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Prevalence of Asymptomatic Bacteriuria among Utagba-Ogbe Technical School Students in Kwale, Delta StateJemikalajah, Daniel Johnson¹*Department of Science Laboratory Technology, Faculty of Science, Delta State University, Abraka¹.**Author for correspondence: jemikalajahjohnson2007@yahoo.com/+234-703-222-2372***Abstract**

*This study aims to determine the prevalence of asymptomatic bacteriuria among technical school students in Kwale. A total of 110 students (30 males and 80 females) selected randomly from Utagba-Ogbe technical school in Kwale were screened for bacteria in their urine. Standard bacteriological methods were used for the screening of subjects. Overall prevalence rate of 8.18% was obtained with 6.36% for females and 1.82% for males respectively. The bacterial isolates recorded were *Staphylococcus aureus* (4.54%), *Escherichia coli* (1.81%), *Klebsiella species* and *Staphylococcus epidermis* (0.90%) each in descending order respectively. This study has shown the need to reduce asymptomatic bacteriuria among the school students.*

Keywords: Prevalence, asymptomatic, bacteriuria, students.

Introduction

Asymptomatic bacteriuria (AB) is defined as a significant bacterial count (usually 10^5 or 10^6 organisms/ml) present in the urine of a person without symptoms. It is characterized by dysuria, pain and fever, which accounts for over 6 million outpatient visits each year (Colgan *et al.*, 2006). Urinary tract infection may be associated with renal insufficiency and increased mortality in adults, but these complications rarely occur among those without underlying structural and functional diseases of the urinary tract (Nicolle, 2003). About 10-35% of infants and children with asymptomatic bacteriuria have vesicoureteral reflux and 6-37% has renal scarring or other abnormalities (Raz, 2003).

Children with major structural abnormalities, chronic pyelonephritis, or severe vesicoureteral reflux are at increased risk of renal scarring, obstructive renal atrophy, hypertension, and renal insufficiency. Pyelonephritis, reflux nephropathy, and urinary tract malformations may cause as much as one fifth of cases of renal failure in children.

The risk of acquiring bacteriuria varies with age and gender. Asymptomatic bacteriuria in term infants is more common in males with estimated prevalence of 2.0-2.9% and 0.0-1.0% in females, but it is considerably more common in girls after the age of one year ranging from 0.7-2.7% in girls and 0.0-0.4% in boys (Ogefere and Oluka, 2013). Approximately 5-6% of girls have at least one episode of bacteriuria between first year and their graduation from high school, and as many as 80% of these children experience recurrent infections. Asymptomatic bacteriuria is a common finding in older persons, especially those who are very old or institutionalized (Mims *et al.*, 2012).

The major cause of urinary tract infection (UTI) is bacteria, but fungi and viruses may occasionally cause UTI. The majority of community-acquired, uncomplicated UTI is caused by *Escherichia coli* (80-90%) or *Staphylococcus aureus* (5-10%) whereas *Klebsiella sp.*, *Enterobacter sp.*, *Proteu sp.* and *Enterococci sp.* infrequently cause infection outside hospitals (Ferry *et al.*, 2004 and Kahlmeter, 2003). In contrast, it is more diverse in nosocomial acquired UTIs where these bacteria species and *Candida species* are more common and where *Escherichia coli* accounts

for only 35-50% (Ronald, 2002 and Bouza, *et al.*, 2001). According to Ani and Mgbechi (2008), *Escherichia coli* (67.2%) are the main causative of UTI in Nigeria. Other significant pathogens include *Staphylococcus aureus*, *pseudomonas spp* and *Klebsiella spp*.

In healthy patients most uropathogens originate from rectal flora and enter the urinary tract via the urethra into the bladder (Hanley *et al.*, 2002). This is known as the ascending route and uropathogens initially adhere to and colonize urothelium of the distal urethra. Enhancement of this route is exacerbated in patients with soiling around the perineum, in patients with urinary catheters and in females that use spermicidal agents (Foxman, 2002). In patients with established cystitis up to 50% of infections may ascend into the upper urinary tracts and most episodes of pyelonephritis are caused by ascension of bacteria from the bladder through the ureter and into the renal pelvis (Busch and Huland (1984). Bacteria ascend is aided by conditions such as pregnancy and ureteral obstruction as these conditions inhibit ureteral peristalsis. Bacteria that reach the renal pelvis can penetrate the renal parenchyma through the collecting ducts and disrupt the renal tubules.

In healthy individual infection of the kidney through the haematogenous route is uncommon. Occasionally, the renal parenchyma may be breached in patients with *Staphylococcus aureus* bacteraemia or *Candida fungaemia* that originate from oral sources in immunosuppressed patients (Smellie *et al.*, 1975). On rare occasions bacteria from adjacent organs may penetrate the urinary tract via the lymphatics. Conditions associated with the lymphatic route are retroperitoneal abscesses and severe bowel infections. Urinary tract infections may arise from ascending, haematogenous or lymphatic routes (Nail and Hugh, 2011). Therefore, this study is set to determine the prevalence of asymptomatic bacteriuria in Technical School students in Kwale, Ndokwa Local Government Area of Delta State.

Materials and methods

Study area

The study was conducted in Kwale, headquarter

of Ndokwa Local government area of Delta State in Southern Nigeria. Kwale town lie approximately between longitude 5° 00' and 6° 45' East and latitude 5° 00' and 6° 30' North of Delta State. Kwale is located at about 71-kilometre North of Asaba with estimated population of about 114,117 (World Gazette, 2007).

Study population

A total of 110 apparently healthy students of Utakwa-Ogbe Technical School, Kwale comprising of 30 males and 80 females between the ages of 11 to 20 years were randomly selected and studied from June, 2016 to July, 2017.

Sample size

A total of 110 students were recruited into the study using simple random sampling technique after informed verbal consent. Sample size (N) was calculated from the formula below using prevalence from previous studies (Ekejindu *et al.*, 2002).

Sample collection

A total of 110 mid-stream urine samples were collected into sterile, transparent, universal containers containing few crystals of boric acid as preservative from the participating students. All the samples were properly labelled and transferred to the Microbiology Laboratory unit, Science Laboratory Technology Department of Delta State University, Abraka for immediate analysis.

Sample analysis

Urine samples were examined macroscopically, microscopically and cultured using standard bacteriological technique (Cheesbrough, 2006).

Standardization of wire loop

This is achieved by winding nichrome wire round once round a metal rod of an approximate diameter of 4mm. Using the loop, drops of water were counted while dropping at a standard rate into a graduated cylinder until the 1ml mark was reached. Three (3) readings were taken and an average obtained (50, 49, and 51). 50 drops give 1ml

$$1 \text{ drop} = 1/50 = 0.02 \text{ ml}$$

Inoculation of plates

Using prepared standard wire loop, a drop of the urine samples was inoculated on to Cystine lactose electrolyte deficient, MacConkey and Blood agar plates. The plates were incubated aerobically at 37°C for 24 hours.

Microscopy of urine deposit

About 10 ml urine was centrifuged in a conical centrifuge tube at 3000rpm for 10 minutes. A drop of unstained deposit was examined on a microscopic slide under a x40 objective for the presence of pus cells. Values of 3-5 pus cells and above are considered meaningful in this study.

Identification of organisms

All bacterial isolates were subjected to

taxonomic analysis by the determination of their morphological, physiological and biochemical characteristics (Sanders, 1994; Cruishank *et al.*, 1975; Cowan and Steel, 1974).

Ethical approval

Ethical approval was obtained from Ethical Committee of Utagba – Ogbe Technical School, Kwale and verbal consent sorted from the participating students.

Statistical analysis

Data collected was analyzed using descriptive statistics and simple percentages. A p- value of ≤ 0.05 was considered statistically significant.

Results

Table 1: Prevalence of asymptomatic bacteriuria among the students

No. Tested	No. Infected	No. Uninfected	% Prevalence
110	9	101	8.18

Table 2: Age and Gender distribution of asymptomatic bacteriuria among the students

Age	No. Tested	No. (%) Infected Male	No. (%) Infected Female	No. (%) Total Infected	% Prevalence
11-13	17	0(00)	1(5.88)	1(5.88)	0.90
14-17	63	1(1.58)	2(3.17)	3(4.76)	2.72
18-20	30	1(3.33)	4(13.33)	5(16.66)	4.54
Total	110	2(1.81)	7(6.36)	9(8.18)	8.18

Table 3: Prevalence of Bacterial Isolates among the Students

Bacterial isolates	No. Tested	No. (%) Positive	No. (%) Negative
<i>Staphylococcus aureus</i>	110	5(4.54)	105(95.45)
<i>Staphylococcus epidermidis</i>	110	1(0.90)	109(99.09)
<i>Escherichia coli</i>	110	2(1.81)	108(98.18)
<i>Klebsiella sp.</i>	110	1(0.90)	109(99.09)
Total	110	9(8.18)	101(91.81)

Discussion

The rate of asymptomatic bacteriuria differs by age, gender, sexual activity, and the presence of genitourinary abnormalities. In healthy women, the prevalence of bacteriuria increases with age, from about 1% in females 5 to 14 years of age to more than 20% in women at least 80 years of age living in the community (Nicolle, 2003).

This study revealed a prevalence rate of 8.18% of asymptomatic bacteriuria among the group

studied. This is slightly lower than the 10% previously reported (Frank-Peterside and Wokoma, 2009). The females have higher prevalence rate than the males. This high prevalence may be due to the close proximity of female urethral meatus to the anus, shorter urethra and frequency of sexual intercourse as earlier observed (Omoriegie *et al.*, 2008). The finding that the prevalence of asymptomatic bacteriuria was significantly higher in female students compared with male students with

increasing age agrees with the notion that UTI increases with age (Colgan *et al.*, 2006). Sexual intercourse, a known risk factor for UTI, may be more common in older students.

In this study, *Staphylococcus aureus* was the most prevalent aetiologic agent of asymptomatic bacteriuria among the students. This is in agreement with several reports from Benin City, Nigeria, among different populations that revealed *Staphylococcus aureus* as the predominant agent of asymptomatic bacteriuria (Omoriegie and Eghafona, 2009; Omoriegie *et al.*, 2008).

Staphylococcus aureus predominance in both genders is based on the fact that it is a normal flora of the female perineum and vulva, and can easily be carried into the urethra during sexual intercourse by a massaging process (Davies, 1996). However, we did not ascertain whether our subjects were sexually active or not.

In this study, the pathogens isolated included; *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Escherichia coli* and *Klebsiella sp.* It is therefore imperative to carry out extensive health education campaign across primary and tertiary education facilities, in addition to early diagnosis and prompt treatment of asymptomatic bacteriuria to prevent chronic ill health and long-term renal damage in the studied area and Nigeria as a whole.

Conflict of interest: None

Funding: None

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