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RESEARCH PAPER

THE PREVALENCE OF URINARY TRACT INFECTIONS AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT UJOELEN PRIMARY HEALTH CARE CENTRE, EKPOMA, EDO STATE, NIGERIA.

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ABSTRACT

Urinary tract infection (UTI) is a common problem amongst pregnant women. This study assesses the prevalence of urinary tract infection in pregnant women attending antenatal clinic at a primary health care center in Ekpoma, Edo State, Nigeria. A total of 200 early morning midstream urine samples were collected aseptically from apparently healthy pregnant women during the three trimesters of pregnancy. The samples were examined macroscopically and microscopically for evidence of infection and then cultured on blood agar, MacConkey agar and cystein lactose electrolyte deficient agar for significant bacterial growth**.** Results showed a significant bacterial infection rate of 85% (170) with *Escherichia coli* (30%), *Staphyloccus aureus* (20%*), Klebsiella pneumoniae* (18.2%), *Staphyloccus saprophytics* (28%), *Proteus mirabilis* (10.6%) and *Pseudomonas aeruginosa* (4.7%). Indeed, the observed high prevalence of UTIs amongst the pregnant women under study was a threat to their health and wellbeing, and an indication of poor public health enlightenment and management by health care givers. Hence, proper public enlightenment campaign on the control and prevention of the UTI's is necessary, with appropriate laboratory diagnosis and treatment schedule.

Key Words: Prevalence, urine, pregnancy women, Urinary tract infection, *Escherichia coli.*

INTRODUCTION

Urinary Tract Infections (UTIs) is an infection caused by the presence and replication of microorganisms in the urinary tract. It is the single most common bacterial infection of mankind (Morgan and McKenzie, 1993; Ebie *et al.*, 2001). Females are believed to be more affected than males except at the extremes of life (Ebie *et al.*, 2001; Kolawole *et al.*, 2009). This is because bacteria can reach the bladder more easily in women, partially due to the short and wider female urethra, and its proximity to the anus. Available scientific information indicates that bacteria easily travel up to the urethra from the rectum and thereby causing infection (Ebie *et al.*, 2001; AAFP, 2004; Kolawole *et al*., 2009).

Of interest, is the fact that UTI in pregnancy increases during the gestational period, beginning from the sixth week of the first trimester and peaking in the 22nd to 24th week of the second trimester (Patterson *et al.*, 1987). At this period, approximately 90% of pregnant women develop ureteral dilatation which remains until delivery, leading to increase in bladder volume and decreased bladder and ureteral tones, causing increase in urinary stasis and

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ureterovesical reflux (Patterson *et al*., 1987). The main factors predisposing married women to bacteriuria are pregnancy and sexual intercourse (NIH, 2004). Sexual activity increases the chances of bacterial contamination of female urethra. Having intercourse may also cause UTIs in non-pregnant women because bacteria can be pushed into the urethra. Urinary tract infections (UTIs) represent the most common bacterial infection in pregnant and non pregnant women (Foxman, 2003 and Foxman *et al.,* 2003).

It has also been recognized for some time that asymptomatic bacteriuria is common in pregnancy; thus women are at increased risk of UTIs. Nicholson (1989) reported that except for a short period immediately after birth (infant period), females far exceed males in the prevalence of asymptomatic bacteriuria (Weatheral et al., 1988; Omonigho *et al.,* 2001). Pyelonephritis is the most common severe bacterial infection complicating pregnancy (Cunningham and Lucas, 1994). Approximately 4% to 10% of pregnant women will have asymptomatic bacteriuria (ASB) and 1% to 4% of pregnant women will develop acute cystitis for the first time during pregnancy (North et al., 1990). A history of childhood UT1 without renal scarring increases the risk for ASB during pregnancy to 27%, and 47% with renal scarring (Martinell *et al.,* 1995). Acute pyelonephritis affects 1% to 2% of pregnant women, particularly during the end of the second and beginning of the third trimesters (Kiningham, 1993).Women with a history of UT1 are at increased risk of UT1 during pregnancy. Risk factors for ASB or acute cystitis during pregnancy include lower socioeconomic status, sickle-cell trait/anaemia, increased parity or older age and minimal medical care throughout the pregnancy. Functional urinary tract abnormalities and *diabetes mellitus* can also increase susceptibility to UT1 during pregnancy (Andriole and Patterson, 1991., Cruikshank, 1990., McNeeley, 1988 and Pastore *et al.,* 1999).

Generally, women with pyelonephritis during pregnancy should be hospitalized for aggressive hydration and parenteral antibiotic therapy. A majority of women (86%) will experience uterine contractions during the first hour after antimicrobial therapy has been initiated, and 50% will continue to have uterine contractions after 25 hours of therapy (Graham *et al.,* 19993). Recent findings suggest that UT1 during pregnancy may increase the risk of cerebral palsy (Polivka *et al.,* 1997) or mental retardation among offspring. Also, data from a retrospective cohort study indicated an increased relative risk for mental retardation or developmental delay, as well as fetal death with maternal UT1 especially during the third trimester (McDermott *et al.,* 2001).

In addition, the organisms that cause UTIs during pregnancy are the same as those found in non-pregnant patients. These include *Escherichia coli* -which accounts for 80%–90% of infection (Patterson, and Andrriole, 1987., Barr *et al.,* 1985 and McDowall *et al.,* 1981), *Proteus mirabilis, Klebsiella aerogenes, Pseudomonas* spp and *Streptococcus* spp (Chamberlin, 1995). Meanwhile, the urine of females has been found to have a more suitable pH and osmotic pressure for the growth of *Escherichia coli* than urine from males (Asscher, 1981; Obiogbolu, 2004). Bacterial colonization of the distal 4 cm of the urethra also predisposes females to UTIs than males with a longer urethra. There is scientific evidence too that an increase in the concentration of amino acids and lactose during pregnancy encourages the growth of *E. coli* in urine (Weatheral *et al.,* 1988). Nevertheless, the prevalence and degree of occurrence of one or two of these organisms over others are dependent on the environment (Omonigho *et al.,* 2001). Gram-negative bacteria have been found most frequently in UTIs cases by several authors with *E. coli* and *Klebisella* spp. being the most predominant organisms (Ayan *et al.,* 1988; De-Mouy *et al*., 1988; Eghafona *et al.,* 1988; Farooqui *et al.,* 1989; Omonigho *et al.,* 2001; Ebie *et al.,* 2001).

Above all, UTI has become the most common hospital-acquired infection, accounting for as many as 35% of nosocomial infections, and it is the second most common cause of bacteraemia in hospitalized patients (Weinstein *et al.,* 1997; Stamm, 2002; Kolawole *et al.,* 2009). Literature has it that in Nigeria, the prevalence of UTI at Sagamu and Ibadan (in South-Western Nigeria), Akwa metropolis (in South-Eastern Nigeria) are 23.9%, 47.5% and 54% respectively (Olusanya *et al*., 1993; Okonko *et al.,* 2010 and Obiogbolu *et al.,* 2009). In Ethiopia and Egypt however, the prevalence of UTI are 7% and 31.3% respectively, while Al-makulla distric of Yemen, has a prevalence rate of 30% (Gabre-selassie, 1998., Dimetry *et al.,* 2007 and Al-Hedded, 2005). Although there are few studies on prevalence and antibiotic susceptibility pattern of UTI (Assefa *et al.,* 2008., Gebre-Selassie, 1998 and Tadesse *et al*., 2007), none has been conducted on pregnant women attending antenatal clinics in these areas. This study therefore, was designed to determine the prevalence pattern of the micro-organisms isolated in the urinary tracts of pregnant women to help improve on their antenatal care.

MATERIALS AND METHODS

Study Area: The study was carried out in Ekpoma, located in Esan West Local Government of Edo State, Nigeria, within longitude 6.13^0E and latitude 6.73^0N.

Sample Collection: A total of 200 urine samples were collected in sterile universal bottles from consecutive and consenting pregnant women of varied gestational age attending antenatal clinics at Ujoelen primary health care centre. The samples were transferred to the laboratory for analysis.

Inclusion and Exclusion Criteria: Only certified pregnant women of varied gestational age attending antenatal clinics and with no history of smoking or being treated with antibiotic agents for more than two weeks prior to the day of specimen collection were included in this study, while women who do not fall into this category were excluded.

Ethical Consideration: Informed consent was requested and granted by the pregnant women under investigation. The concept of the study was explained to them and having understood its dimensions, granted their informed consent.

Sample Analysis: The urine specimens were inoculated on blood agar, MacConkey agar and cystein lactose electrolyte-deficient agar. The plates were incubated at 37^oC for 24 hours under aerobic conditions. After 24 hours of incubation, the culture plates were examined macroscopically to evaluate ***the*** appearance, size, colour, and morphology of the colonies. The bacterial isolates were identified using standard bacteriological procedures, including Gram stain, microscopic examination and biochemical tests as described by Cheesbrough (2004).

RESULT

Out of the 200 samples screened, 170 (85%) had significant bacterial growth with the first and second trimesters having the highest infection rate (figure 1). Isolates include *Escherichia coli* (*E.coli*) with an incidence rate of 51(30%) followed by *Staphylococcus aureus* (*S.aureus*) 34 (28%), *Klebsiella pneumonia* (*Kleb. Pneumo*) 31(18.2%), *Staphylococcus saprophyticus* (*S. sapro*) 28(16.5%), *Proteus morabilis* (*P.mirabilis*) 18(10.6%) and Peudomonas aeruginosa (*Pseud. aeru*) 8(4.7%) as shown in figure 2. The biochemical characterization of Gram positive and negative bacteria isolates are shown in Table 1.

TABLE 1: BIOCHEMICAL CHARACTERIZATION OF GRAM NAGATIVE ISOLATES

TEST	*E. coli*	*P.mirbilis*	*P. aeruginosa,*	*K. pneumonia*	*S. aureus*	*S. saprophyticus*
Lactose	+	-	-	+	+	+
Mannitol	+	-	-	+	+	+
Sucrose	-	+	+	+	+	+
Urea	-	-	-	+	-	+
Citrate	-	+	+	+	-	-
Oxidase	-	-	+	-	-	-
Indole	+	-	-	-	+	-
Motility	+	+	+	-	-	-
Catalase	+	+	+	+	+	+
Coagulase					+	-

Key: + Positive; -Negative

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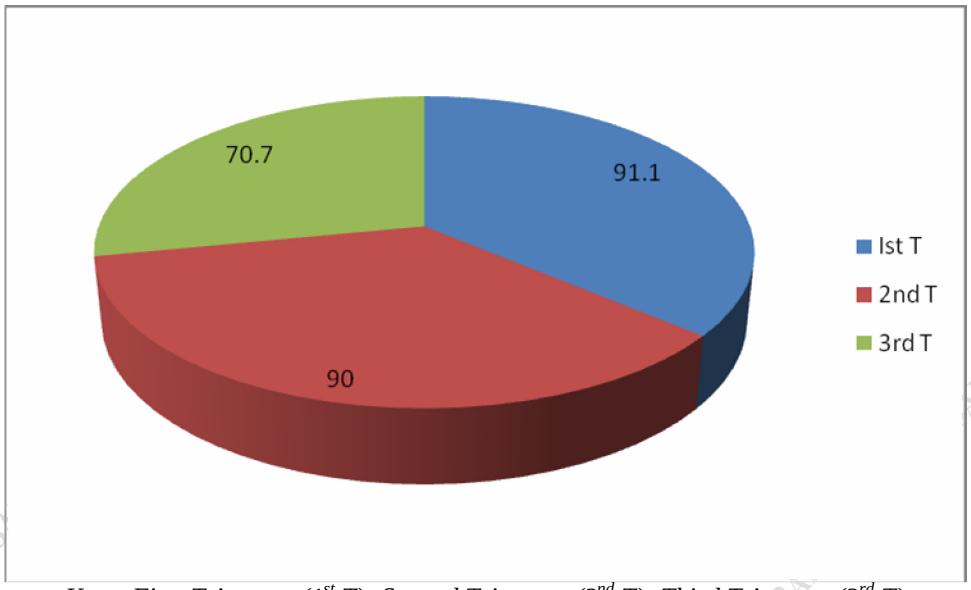

Keys: First Trimester (1st T); Second Trimester (2nd T); Third Trimester (3rd T)

Figure 1: Incidence of significant bacteria growth in the sample screened for the three trimesters.

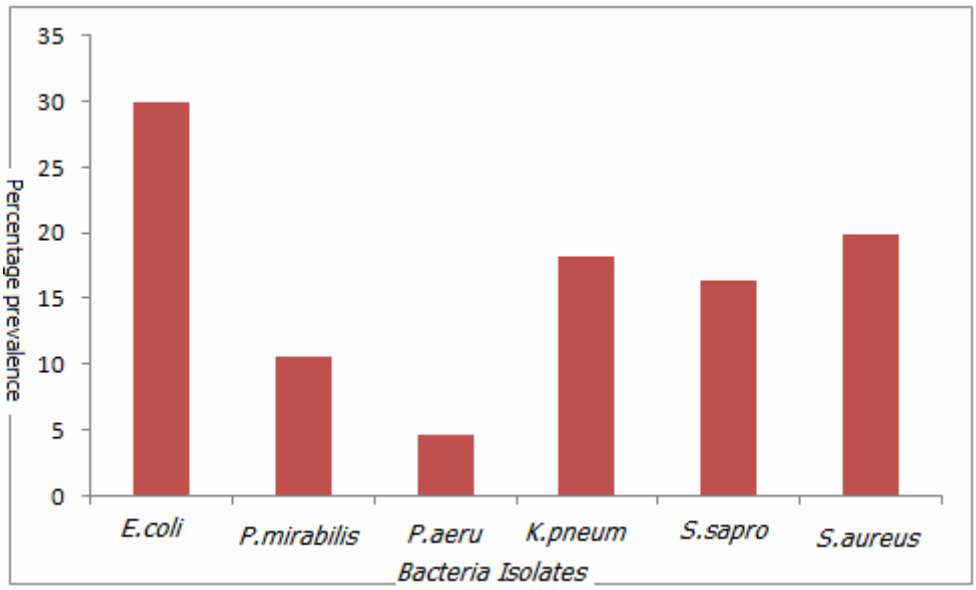

Figure 2: Bacteria organism isolated from specimens examined.

DISCUSION

In this study the prevalence of UTI in pregnant women was 85% and the predominant pathogens were pathogenic *E. coli, S. aureus and Klebsiella pneumoniae* with prevalence rate of 30%, 28% and 18.2% respectively. It agrees with the reports by Onifade *et al*., (2005), Okonko *et al,* (2010) and Obiogbolu *et al,* (2009) who also reported high prevalence of 58%, 66%, 47.5%, 30-60% and 54% respectively, but contrary to the findings by Ekweozor and Onyemenen (1996), Nedolisa (1998), Ebie (2001), Omonigho *et al.* (2001) and Dimetry *et al*. (2007) with low

prevalence rates of 22%, 25.6%, 35%, 26.7%, 22.3% and 31.3% respectively. The prevalence of UTI is generally higher in developing countries than the developed countries as observed by Mikhail *et al*. (1995) and Laura et al., (1994). In Yemen, Pakistan and Egypt, prevalent rates of 30%, 28.5% and 22-28.8% respectively, had also been reported (Al- Haddad, 2005; Sheikh *et al*., 2000; Agina, 1985; Maqlad, 1992; Hagrasi *et al.,* 1987).

However, the high prevalence of UTI in this study is probably due to the prevailing poor housing and drainage systems in the area of study, as well as the lack of proper personal and environmental hygiene, population susceptibility and other factors like low socio-economic status and sexual intercourse among pregnant women (Andriole, 1985; Akinyemi *et al.,* 1997; Kolawole *et al.,* 2009). Another important factor that can be attributed to the high prevalence of the UTI in this study, is the fact that the urethra in females is shorter, wider and close to the anus. As such, bacteria from the rectum can easily travel up the urethra and cause infections (Ebie *et al*., 2001; AAFP, 2004; Kolawole *et al.,* 2009). Also, the hormonal changes that characterized pregnancy have been observed to reduce ureteric muscular tone and induce mechanical pressure from the gravid uterus. This leads to urinary stasis which encourages bacterial proliferation in urine since urine can act as an excellent culture media (Obiogbolu, 2004).

The prevalence of UTI in the trimesters as shown by the results of this study, agrees with the findings by Okonko *et al.,* (2010) and Dimetry *et al.,* (2007) who also reported the high prevalence of UTI in each of the trimesters. Although, the highest prevalence rate reported in this study for the first trimester is in agreement with the findings by Dimetry *et al.* (2007), it is however contrary to the report by Okonko *et al.,* (2010) who stated that the prevalence of UTI was higher in the second and third trimesters than the first trimester of pregnancy. The results in second and third trimesters are also not in line with the findings by Okonko *et al.,* (2010) and Dimetry et al., (2007). Similarly, the highest prevalence of UTI in the third trimester reported by Maqlad (1992), Badr *et al.* (1992) and Al- Haddad (2005) are not in line with the findings of this study.

Furthermore, our findings that *E. coli* has the highest prevalence of 30% followed by *S. aureus* (28%) and *Klebsiella pneumonia* (18.2%) agrees with the reports by Nwanze et al. (2009) and Kolawole et al. (2009), who stated that the commonest isolates were *Escherichia coli* (51.2%), *S. aureus* (27.3%), and *K. pneumoniae* (12.8%). Moreover, available scientific evidence indicates that *E. coli* accounts for 80% - 90% of UTI in pregnancy (Patterson and Andrriole, 1987., Barr *et al.,* 1985 and McDowall *et al.,* 1981). Similarly, Gram negative bacteria, particularly *E. coli* has being reported to be the commonest pathogen isolated in patients with UTI (Burbige *et al.,* 1984; Akinyemi *et al.,* 1997; Okonofua and Okonofua, 1989; Ebie *et al.,* 2001; Njoku *et al.,* 2001; Onifade *et al.,* (2005), Delzell (2000) and Aiyegoro *et al.,* (2007). This is because the urine of females was found to have more suitable pH and osmotic pressure for the growth of *Escherichia coli* than urine from males and an increase in the concentration of amino acids and lactose during pregnancy are believed to encourage the growth of *E. coli* in urine (Asscher, 1981; Obiogbolu, 2004 and Weatheral *et al*., 1988). However, our findings contradict that of Omonigho et al. (2001) who found *Klebisella* spp. to be more prevalent than *E. coli* in UTIs. Consequently, the 18.2% prevalence of Klebsiella pneumonia in this study brings to light the fact that *Klebisella species* are achieving more prominence as aetiological agents of UTI than previously reported (Obaseki, 1988; Abdulrahman *et al.,* 1992; Adeyemo et al., 1994; Nwanze *et al.,* 2009; Kolawole *et al.,* 2009).This finding is in line with the report of Okonko *et al.,* (2010) with 18.4% prevalence of *Klebsiella aerogenes*.

Generally, the high prevalence rate (85%) reported in this study is of great concern, as not only do UTI pose a threat to health, but can impose an economic and social burden. Therefore, there is the need for urgent action to control the situation in this area. Also public enlighten is needed to create awareness of UTIs and to expand services for prevention and treatment for pregnant women. Since UTI may be symptomatic and asymptomatic in most cases, it is therefore necessary that routine screening and proper laboratory diagnosis of patients with appropriate antimicrobials agents should be administered after sensitivity tests have been carried out. This will help in detection of asymptomatic UTI which may become symptomatic later with resultant renal damage. Health education about personal hygiene should be emphasized by the antenatal care physicians to all pregnant women, specifically those of low socio-economic level.

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AUTHOR'S CONTRIBUTIONS

Turay, A.A. conceptualized this research. The analysis was done under the supervision of Turay, A.A. while Eke, S.O., Oleghe, P.O. and Ozekhome, M.C. joined in writing and reviewing the paper. All authors funded it. No conflict of interest declared.