

Prevalence of Urinary Tract Infection among Age Groups in Bauchi Metropolis, Nigeria

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Abstract: *Urinary Tract Infection (UTI) is a common pathogenic inflammatory, distressing and occasionally life-threatening condition that affects people of all ages and gender. The research was conducted from month of May-August, out of the 236 samples analyzed, 120(50.8%) showed significant bacteriuria. Highest infection rate, 12(29.3%) and 28(35.4%) falls at age group of 21-30 years in males and females respectively, while those of age group ≥ 71 years had the lowest 0(0.0%) and 1(1.3%) infection rate in both gender. This shows that age group of 21-30 years are at the peak of infection and females are at highest rate of infection.*

Keywords: UTI, males and females

1. Introduction

The urinary tract comprises the kidney, ureters, bladder and urethra; it is the body's filtering system for removing waste liquid, or urine (Ramadan, 2013). A urinary tract infection (UTIs) is defined as the presence of microbial pathogens in the urinary tract with associated symptoms. When it affects the lower urinary tract, it is known as cystitis and when it affects the upper urinary tract it is known as pyelonephritis i.e. affecting the kidney (Ramesh and Aggarwal, 2012). Urinary tract infections (UTIs) is one of the most common infectious disease in humans Mohamad *et al.* (2010) that occur in both community and hospital environments. They are the most common type of nosocomial infections (Sharifi *et al.*, 2013). Several different microorganisms have been known to cause urinary tract infection; these include those of normal flora of the skin, genital areas, anus and those from exogenous sources that may be contacted through bad sanitary habits especially of under wear's (Nicolle, 2008). Some of the risk factors of UTIs include gender, sexual activity, immune system disorder, urinary tract anatomical malformations, disruption of normal flora of the genital area with antiseptics and antibiotics, urinary catheter and instrumentation (Foxman, 2003; Gould *et al.*, 2010).

Gram negative bacteria have been found most frequently in UTIs cases by several investigators with *E. coli* and *Klebsiellapneumoniae* being the most predominant organisms (Obiogbolu *et al.*, 2009) others include; *Proteus mirabilis*, *E. faecalis* *S. saprophytics*, *P. aeruginosa*, *Serratia* and *Acinetobacter*. According to Manikandan *et al.* (2011), *E. coli* is the most prevalent cause accounting for greater than 80-95% of bacterial UTIs and appears to be a true community pathogen

Depending on age, symptoms of UTIs include; fever, burning and painful urination, nausea, vomiting, dysuria, urgency, frequency, abdominal or lower back pain, weakness, and dark bloody, cloudy or bad smelling urine (Mandell *et al.*, 2005). The pathogenesis of UTIs involves complex interaction between an organism, environment and the potential host (Ouno *et al.*, 2013). For women, the lifetime risk of having a UTI is greater than 50 per cent (Kumar *et al.*, 2012). John (2015) reported that UTIs are rare

in adult males younger than 50 years but increase in incidence thereafter.

UTIs are a major cause of hospital admissions and are associated with significant morbidity and health care costs. It causes serious health problem and affecting a million of people over the world (Barisic *et al.*, 2003).

A urinary tract infection is an old problem that continues to present new challenges due to change in the etiology of UTI and the antimicrobial susceptibility of urinary pathogens over the years (Iroha *et al.*, 2009).

The objective is to find out the bacteria responsible for urinary tract infection and the prevalence according to gender.

2. Materials and Methods

The study area for the collection of sample include; Abubakar Tafawa Balewa University Teaching Hospital (ATBUTH), Bauchi Specialist Hospital, Primary Health Care TanshenBabiye Hospital, Bauchi State. A total of 236 midstream urine samples were obtained from males (101) and females (135) patients with symptoms of urinary tract infection between month of May-August. All urine samples were collected from each patient into a 20ml calibrated sterile screw- capped universal containers, patients were informed to provide clean catch midstream urine which gives a true representation of what is contained in the bladder. At the point of collection, samples were labeled with name, sex and age of the patients, the samples were processed immediately at the laboratory, but in cases of delay, the urine samples were refrigerated at 4°C to avoid multiplication of bacteria (Rushita *et al.*, 2016).

Samples were observed macroscopically for colour, blood tinge and turbidity. Using a sterile wire loop, a loopful of well mixed uncentrifuged urine were aseptically inoculated onto Cysteine Lactose Electrolyte Deficient Agar by streak method with the aid of sterile wire loop. To obtain pure isolates, discrete colonies of growth isolated from the primary media were inoculated on well dried MacConkey Agar plates. The plates were incubated at 37°C overnight

(Iraq and Nilufar, 2010), and subcultured on slants for subsequent identification.

After overnight incubation, colonies were identified based on colonial morphology and biochemical characteristics. Colonies were observed for morphological features such as size, shape, edge consistency, margin, colour, opacity and effect on media i.e. lactose or non-lactose fermenters (Ezeigbo *et al.*, 2016). In addition to these morphological features of the colonies, motility, Gram staining reaction, and biochemical tests were used in characterizing the isolates. The identified bacterial isolates were maintained on nutrient agar slants.

Ethical clearance

This was duly obtained from the hospital management. The ethical approval was granted by West African Bioethics research programme, Abubakar Tafawa Balewa University Teaching Hospital, Ministry of Health Bauchi State Government Ethical Steering Committee.

Selection criteria

All patients both in patients and out patients with symptoms of urinary tract infection were included in the study

Sample Size Determination

Using the formula $n = \frac{Z^2 p(1-p)}{d^2}$ (Naing *et al.*, 2006)

Where;

n = Desired sample size

Z = 1.96 (The standard normal deviate, corresponds to the 95% confidence level).

p = Prevalence based on previous studies 19% (Iregbu and Nwajiobi-Princewill, 2013).

d = Degree of accuracy

Therefore $n = \frac{(1.96)^2 \times 0.19 (0.19-1)}{(0.05)^2}$

$n = \frac{(1.96)^2 \times 0.19 (0.81)}{(0.05)^2}$

$n = \frac{3.8416 \times 0.1539}{0.0025}$

$n = \frac{0.59122}{0.0025}$

Sample size = 236 specimen of urine

Data Analysis

The data obtained was analyzed by Chi-square and ANOVA using Statistical Package for Social Science (SPSS) version 22.0.

3. Results and Discussion

Bacterial Isolates Obtained from Urine Sample

The Table 1 shows that, out of the 236 urine samples analyzed in the study, 120 representing (50.8%) were positive for bacteria growth. Six different uropathogens, were isolated with *E. coli* having the highest frequency of occurrence of 60(50.0%), followed by *Klebsiellapneumoniae* 28(23.3%), *Staphylococcus saprophyticus* 12(10.0%), *Staphylococcus aureus* 9(7.5%), *Proteus mirabilis* 9(7.5%), *Pseudomonas aeruginosa* had the least frequency of occurrence 2(1.7%).

Characterization of Bacterial Isolates from Urine Sample

The isolates were subjected to biochemical reactions which include catalase, coagulase, indole, urease, citrate utilization test, triple sugar iron test, motility test and gram staining reactions. Out of the isolates characterized 4 were gram negative bacteria and 2 were gram positive bacteria. (Table 2).

Age and Sex Distribution of the Patients Involved in the Study

Females within the age range of 21-30 years have the highest prevalence rate of 35.4%, followed by 31-40 years (24.1%), 41-50 years (16.5%), while above 70 years of age showed the lowest (2.5%). Among the male patients, 21-30 years also showed the highest prevalence rate of 29.3%, followed by 31-40 years (29.5%), 41-50 years (21.9%), while above 70 years of age showed the lowest (2.4%) as indicated in table 3.

Table 1: Bacterial Isolates Obtained from Urine Sample (n=236)

Organism Isolated	Frequency of occurrence	Percentage (%)
<i>E. coli</i>	60	50.0
<i>K.pneumoniae</i>	28	23.3
<i>S.saprophyticus</i>	12	10.0
<i>S.aureus</i>	9	7.5
<i>P.mirabilis</i>	9	7.5
<i>P.aeruginosa</i>	2	1.7
Total	120	100

(P < 0.05)

Table 2: Characterization of Bacterial Isolates from Urine Sample

Colony morph Inference	Biochemical Reaction								
	Gram reaction	Catalase	Coagulase	Indole	Oxidase	TSI	Motility	Urease	Citrate
Pinkish shiny slightly <i>E. coli</i> raised lactose fermenter	GNR	-	-	+	-	-	+	+	-
Whitish raised round colonies <i>S.aureus</i>	GPC	+	+	-	-	-	-	+	+
Flat mucoid lactose <i>K.pneumoniae</i> colonies	GNR	+	-	-	-	+	-	+	+
Tiny colonies of non <i>P.aeruginosa</i> lactose fermenter	GNR	+	-	-	+	+	+	-	+
Swampy like colony <i>P.Mirabilis</i>	GNR	+	-	-	-	-	+	+	+
Opaque circular colonies	GPC	+	-	-	+	-	-	+	-

Key: += positive, -= negative, GPC= gram positive cocci, GNR=gram negative rod.

Table 3: Age and Sex Distribution of the Patients Involved in the Study

Age group (years)	No. (%) Male positive (n=41)	No. (%) Female positive (n =79)
≤10	2(4.9)	4(5.1)
11-20	4(9.8)	6(7.6)
21-30	12(29.3)	28(35.4)
31-40	10(24.4)	19(24.1)
41-50	9(21.9)	13(16.5)
51-60	3(7.3)	6(7.5)
61-70	1(2.4)	2(2.5)
≥70	0(0.00)	1(1.3)
Total	41(100)	79(100)

(P< 0.05)

4. Discussion

The result obtained indicated that 120(50.8%) of the 236 urine samples were contaminated with bacteria, of which six bacteria genera were isolated and these include; *E.coli*, *K.pneumoniae*, *S.saprophyticus*, *S.aureus*, *Proteus mirabilis*, *Pseudomonas aeruginosa*. These findings are in accordance to a report by Obiogboluet *al.* (2009) in South Eastern part of Nigeria. This finding is also related to that of Kolawoleet *al.* (2009) were 60% showed positive culture. The reason for these variations could be linked to differences in geographical locations and orientation of the people in the localities among the factors. Ramesh and Aggarwal, (2012).

The most common bacteria isolated (Table 1) were similar to report by Kolawoleet *al.* (2009); Obiogboluet *al.*, 2009; Shanti and Kayathri, 2012, but at variance to a report by Sabrina *et al.* (2010) where they isolated *Enterococcus* species in addition to the bacteria isolated in the present study. The most common bacteria responsible for UTI in these study are *E. coli* (50.0%), *Klebsiellapneumoniae* (23.3%), *Staphylococcus saprophyticus* (10.0%), *Staphylococcus aureus* (7.5%), *Proteus mirabilis* (7.5%), *Pseudomonas aeruginosa* (1.7%). This findings is similar to other reports which indicated that Gram negative bacteria particularly *E.coli* is the most implicating pathogen isolated in patients with UTI (Onifade *et al.* 2005; Aiyegoro *et al.* 2007; Mbata, 2007). *E. coli* was found to be highest 60(50%) in occurrence followed by *K.pneumoniae* 28 (23.3%). The findings of this study is similar to another study were *E.coli* and *K.pneumoniae* were found to be the main culprits responsible for the UTI (Hassan *et al.*, 2011), but at variance to a study conducted by Kozima and Gollert (2009) who reported *Staphylococcus* and *Proteus* species with higher frequency of occurrence than *E.coli*. Also the findings of Omonigho *et al.*, (2001) found *Klebsiella* species to be more prevalent than *E.coli*. These organisms usually originate from normal microbial flora, the outer genital and periurethral bacterial flora usually reflect the gut flora (Geoffrey *et al.*, 2013).

The isolated pathogens in this study mostly are coliforms which are index organisms of safety, good hygiene, and sanitary quality. This conforms to the report of Anyamene *et al.* (2002) that the dominant etiologic agent accounting for more than 85% of cases of UTIs are the Gram-negative bacilli which are normal flora of the intestinal tract.

Table 3 revealed that the incidence of bacterial pathogens was highest among the females (35.4%) than males (29.3%). This is in agreement with other reports which stressed that UTI is more frequent in females than in males, during youth and adulthood (Asinobi *et al.*, 2003; Mbata, 2007) which could be attributed to the proximity between the genital tracts, urethra and anus which perhaps facilitates auto transmission as suggested by Audu and Kudi (2004); Adedeji and Abdulkadir (2009). According to Ebie *et al.* (2001) moist environment of the female perineum could also favour microbial growth and bladder contamination. Secondly, Females mostly remain indoor and have less access to primary health care. Hence, some women do not usually report to the hospital till their condition becomes serious, they prefer treating themselves with homeopathic remedies.

5. Limitation

Difficulty in educating some of the patients on urinary tract infection

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