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URINARY FINDINGS IN YOUNG ADULTS IN ABAKALIKI, NIGERIA

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ABSTRACT

Objective: To determine the prevalence of urinary abnormalities in young adults living in Abakaliki, Southeastern Nigeria.

Method: Two hundred and fifty (250) clean-catched mid-stream urine samples obtained between October 2005 and June 2006 from apparently healthy young adults, aged 18-25 years (mean= 19.7 ± 4.1 years) resident in Abakaliki, comprising 151 (60.4%) females and 99 (39.6%) males were analysed using standard laboratory procedures and techniques.

Results: The prevalence of urinary abnormalities was found to be 20.7%. In addition to leucocyte esterase and pyuria, which were found in significantly more female samples than the males' ($p < 0.05$), there were generally more abnormalities in female urine samples than their male counterparts ($p < 0.05$). The major abnormalities recorded were pyuria (47.1%), bacteriuria (21.6%), proteinuria (14.0%) and haematuria (8.0%).

Conclusion: The finding supports routine urine screening as an important disease surveillance approach in young adults Nigerians resident in Abakaliki metropolis.

Key words: Urinalysis, Diagnosis, Urinary Tract Infection, Young Adults. *(Accepted 9 August 2007)*

INTRODUCTION

From historical perspective, the importance of urinalysis in diagnostic medicine came to limelight over a century ago when William Roberts [1], an English Physician published the first paper on the observation of bacteria in fresh urine. However, the first extensive description of the use of urine for diagnostic purpose came from Hippocrates of Cos [2] who in his great writing stated that bubbles on the surface of urine indicates kidney disease and long standing illness as a result of high concentration of protein. Analysis of urine includes physical, chemical and microscopic examination for the diagnosis of genitourinary, metabolic, endocrine and genetic disorders [3-6]. However, culture result of appropriately obtained urine sample is considered the gold standard for the diagnosis of urinary tract infection [5].

Study has shown that renal disease, especially glomerular disease, which commonly presents as nephritic syndrome, is more prevalent in Africa and more severe in blacks than whites [7]. It is estimated that 2-3% of all medical admissions in tropical countries are due to renal related complaints, majority being glomerulonephritis [7]. In Nigeria, glomerulonephritis accounts for 5.9% of the aetiology of renal failure and as high as 40% of cases of death due to chronic renal failure (CRF) [8]. Autopsy study has shown that highest cases of CRF occur within the age group 31-40 years with male preponderance [8].

Abnormalities in urine volume and composition (oliguria, haematuria and proteinuria) are characteristics of early renal disease [9]. It has been shown up to 45% of children diagnosed with urinary tract infection (UTI) will have urogenital abnormalities requiring treatment [10]. Today, urinalysis the first of all laboratory tests, which offers the advantage of being simple, non-invasive, fast and cost-effective [3-5] means of diagnosis in clinical medicine is grossly neglected. Missed diagnosis of UTI could result in failure to institute appropriate treatment with the possibilities of renal damage [11, 12]. Previous studies on mass urine screening in outpatients [13, 14], asymptomatic children [15], febrile children [16], young adults [17] and in healthy adults [4] were encountered. While Topham et. al [17] discouraged routine urine screening in young adults in England, based on lack of merit of such programme, Cho and his co-researchers [18] reported that significant number of patients in mass screening programme in Korea showed chronic renal disease, especially in group with combined haematuria and proteinuria. In Okinawa, Japan, Iseki et. al. [19] demonstrated that haematuria next to proteinuria was a potent predictor of end-stage renal disease (ESRD) with male gender being a significant risk factor. However, it has been shown that up to 50% of the long-term sequalae of occult UTI in young children appear preventable by urine testing [16]. Early detection of renal disease, which

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may progress rapidly or slowly to ESRD, depending on the nature of the disease, may be an important strategy for preventing chronic renal disease in a resource limited setting where dialysis and renal replacement therapy (RRT), the standard management protocol for ESRD are inaccessible because of non-availability of funding and donors. The aim of this study is to document the prevalence of urinary abnormalities in young adult Nigerians living in Abakaliki metropolis.

MATERIALS AND METHODS

Site and Subjects: This study was conducted at Ebonyi State University Teaching Hospital (EBSUTH) Abakaliki between October 2005 and June 2006. Ethical Committee of Ebonyi State University Teaching Hospital, Abakaliki, approved the protocol for the study. Our subjects were two hundred and fifty (250) apparently healthy young adult Nigerians resident in Abakaliki urban, aged 18-25 years (mean = 19.7 ± 4.1 years) comprising 151 females and 99 males without signs or symptoms of urinary tract infection based on medical examination by a qualified physician. Informed consent were sought and obtained. The subjects were interviewed to obtain vital information such as age, gender, drug and medical history. Those with history of UTI, antibiotic prophylaxis, underlying renal or urogenital abnormalities and any other abnormalities that may affect the result were excluded from the study.

Laboratory Methods: Standard laboratory methods and techniques were used to analyse urine samples [7]. Ten millilitres (10ml) of urine was collected into sterile screw-capped plastic universal containers. Aliquot of 7ml of the unspunned sample was tested with dipstick (Macromed, Johannesburg, and S.A). The results of leucocyte esterase (Le), pH, Specific gravity (Sg), Blood (Bld), Nitrite (Nit) and physical appearance (App) were recorded after appropriate reaction time. Leucocyte esterase was recorded positive in the presence of any shade of colour change after 2 minutes. Nitrite was recorded Positive if there is any colour change at one minute. Blood and protein were recorded positive if the reading (colour change) is small or more at one minute. Specific gravity was recorded abnormal if < 1.010 or > 1. 030 while pH was regarded abnormal if < 5.0 or > 8.0 at one minute. The urine physical appearance was recorded cloudy in the presence of abnormal colour or turbidity. Urine was then spunned in a laboratory centrifuge at 2,200g for 5 minutes and the deposits examined under the microscope using 40x objective. The number of leucocytes, casts, crystals and organisms per high power field (/hpf) were recorded. Pyuria was defined as = 5wbc/hpf. Urine (from the remaining 3ml) was then plated on MacConky and CLED (Cysteine Lactose Electrolyte Deficient) agar respectively with 0.01ml calibrated loop, incubated at 37^0C and examined daily for 2 days (48h). Positive cultures were those that produced = 10^5 cfu/ml. Organisms were appropriately identified by biochemical tests [20]. Cultures were regarded contaminated if more than three organisms were isolated.

STATISTICAL ANALYSIS

Data was analysed for mean, percentage and Chi-square using EPI-INFO 6.2 Statistical package with level of significant set at less than 0.05 ($p < 0.05$).

RESULTS

The age range of our subjects was 18-25 years (mean = 19.7± 4.1 years). One hundred and fifty one (60.4%) of the 250 samples were from females and 99 (39.6%) were from the males. The major abnormalities recorded were pyuria (47.6%), positive culture (21.6%), abnormal appearance (19. 6%), proteinuria (14.1%), abnormal pH (11.2%), abnormal Specific gravity (10.4%) and haematuria (8. 0%) table 1.

In general, significantly more total abnormalities were found in female urine samples than males' (319 vs. 146, $p < 0.05$). However, only leucocyte esterase and pyuria were found in significantly more samples from females than males on individual parameter

Table 1: **Distribution of Urine Abnormalities among Sexes (Percentage in Parenthesis).**

	App.	Sg.	pH	Prt.	Le.	Nit.	Bld.	Pyr.	Poc.	Total Abnormalities
Males	19	9	7	9	35	5	7	36	19	146
n= 99	(38.8)	(34.6)	(25)	(25.7)	(29.4)	(41.7)	(35)	(29.5)	(35.2)	(31.4)
Females	30	17	21	26	84	7	13	86	35	319
n= 151	(61.2)	(65.4)	(75)	(74.3)	(70.6)*	(58.3)	(65)	(70.5)*	(64.8)*	(68.6)*
Total										
n= 250	49	26	28	35	119	12	20	122	54	465

*$p < 0.05$ from males.

Legend

App. (Appearance); **Sg.** (Specific gravity); **Prt.** (Protein); **Le.** (Leucocyte esterase); **Nit. (**Nitrite), **Bld.** (Blood); **Pyr.** (Pyuria); **Poc.** (Positive culture).

Table 2: **Comparison of Bacteriological Findings (Percentage in Parenthesis).**

Urine Appearance	Positive	Negative	Total
	37 (75.5)	12 (24.5)	49 (100)
Cloudy	**(68.5)**	**(6.1)**	**(19.6)**
	17 (8.5)	184 (91.5)	201 (100)
Clear	**(31.5)**	**(93.9)**	**(80.4)**
	54 (21.6)	196 (78.4)	250 (100)
Total	**(100)**	**(100)**	**(100)**

Table 3: **Urinary Pathogens Isolated From Young Adult Nigerians.**

Organism	Frequency	percentage
Escherichia coli	26	48
Pseudomonas auriginosa	8	15
Klebsiella pneumonia	7	13
Staphylococcus epidermidis	6	11
Proteus mirabilis	5	9
Beta-haemolytic streptococcus	1	2
Candida albicans	1	2
Total	54	100

tested (84 vs. 35, $p < 0.05$ and 86 vs. 36, $p < 0.05$ respectively) as shown in table 1. Bacteria was isolated from thirty-seven (75.5%) of the cloudy urine (n = 49) while 17 (8.5%) of the clear urine samples (n = 201) produced positive cultures. Overall, 54 (21.6%) of the 250 samples yielded positive cultures
(table 2). Interestingly, all the culture positive samples yielded the growth of a single organism with *Escherichia coli* being the predominant pathogen and *â-haemolytic streptococcus* and *Candida albicans* the least (table 3). Out of the 201 clear urine, 184 (91.5%) were culture negative while 37 (75.5%) of the 54 samples that produced positive cultures were cloudy in appearance, thus giving urine physical examination a 91.9% specificity and 68.5% sensitivity.

DISCUSSION

A UTI prevalence of 21.6% in the present study is slightly higher than 18% previously reported among children [5]. The slightly higher prevalence in this study cannot be attributed to the method of urine sampling. Our samples were clean-catched mid-stream urine (MSU), which are more preferable to catheterised samples that are often liable to contamination [11]. Age may be a factor in the higher prevalence of UTI observed in this study as our subjects were young adults (mean age, 19.7 ± 4.1 years). This is a sexually active age group that is often exposed not only to sexually transmitted diseases but also UTI. However, our subjects were apparently healthy individuals and may be harbouring asymptomatic UTI, which may be a direct or an indirect consequence of residual genital infection as prevalence of bacteriuria, has been found to increase with age and sexual activity [21].

Although the finding of significantly more urinary abnormalities in females than the males (319 vs. 146, $p < 0.05$) in this study raises the issue of gender-related activities as contributory factors in the acquisition of UTI [22] and corroborates earlier finding by Khallid and Haddad [4], it may not be unconnected to enrolment of more females than males. However, in addition to shortness of urethra, female hormones (estradiol and progesterone) have been implicated in the susceptibility of women to sexually transmitted infections (STI) or/ UTI [23]. A recent study [24] demonstrated that while estradiol-treated female mice were 100% protected from herpes simplex virus type 2 (HSV-2), one of the most common sexually transmitted disease, those treated with progesterone and placebo were extensively infected. It is thus suggested that the relative concentration of female hormones (estradiol and progesterone) rather than absolute concentrations may be an important factor in female vulnerability to urinary tract and other urogenital infections. However, the role of hormonal imbalance in the aetiology of UTI has not been established in man [24]. It has also been demonstrated that women are usually victims of sexual and gender base violence, such as rape, forced prostitution, sexual exploitation, female genital cutting and forced marriage [22]. These practices may increase the susceptibility of women to STI/UTI. The implication of the present finding is that being a female may actually be an important risk factor for UTI and/renal disease. This contrasts earlier reports [8, 19] where male sex was identified as one of the risk factor for ESRD. High prevalence of abnormal urinary findings (20.7%) with higher proteinuria, haematuria and pyuria in the present study may indicate early presentation of renal disease as studies in both animal and humans have shown that proteinuria is a mediator as well as a marker of progressive glomerular damage [6]. Excessive amount of protein within the glomerular tuft does not only stimulates messangial cell proliferation but is as well toxic to proximal tubular cells, leading to irreversible damage to the glomerulus, tubules and intestitium which results in nephron loss and subsequent renal failure. Unfortunately however, none of our subjects with

these urinary abnormalities were followed-up to ascertain the level of renal involvement. This would be n interesting research question for future studies.
The finding of *Escherichia coli* as the predominant organism isolated in this study corroborates earlier report [5] but contrasts recent findings in pregnant women where *Staphylococcus aureus* featured more frequently than *Escherichia coli* [21]. Interestingly, bacteriological findings in females in this study, about 65% (64.8%) is lower than 83% found by Blake et. al. [5], but high enough to suggest the promotion of more gender specific medical approach in future. Although the aim of the present study was not to recommend an alternative test to urine culture for the diagnosis of UTI, urine physical examination (sensitivity of 68.5% and specificity of 91.9% appears to be an important cost-effective point of care (POC) test for early detection of renal disease. We conclude that with urinary abnormality prevalence of 20.7% and UTI prevalent rate of 21.6%, young adult Nigerians may be harbouring asymptomatic renal disease, which needs to be detected early through mass urine screening programme.

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