.5)	19(90.5)

P < 0.05

Discussion

Several reports exist, indicating changes in the prevalence of uropathogens (Ehinmidu, 2003; Akinloye *et al*., 2006). Against this background, this study focused on determining the prevalence of AB among out-patients of a tertiary hospital as well as to determine the most prevalent uropathogen and the distribution of uropathogens among genders of the study population. Our study showed a prevalence of AB of 27.6%.

The finding that females had higher prevalence of AB than males agrees with earlier studies (Anochie *et al*., 2001).Aiyegoro *et al*., 2007). Women are more prone to UTIs than men because in females, the urethra much shorter and closer to the anus than in males, (Akinloye et al., 2006) and they lack the bacteriostatic properties of prostatic secretions. In young sexually active women, sex is the cause of 75—90 % of bladder infections, with the risk of infection related to the frequency of sex (Nicolle, 2008).The term "honeymoon cystitis" has been applied to this phenomenon of frequent UTIs during early marriage.

A total of 279 isolates were recovered from 213 specimens with asymptomatic bacteriuria, indicating mixed infections in some patients. *Klebsiella species* was generally, the most common isolate in the patients. Also, was the most prevalent isolate in both genders.

The most common organism implicated in UTIs (80—85 %) is *E coli* (Nicolle, 2008) the reason for this observed change cannot be clearly explained. Klebsiella are ubiquitous in nature. In humans, they may colonize the skin, pharynx, or gastrointestinal tract. They may also colonize sterile wounds and urine (Einstein, 2000). Klebsiella may be regarded as

normal flora in many parts of the colon and intestinal tract and in the biliary tract. Oropharyngeal carriage has been associated with endotracheal intubation, impaired host defenses, and antimicrobial use (Nordman *et al*., 2009) Infection with *Klebsiella* organisms occur in the lungs, where they cause destructive changes. Necrosis, inflammation, and hemorrhage occur within lung tissue, sometimes producing thick, bloody, mucoid sputum described as currant jelly sputum (Chan *et al*., 2009). The illness typically affects middle-aged and older men with debilitating diseases such as alcoholism, diabetes, or chronic bronchopulmonary disease (Chan *et al*., 2009). This patient population is believed to have impaired respiratory host defenses (Hirsch *et al*., 2005). The organisms gain access after the host aspirates colonizing oropharyngeal microbes into the lower respiratory tract (Hirsch *et al*., 2009).

Klebsiella have also been incriminated in nosocomial infections (Mitford *et al*., 2008). Common sites include the urinary tract, lower respiratory tract, biliary tract, and surgical wound sites. The spectrum of clinical syndromes includes pneumonia, bacteremia, thrombophlebitis, urinary tract infection (UTI), cholecystitis, diarrhea, upper respiratory tract infection, wound infection, osteomyelitis, and meningitis (Mitford *et al*., 2008). The presence of invasive devices, contamination of respiratory support equipment, use of urinary catheters, and use of antibiotics are factors that increase the likelihood of nosocomial infection with *Klebsiella* species (Weinserberg *et al*., 2009).

Extensive use of broad-spectrum antibiotics in hospitalized patients has led to both increased carriage of *Klebsiella* and, subsequently, the development of multidrug-resistant strains that produce extended-spectrum beta-lactamase (ESBL) (Paterson, 2000; Kaye *et al*., 2000). These strains are highly virulent, show capsular type K55, and have an extraordinary ability to spread (Kaye 2000, Mitford, 2008, Adams-Haduch *et al*., 2009). Most outbreaks are due to a single clone or single gene (Kaye, 2000); the bowel is the major site of colonization with infection of the urinary tract, respiratory tract, and wounds (Kaye, 2000).

It should be noted that these observed changes in the prevalence of uropathogens are mostly from Africa as *Escherichia coli* remains the most common aetiological agent in North America (Drew *et al*., 2005).This may indicate that these changes occur in some geographical locations. The changes may also be transient as they were first reported in 1969 (Okubadejo *et al*., 1969; Philips *et al*, 1969) and later in 2003 and 2006 (Ehinmidu, 2003; Akinloye *et al*., 2006). However, these will require further investigations to verify.

The observed changes in this study have serious implications as most clinicians treat patients without recourse to laboratory guidance (Orret *et al*., 2006). Such treatments are usually based on known aetiological agents and susceptibilities. This observed change in the prevalence of uropathogens may lead to change in antimicrobial susceptibility and ineffective treatment. Therefore, clinicians should rely on laboratory guidance before therapy as this will overcome the problem of mistreatment and reduce the emergence of resistant uropathogens. In conclusion, our study revealed a prevalence of 27.6% of AB among out–patients of University of Benin Teaching Hospital, Benin City. *Klebsiella sp* was the most prevalent uropathogen among the patients. Further studies are needed to ascertain if this change in the prevalence of uropathogens are transient and restricted to certain geographical locations.

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