

An Assessment of Urine Analysis, *Trichomonas vaginalis* and *Schistosoma haematobium* Infections in Women Attending Out-patient Clinics in Southeastern Nigeria

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Citation

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Abstract

Urine analysis can detect a wide variety of disorders of urinary system and may give earliest warning of significant pathology. An assessment of urine analysis using rapid dipstick and infections with *Trichomonas vaginalis* and *Schistosoma haematobium* using standard techniques was conducted among women attending out-patient clinics in south-eastern Nigeria. Of the 218 females screened, 89(40.8%) and 27(12.4%) women had acidic and alkaline urine respectively. Protein was found among 43(19.7%) while nitrite and blood were detected in 14(6.4%) and 18(8.3%) of them respectively. Moderate to many pus cells were observed among 33(15.1%) women. Individuals less than 31 years old, were more likely to have protein, nitrite, blood and epithelial cells in their urine. Four (1.8%, 95% CI, 0.0 – 4.0%) women were infected with *S. haematobium* while 6(2.8%, 95% CI, 1.0 – 5.0%) had *T. vaginalis* infection. Urine analysis remains a vital tool for disease surveillance and should be a component of screening programmes.

INTRODUCTION

Urine analysis, the first of all laboratory tests, began as and still remains a most valuable and highly important means of diagnosis in clinical medicine [1]. The recognition of the importance of urine in diagnosis was made over 6000 years ago by several of the earliest civilizations, and a few of their clay tablets have been found that give us some insight into their observations and conclusions. Urine analysis can be used to detect a wide variety of disease states, particularly disorders of the urinary system. Although routine urine analysis is common, the results are important in management of only certain diseases [2]. However it is a very useful tool in establishing a baseline status in each patient. This has two important benefits. First, if a patient can acidify and concentrate urine, this establishes that renal function was normal at one point in time; secondly, if at some future date an abnormality is detected, such as hematuria, it will be of great help to know if this is an acute abnormality (eg, poststreptococcal glomerulonephritis), or a chronic abnormality (eg, hypercalciuria) [3].

There is considerable information on the prevalence of urinary abnormalities in outpatient clinics, in hospitals [4,5,6], in a- symptomatic children [7,8,9] and in healthy adults [10].

The detection of proteinuria and/or haematuria is useful in selecting patients who require long-term surveillance [11]. Haematuria, after exclusion of serious urinary tract infection, renal calculi and malignancy may follow a benign course and have a good prognosis [12]. Glycosuria has significant correlation with blood glucose level [10,13], while pyuria is a common problem, mainly in women and has been reported that as many as a quarter may experience an acute dysuric episode each year [14,15]. It is often customary to perform the microscopic examination of urinary sediment with all routine urine analysis tests, if transparency, glucose, protein, blood, nitrite, or leukocyte esterase is abnormal. Microscopic examination of urine sediment is necessary as it can establish the existence of trichomoniasis caused by *Trichomonas vaginalis* and urinary schistosomiasis caused by *Schistosoma haematobium*. *T. vaginalis* and *S. haematobium* are two important parasitic agents associated with the urogenital tract and can cause severe infections in women.

Although infection with *T. vaginalis* is frequently asymptomatic and self limited, it can however, cause vaginitis in women. Vaginal discharge, vulvovaginal soreness, dysuria, dyspareunia, and/or irritation are usually

experienced by symptomatic women with trichomoniasis [16]. Trichomoniasis takes a great toll on health through their sequelae i.e. conditions resulting from the spread of the pathogen from the point of infection, usually the genital region, to another part of the reproductive tract, such as the fallopian tube in women. This can impair and there is increased risk of ectopic pregnancy, a condition that can kill from sudden and severe internal bleeding following rupture of the fallopian tube [17]. On the other hand *S. haematobium* infection varies from small percentage to near saturation of a native population. The infection is particularly prevalent among women of child-bearing age who come in contact with schistosoma contaminated water particularly via washing of clothes and agricultural practices. *S. haematobium* induces chronic inflammation of the lower urinary tract, leading to obstruction, squamous metaplasia, urinary retention and secondary bacterial infections [18]. More often the first evidence of the infection is the painless passage of blood at the end of the period of micturition, but more and more, there is also discharge of pus cells and necrotic tissue debris, decrease in the interval between periods of urination and eventual incontinence, or anuria due to urethra structure bladder colic is a cardinal symptom [19].

The purpose of this study was to provide baseline data on routine urine analysis and prevalence of *T. vaginalis* and *S. haematobium* infections among women attending out-patient clinics. The public health implications of findings as they relate to general maternal health are discussed.

MATERIALS AND METHODS

STUDY AREA

The study location was Abakaliki the capital city of Ebonyi State, South-eastern Nigeria. The study was conducted at the two major hospitals in the city which run the largest out-patient clinics. The hospitals were Ebonyi State University Teaching Hospital (EBSUTH) and Federal Medical Centre (FMC). The study area is defined by longitude 8°6'16"11"E and latitude 6°22'12"81"N, elevated at 380ft above sea level. The vegetation characteristic is that of the tropical rain forest with an average annual rainfall of about 1,600mm and an average atmospheric temperature of 30°C. There are two distinct seasons, the wet and the dry seasons, the former takes place between April and October, while the latter occurs from November to March.

ETHICAL CONSIDERATIONS

The study protocol was approved by the Infectious Diseases

Research Division, Department of Medical Microbiology, Faculty of Clinical Medicine, Ebonyi State University, Abakaliki and from the authorities of EBSUTH and FMC Abakaliki. The approval was on the agreement that patient anonymity must be maintained, good laboratory practice/quality control ensured, and that every finding would be treated with utmost confidentiality and for the purpose of this research only. All work was performed according to the international guidelines for human experimentation in clinical research [20].

STUDY POPULATION /SAMPLING TECHNIQUE

The study was conducted from October 2005 to April 2006. The study population consisted of 218 women attending the out-patient clinic of the selected hospitals and were referred to the laboratory units of the hospital for urine collection. After obtaining informed consent from each patient, a clean leak-proof sterile container was given to each participant and instructed on the urine collection. For example, the women were told to cleanse the area around the urethral opening with water, dry the area and collect the mid-stream urine with the labia held apart, they were advised not to touch the inside or rim of the container. The samples were collected between the hours of 10am to 12noon and were transported immediately to the Medical Microbiology Laboratory, Ebonyi State University, Abakaliki for analysis. All samples were analysed within 60minutes of collection.

LABORATORY ANALYSIS

Urine analysis rapid dipstick test was performed using the Medi-Test Combi 9 (MACHERY-NAGEL GmbH, Duren) strictly according to procedure specified by manufacturer. Microscopic examination of wet mount preparations of the urine samples was also done to detect pus cells and epithelial cells. *T. vaginalis* was detected using the spun urine analysis as described previously [21]. Diagnosis of trichomoniasis was predicted on visualization of the organism through direct microscopy. The urine sedimentation technique described previously [22,23] was used to detect the presence of *S. haematobium* ova in the urine samples

STATISTICAL ANALYSIS

Differences in proportion were evaluated using the chi-square test. Statistical significant was achieved if $P < 0.05$.

RESULTS

The urine analysis result showed that a total of 89(40.8%) and 27(12.4%) women had acidic and alkaline urine

respectively, the remaining 102(46.8%) had normal urine pH of 7. Protein was found among 43(19.7%) of the women while nitrite and blood were detected in 14(6.4%) and 18(8.3%) of them respectively (Table 1).

Figure 1

Table 1: Age-related prevalence of urine analysis parameters among women attending out-patient clinics in Abakaliki, Nigeria.

Age (years)	Total Number examined	Urine pH No (%) with acidic alkaline	No (%) with Protein	No (%) with Nitrite	No (%) with Blood	No (%) with Epithelial cells	No (%) with Pus cells
≤ 20	27	10(37.0) 6(22.2)	7(25.9)	4(14.8)	3(11.1)	13(48.1)	16(59.3)
21-30	100	37(37.0) 17(17.0)	25(25.0)	4(4.0)	9(9.0)	50(50.0)	50(50.0)
31-40	45	16(35.6) 1(2.2)	8(17.8)	4(8.9)	4(8.9)	22(48.9)	29(64.4)
41-50	16	8(50.0) 2(12.5)	1(6.3)	0(0.0)	0(0.0)	3(18.8)	11(68.8)
≥ 51	30	18(60.0) 1(3.3)	2(6.7)	2(6.7)	2(6.7)	15(50.0)	20(66.7)
Total	218	89(40.8) 27(12.4)	43(19.7)	14(6.4)	18(8.3)	103(47.2)	126(57.8)

Epithelial cells were detected among 103(47.2%) women and pus cells were identified in 126(57.8%) of them. Moderate to many pus cells were observed among 33(15.1%) of the women. Individuals of the ≤20 and 21-30 years age categories were more likely to have protein, nitrite, blood and epithelial cells in their urine (Table 1).

Of the 218 females screened, 4 (1.8%, 95% CI, 0.0 – 4.0%) were infected with *S. haematobium* while 6(2.8%, 95% CI, 1.0 – 5.0%) had *T. vaginalis* infection (Table 2).

Figure 2

Table 2: Age-related prevalence of infection among women attending out-patient clinics in Abakaliki, Nigeria.

Age (years)	Total Number examined	<i>S. haematobium</i> Number(%) 95% Confidence interval	<i>T. vaginalis</i> Number(%) 95% Confidence interval
≤ 20	27	1(3.7) 3.0 – 11.0	1(3.7) 3.0 – 11.0
21-30	100	2(2.0) 0.7 – 4.7	1(1.0) 0.0 – 2.0
31-40	45	1(2.2) 2.1 – 6.5	2(4.4) 2.0 – 10.0
41-50	16	0(0.0) -	1(6.3) 6.0 – 18.0
≥ 51	30	0(0.0) -	1(4.6) 4.0 – 14.0
Total	218	4(1.8) 0.0 – 4.0	6(2.8) 1.0 – 5.0

Statistically, there was neither a significant difference in the association between age with the *T. vaginalis* infection ($\chi^2=2.7$, df=4, $P>0.05$) nor with the *S. haematobium* infection ($\chi^2=1.5$, df=4, $P>0.05$).

DISCUSSION

Although urine analysis is a simple semiquantitative test, it can detect various types of illness and may give the earliest warning of unexpected and significant pathology [24]. Because of its routine nature, substantial abnormalities may be overlooked and this is with the possible consequences of missing serious curable conditions. In this study a high

percentage (40.8%) of the women had acidic urine, which may indicate a high protein diet, acidosis, uncontrolled diabetes mellitus, and renal tubular acidosis [25]. About 12.4% of the women screened had alkaline urine which might be an indication of urinary tract infection [25]. These findings demonstrate a clear need for further patient evaluation. Even though pH varies with a person's diet, tending to be acidic in people who eat meat but more alkaline in vegetarians, pH measurements are useful in determining metabolic or respiratory disturbances in acid-base balance. For example, kidney disease often results in retention of H⁺ (reduced acid excretion) [26,27].

A relatively high rate of proteinuria (19.7%) was observed among the women in this study and was comparatively higher than those observed in a similar study in Ramat Aviv, Israel (3.9%) [28]. The rate of hematuria observed in this study (8.3%) is similar to that observed in the study in Israel (8.1%). The presence of protein in the urine may be an indication of glomerular disease and may develop into a protein losing nephropathy [25]. However, a weakly positive test for urinary protein in a symptomless woman is often due to contamination of the urine from the perineum [29]. It is important that menstruation be always excluded as a cause of apparent haematuria and proteinuria. Slight proteinuria is a non-specific finding of no diagnostic importance that may be found in most pyrexial illnesses and in congestive heart failure while gross proteinuria is rarely an unexpected finding; it may occur in pre-eclampsia or in the nephrotic syndrome, which is often suggested by the clinical picture or the finding of hypoalbuminaemia [29]. The urine must be examined by microscopy and microbiological methods if urinary infection is suspected; this is much more useful than testing for protein.

Nitrite was detected in 6.4% of the women screened and this signified possible infection with bacterial agents such as *Escherichia coli*, *Enterobacter* species, *Klebsiella* species and *Proteus* species, all having the capacity of converting nitrate into nitrite [30]. For the purpose of making accurate diagnosis, microbiological culture of the urine sample should normally be conducted for the identification and isolation of the bacteria that might be responsible for the infection. Although pus cells were detected in 57% of those screened, only 15.1% had moderate to many pus cells which might possibly indicate pyuria. It is established that bacteruria without pyuria may occur in diabetes, enteric fever, bacteria endocarditis, or when the urine contains many

contaminating organisms [30].

The prevalence of *T. vaginalis* infection (1.8%) observed in this study appeared to suggest the existence of low rate of the infection among women in the area. However our data must be interpreted cautiously as the possibility of underestimation of the prevalence may not be completely ruled out due to our diagnostic technique. Although performing the wet mount microscopy of spun urine analysis to detect *T. vaginalis* is reported to be reasonably sensitive and diagnostic [21], a negative wet mount does not necessarily exclude *T. vaginalis* infection [31]. The wet mount microscopy is used routinely in most settings in Nigeria for *T. vaginalis* diagnosis, and this has an average sensitivity of 60 to 80 percent for detection of the motile *T. vaginalis* organisms [32]. Culture of *T. vaginalis* using a Diamond medium, which has a sensitivity of 91 to 100 percent, is considered to be far superior to wet mount examination, however, the culture technique is more expensive than wet mount examination and requires two to seven days to obtain results [33].

Our result showed that only six persons (2.8%) had *S. haematobium* infection. This low prevalence may have been because of the socio-economic, environmental and health seeking behavioral characteristics of the population which not conducive to the spread of urinary schistosomiasis. The factors known to be responsible for urinary schistosomiasis are the inadequate and indiscriminate disposal of human sewage and high water contact activity with snail infested pond, rivers and streams [34]. These factors are essentially lacking in the study area. Infected individuals may have contracted the infection from the rural areas.

In conclusion, it is important to note that urine analysis is a vital tool for disease surveillance and still remains an accepted and well established component of many screening programmes. However the need for additional laboratory analysis for proper patient evaluation cannot be over-emphasised. This is to avoid the underestimation or overestimation of abnormal urine analysis and the attendant consequences.

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