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*Full Length Research Paper*

# Incidence of urinary tract infection (UTI) among pregnant women in Ibadan, South-Western Nigeria

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**This study reports the incidence of urinary tract infections (UTIs) among 80 pregnant women attending antenatal clinics at Oluyoro Catholic Hospital (OCH), Ibadan, Nigeria, as well as the isolation and identification of the pathogens responsible for the infection. A total of 80 clean voided mid-stream urine samples were collected from pregnant women between the ages of 21-40 years. The results showed that the incidence of UTIs in this study population was 47.5%, and 38 bacterial isolates were identified based on colonial morphology, microscopic characteristics, and biochemical tests. The most predominant bacterium was *Escherichia coli* 16 (42.1%). This was followed by *Staphylococcus aureus* 11 (28.9%), *Klebsiella aerogenes* 7 (18.4%), *Pseudomonas aeruginosa* 2 (5.3%), and a mixed culture of *K. aerogenes* and *Staphylococcus aureus* 2 (5.3%). Urine microscopy revealed the presence of pus cells in 15 of the urine samples collected. Two urine samples, representing 2.5% of the samples, contained yeast cells, suggesting that candidiasis was also predominant. The high incidence of UTIs reported in this study should be of great concern, as not only do UTIs pose a threat to health, but they also impose an economic and social burden due to the stigma associated with these infections.**

**Key words:** Bacteriuria, pregnant women, urine, urinary tract infection.

## INTRODUCTION

Urinary Tract Infections (UTIs) is an infection caused by the presence and growth of microorganisms anywhere in the urinary tract. It is perhaps the single most common bacterial infection of mankind (Morgan and McKenzie, 1993; Ebie et al., 2001). Urinary tract includes the organs that collect and store urine and release it from the body which include: kidneys, ureters, bladder and urethra. (UTIs) are among the most common bacterial infections in humans, both in the community and hospital settings and have been reported in all age groups in both sexes (Hooton et al., 1995). It is a serious health problem affecting millions of people each year and is the leading cause of Gram-negative bacteriaemia. UTIs are also the leading cause of morbidity and health care expenditures in persons of all ages. In the United States, it is estimated from surveys of office practices, hospital-based clinics and emergency departments that UTIs account for over eight million cases of UTI annually and more than 1 million hospitalizations, with an overall annual cost in excess of $1 billion (Kunin, 1994; Patton et al., 1991;

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Aiyegoro et al., 2007). The pathogens producing UTI have been said to be mostly derived from the hospital (Tapsal et al., 1975; Ebie et al., 2001).

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). UTI accounts for a significant part of the work load in clinical microbiology laboratories and enteric bacteria (in particular, *Escherichia coli*) remain the most frequent cause of UTI, although the distribution of pathogens that cause UTI is changing (Ojiegbe and Nworie, 2000; Kolawole et al., 2009).

Numerous reports have also suggested that UTI can occur in both males and females of any age, with bacterial counts as low as 100 colony forming units (CFU) per millimeter in urine (Akinyemi et al., 1997; Ebie et al., 2001). This is common in patients with symptoms of acute urethral syndrome, males with chronic prostatitis and patients with indwelling catheters (Karen et al., 1994). Females are however believed to be more affected than males except at the extremes of life (Ebie et al., 2001; Kolawole et al., 2009). Untreated upper UTI in pregnancy carries well documented risks of morbidity, and rarely, mortality to the pregnant women (Nice, 2003). Sexually active young women are disproportionately affected. An estimated 40% of women reported having had a UTI at some point in their lives (Kunin, 1994).

Recently published studies have added to the body of knowledge concerning the pathogenesis, diagnosis and management of UTIs (Orenstein and Wong, 1999). Usually, a UTI is caused by bacteria that can also live in the digestive tract, in the vagina, or around the urethra, which is at the entrance to the urinary tract. Most often these bacteria enter the urethra and travel to the bladder and kidneys. Usually, the body removes the bacteria, and shows no symptoms. The signs and symptoms include burning feeling during urination, frequent or intense urges to urinate, even when one have little urine to pass, pains in the back or lower abdomen, cloudy, dark, bloody, or unusual-smelling urine, fever or chills (Nkudic, 2005).

Women tend to have UTIs more often than men because bacteria can reach the bladder more easily in women. This is partially due to the short and wider female urethra and its proximity to anus. Bacteria from the rectum can easily travel up the urethra and cause infections (Ebie et al., 2001; AAFP, 2004; Kolawole et al., 2009). Moreover, 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 women because bacteria can be pushed into the urethra.

This anatomical relationship of the female urethra to the vagina makes it liable to trauma during sexual intercourse as well as bacteria being massaged up the urethra into the bladder during pregnancy/child birth (Duerden et al., 1990; Ebie et al., 1990; Kolawole et al., 2009). Using a diaphragm can also lead to UTIs because diaphragms push against the urethra and make it more difficult to completely empty the bladder. The urine that stays in the bladder is more likely to allow growth of bacteria and cause infections (APFP, 2004; Nkudic, 2005).

However, the importance of coliform bacilli in UTI among pregnant women has long been known in developed countries (Omar and ElHaj, 1992). Health care practitioners regularly have to make decisions about prescription of antibiotics for urinary tract infections. UTI is the second most common clinical indication for empirical antimicrobial treatment in primary and secondary care, and urine samples constitute the largest single category of specimens examined in most medical microbiology laboratories (Morgan and McKenzie, 1993).

UTI is challenging, not only because of the large number of infections that occur each year, but also because the diagnosis of UTI is not always straight forward (Kolawole et al., 2009). Criteria for the diagnosis of UTI vary greatly depending on the patients and context. According to Tena et al. (2008), there is not 1 best way of performing urine cultures. Guidelines for the diagnosis of UTI includes the use of sheep blood agar and either MacConkey agar or a similar selective medium for routine urine culture. The plates should be incubated overnight (at least 16 hours) at 37°C in ambient air; alternatively, the blood agar plate can be incubated in elevated (3–8%) $CO_2$ (Clarridge et al., 1988). For fastidious microorganisms, chocolate agar can be added to the MacConkey agar and the plates incubated in 5% $CO_2$ for 2 days (Clarridge et al., 1988). $CO_2$ can play a role in the growth of microorganisms for instance, *E. coli* as a substrate for carboxylation reactions (Kozliak et al., 1995). There is considerable evidence of practice variation in use of diagnostic tests, interpretation of signs or symptoms and initiation of antibiotic treatment such as drug selection, dose, duration and route of administration (Jamieson *et al.,* 2006). For patients with symptoms of UTI and bacteriuria the main aim of treatment is to get rid of infectious bacteria causing the symptoms. Secondary outcomes are adverse effects of treatment or recurrence of symptoms.

This study therefore focuses on the detection and incidence of UTI among pregnant women Ibadan, South-Western, Nigeria. It also aimed to isolate and identify the organisms isolated from clinical specimen.

## MATERIALS AND METHODS

### Study area

The study area is the municipal area of Ibadan, which is made up of five local government areas. Ibadan city lies on the longitude 3°5' East of Greenwich meridian and latitude 7°23' North of the Equator. Besides being the largest indigenous city in Africa south of Sahara, the city is an important trade and educational centre. It also houses one of the largest and foremost teaching hospitals in Africa. However, the city is characterized by low level of environmental

sanitation, poor housing, and lack of potable water and improper management of wastes especially in the indigenous core areas characterized by high density and low income populations.

**Study population**

Urine samples were collected from a total of 80 pregnant women between the ages of 21 to 40 years. All these persons were outpatients attending the antenatal clinics in Oluyoro Catholic Hospital (OCH) Ibadan, Oyo State, Nigeria. The urine samples were obtained by informed consent of the pregnant women used for this study and the permission to that effect was obtained from the ethical committee of the hospital. Also, the pregnant women used for this study was addressed by the matron-in-charge of the antennal clinic before the urine samples were collected.

**Demographic and clinical information**

Demographic and clinical information of the subjects were obtained by chart abstraction and recorded on a prepared data collection form. The study groups were also stratified by age distribution. Information was collected on the women's age, occupation, menstrual and obstetric histories, gestational age, and parity, perceived gynaecological symptoms, health care-seeking behaviour and contraceptive practices.

**Urine collection**

Clean catch urine samples were collected in sterile universal containers as described by Karlowsky et al. (2006) and Solberg et al. (2006). Eighty "clean catch" mid-stream urine (MSU) samples were collected inside sterile disposable universal bottles from pregnant women. They were instructed on how to collect samples and the need for prompt delivery to the laboratory. The samples were labeled and transported to the Medical Microbiology and Parasitology laboratory of University College Hospital (UCH), Ibadan in iced pack and were analyzed within 30 min to 1 h of collection.

**Sterilization of media and materials**

The media used were Nutrient Agar (NA) from Biotec Limited, while Nutrient Broth (NB), MacConkey agar (MCA), Blood Agar (BA) and Cystein Lactose Eletrolyte Deficient (CLED) Agar were supplied by Oxoid Limited. All glass wares were washed with detergent and rinsed with water, then allowed to dry. The glass wares were later wrapped in aluminum foil and sterilized in a hot air oven at 160°C for 3 h. Media were prepared according to the manufacturer's specifications and sterilized by autoclaving at 121 lb $g^{-1}$ for 15 min.

Microscopy

The urine samples were mixed and aliquots centrifuged at 5000 rpm for 5 min. The deposits were examined using both x10 and x40 objectives. Samples with ≥10 white blood cells/$mm^3$ were regarded as pyuric (Smith et al., 2003). A volume of the urine samples were applied to a glass microscope slide, allowed to air dry, stained with gram stain, and examined microscopically (Kolawole et al., 2009).

**Culturing of bacteria from urine samples**

This was carried out as described by Cheesbrough (2002, 2004) and Prescott et al. (2008). Ten-fold serial dilutions were made by transferring 1.0 ml of the sample in 9.0 ml of sterile physiological saline. One ml was then poured into molten nutrient agar in Petri dishes and rotated gently for proper homogenization. The contents were allowed to set and the plates were then incubated at 37°C for 24 h. Bacterial colonies growing on the agar after the incubation period were enumerated to determine urine samples with significant bacteriuria. A loopful of each urine sample was also streaked on MacConkey agar and Blood agar plate for the isolation of the bacteria present in the urine. After incubation, plates with growth were selected, the colonies were isolated using an inoculating loop and subsequently subcultured on agar slants for use in further tests.

**Table 1.** Microscopic examination of urine samples.

| Isolates | No. of Positive Samples (%) |
|---|---|
| Pus cells | 15 (62.5) |
| *Schistosoma haematobium* | 04 (16.7) |
| yeast cells | 04 (16.7) |
| Total | 24 (30.0) |

**Identification of isolates**

The methods used in the identification and characterization of isolated bacteria included Gram stain followed by microscopic examination, motility test and biochemical tests according to Cheesbrough (2002, 2004). The isolates were identified by Bergey's Manual for Determinative Bacteriology (Buchanan and Gibbons, 1974).

## RESULTS

Of the 80 samples examined in this study, only fifteen samples were observed to have pus cells, 4 had *Schistosoma haematobium* and yeast cells (Table 1).

Also of the 80 urine samples examined in this study, 38 (47.5%) were found to contain heavy and appreciable bacterial growth (significant bacteriuria) while 42 (52.5%) had no appreciable bacterial growth (Table 2). Urine microscopy revealed pus cells in 15 of the urine samples collected while yeast cells was only found in 2 (2.5%) of the samples. Culture plates with bacterial counts greater than or equal to $1x10^5$ CFU/ml were taken as positive, thus indicative of UTI. The bacterial isolates were identified based on colony morphology characteristics, Gram stain reaction and biochemical tests.

Table 2 shows the incidence of UTIs in relation to age of the subjects. A higher percentage of pregnant women (77.8%) with UTIs were found within the age brackets of 36-40 years while age groups 26-30 years had the least percentage (37.1%). The highest number of bacterial isolates was obtained from pregnant women within the age brackets of 21-25 years followed by 26-30 years. Comparatively, lower number of bacterial isolates was obtained from age groups 31-35 and 36-40 years as shown in Table 2.

**Table 2.** Incidence of UTI in relation to age distributions of pregnant women.

| Age group (years) | No. tested (%) | No. positive (%) | No. negative (%) |
|---|---|---|---|
| 21-25 | 14 (17.5) | 7 (50.0) | 7 (50.0) |
| 26-30 | 35 (43.8) | 13 (37.1) | 22 (62.9) |
| 31-35 | 22 (27.5) | 11 (50.0) | 11 (50.0) |
| 36-40 | 9 (11.3) | 7 (77.8) | 2 (22.2) |
| Total | 80 (100.0) | 38 (47.5) | 42 (52.5) |

**Table 3.** Frequency of isolation of organisms in pregnant women.

| Isolates | No. of positive samples (%) |
|---|---|
| *Escherichia coli* | 16 (42.1) |
| *Staphylococcus aureus* | 11 (28.9) |
| *Klebsiella aerogenes* | 7 (18.4) |
| *Pseudomonas aeruginosa* | 2 (5.3) |
| Mixed Cultures: *Klebsiella* & *Staphylococcus* spp. | 2 (5.3) |
| Total | 38 (100.0) |

**Table 4.** Incidence by occupational groups.

| Occupational groups | Total No. tested | No. positive (%) |
|---|---|---|
| Students | 23 | 7 (30.4) |
| Teachers | 10 | 7 (70.0) |
| Civil Servants | 9 | 7 (77.8) |
| Businesswomen | 13 | 7 (53.8) |
| Traders | 15 | 6 (40.0) |
| Professionals/Artisans/Housewives | 11 | 4(36.4) |
| Total | 80 | 38 (47.5) |

**Table 5.** Incidence of UTI by Parity (No. of Pregnancy)

| Parity | No. Tested | No. Positive (%) |
|---|---|---|
| First pregnancy | 40 | 17 (42.5) |
| 2nd pregnancy | 16 | 7 (43.7) |
| 3rd pregnancy and above | 24 | 14 (58.3) |
| Total | 80 | 38 (47.5) |

Of the 38 isolates obtained, Gram negative bacteria occurred more frequently than Gram positive bacteria, constituting 25 (65.8%) of the total isolates. These include *Escherichia coli* 16 (42.1%), *Klebsiella aerogenes* 7 (18.4%) and *Pseudomonas aeruginosa* 2 (5.3%) as shown in Table 3. Gram positive bacteria accounted for 11 (28.9%), with *Staphylococcus aureus* 11 (28.9%) and mixed cultures of *Klebsiella* spp. and *Staphylococcus* spp accounting for 2 (5.3%) as shown in Table 3. It was also found that the rate of isolation of *Klebsiella aerogenes* and *Staphylococcus aureus* was higher in specimens collected from pregnant women in all age brackets while *Pseudomonas aeruginosa* were isolated exclusively from age brackets 36-40 years.

Table 4 shows the incidence of UTIs by occupational group. UTIs appear to be more prevalent among civil servants who constituted 77.8% of the pregnant women with UTIs, followed by teachers (70%), businesswomen (53.8%), traders (40.0%), professionals/artisans/full housewives (36.4%), and students appeared to be the least constituting 30.4% (Table 4).

Table 5 shows incidence of UTIs by parity. The highest percentage UTIs occurrence by parity is 58.3%, followed by 43.7% and the lowest percentage incidence of UTI by parity is 42.5%. This also shows that women in their 3rd pregnancy and above have had a greater number of UTI

**Table 6.** Incidence by gestational age (age of pregnancy).

| Age of pregnancy (months) | No. tested (%) | No. positive (%) |
|---|---|---|
| 3 | 2 | Nil |
| 4 | 4 | 2 (50.0) |
| 5 | 11 | 3 (27.3) |
| 6 | 14 | 7 (50.0) |
| 7 | 14 | 10 (71.4) |
| 8 | 24 | 12 (45.8) |
| 9 | 11 | 5 (45.5) |
| Total | 80 | 38 (47.5) |

**Table 7.** Incidence of UTI by trimester (period of 3- three-months of pregnancy)

| Trimester (period of 3- three-months) | No. tested (%) | No. positive (%) |
|---|---|---|
| First trimester (1st 3 months) | 02 | 00 (00.0) |
| Second trimester (2nd 3 months) | 29 | 12 (41.4) |
| Third trimester (3rd 3 months) | 49 | 27 (55.1) |
| Total | 80 | 38 (47.5) |

cases. This shows that the incidence of UTIs among pregnant women could also be contributed by parity.

Table 6 shows the prevalence of UTI by gestational age (age of pregnancy) as at the time of this study. This revealed that women in the 6 and 7 months of their pregnancy had the highest prevalence of 50.0 and 71.4% respectively while women in the early month of their pregnancy had no specific bacteria growth and shows no sign of UTIs.

Table 7 shows the incidence of UTI by trimester (a period of three months, especially one of the three-three-month periods into which human pregnancy is divided for medical purposes) as at the time of this study. This also shows that women in their 2nd and 3rd trimester had a greater number of UTI cases having an incidence of 41.4 and 55.1% respectively. Women in their first trimester, though fewer in number, had no specific bacteria growth and shows no sign of UTI. This shows that the incidence of UTIs among pregnant women could also be contributed by trimester.

Table 8 shows the prevalence of UTI in relation to the presenting clinical history. Among all pregnant women in the study, 38 (47.5) reported with symptom suggestive of an UTI and reproductive tract infection (RTI), including white discharge (42.5%), burning sensation while passing urine (1.3%) and vaginal itch (8.8%), others include abdominal pains (40%), malaria (8.8%), vomiting/spitting (5.0%) etc. Among those 48 (60%) women reported with symptoms, 17 (35.4%) women had one symptom, 33 (68.8%) women had two symptoms and 13 (27.1) women had all the three. Only 35 (72.9%) of the 48 pregnant women who showed symptoms of UTIs had specific growth in the urine culture while 3 (60.0%) of the 5 pregnant women which show no symptom also gave a positive urine culture (Table 6).

## DISCUSSION

The incidence of UTIs in this study population was 47.5%. This is similar to the figures reported in previous studies. This study is in agreement with other reports which stress that UTI is more frequent in females than in males, during youth and adulthood (Ibeawuchi and Mbata, 2002; Asinobi et al., 2003; Olaitan, 2006; Mbata, 2007). The finding of this study is higher than the incidence rate of 11.9% reported by Aiyegoro et al. (2007) among children and adolescents in Ile-Ife and 16.5% reported by Okafor et al. (1993) in patients between ages 0 and 20 years. This figure is also higher than the prevalence rate of 22% significant bacteriuria reported by Ekweozor and Onyemenen (1996) in Ibadan and 25.6% by Nedolisa (1998) at the Jos University Teaching Hospital (JUTH). The findings of this study is also higher than the incidence rate of 28.1% reported by Olowu and Oyetunji (2003) in a population of 2780 outpatients at the Lagos University Teaching Hospital (LUTH) and a prevalence rate of 30% reported by Anochie et al. (2001) among a population of 100 school children, between ages 4 - 18 years in a rural community in Enugu as well as 38.6% reported by Akinyemi et al. (1997) in Lagos, and 35.5% rate recorded by Ebie et al. (2001) in Rukuba Military Cantoment, Jos, Plateau State. However, the findings in this study comparably to the 58% incidence rate reported by Onifade et al. (2005) in a similar study among pregnant women in Ondo state, but

**Table 8.** Incidence by clinical history.

| Clinical history | No. tested (%) | No. positive (%) | No. negative (%) |
|---|---|---|---|
| Symptomatic | 48 (60.0) | 35 (72.9) | 13 (27.1) |
| No Symptoms | 5 (6.3) | 3 (60.0) | 2 (40.0) |
| Discharges | 34 (42.5) | 13 (38.2) | 21(61.8) |
| Burning Sensations | 1 (1.3) | 1 (100.0) | Nil |
| Abdominal Pains | 32 (40.0) | 18 (56.3) | 14 (43.7) |
| Swollen Legs | 4 (5.0) | 1 (25.0) | 3 (75.0) |
| Backache | 22 (27.5) | 10 (45.5) | 12 (54.5) |
| Malaria | 7 (8.8) | 6 (85.7) | 1 (14.3) |
| Headache | 9 (11.3) | 4 (44.4) | 5 (55.6) |
| Stomachache | 1 (1.3) | 1 (100.0) | Nil |
| Waist pain | 6 (7.5) | 3 (50.0) | 3 (50.0) |
| Cough | 1 (1.3) | 1 (100.0) | Nil |
| Dizzy | 1 (1.3) | 1 (100.0) | Nil |
| Vomiting/Spitting | 4 (5.0) | Nil | 4 (100.0) |
| Muscle pull | 1 (1.3) | 1 (100.0) | Nil |
| Body pain | 3 (3.8) | 3 (100.0) | Nil |
| Hand pain | 1 (1.3) | 1 (100.0) | Nil |
| Leg/Knee pain | 4 (5.0) | 2 (50.0) | 2 (50.0) |
| Thing pain | 2 (2.5) | 1 (50.0) | 1 (50.0) |
| Shoulder pain | 1 (1.3) | Nil | 1 (100.0) |
| Side pain | 1 (1.3) | Nil | 1 (100.0) |
| Buttocks pain | 1 (1.3) | Nil | 1 (100.0) |
| Cold | 1 (1.3) | 1 (100.0) | Nil |
| Sleeplessness | 1 (1.3) | 1 (100.0) | Nil |
| Itchy Sensation | 7 (8.8) | 3 (42.9) | 4 (57.1) |

lower than a prevalence rate of 71.6% earlier reported in a similar study by Jellheden et al. (1996) in non-pregnant women less than 50 years of age with acute systems of UTIs, and with Mbata (2007) who recorded 77.9% among Prison inmates in Nigeria. This high incidence of UTI reported in this study may also be attributed to such factors as poor housing, poor drainage systems, lack of proper personal and environmental hygiene, genuine population susceptibility since it is that factors such as low socio-economic status, sexual intercourse, and pregnancy among others are common among Nigerian women (Andriole, 1985; Akinyemi et al., 1997; Kolawole et al., 2009). The low incidence rate of urinary tract infection reported among students (30.4%) in this study may be attributed to the extensive health care talk given regularly in schools and public awareness programmes among the full housewives. UTIs were also more common among women whose husbands were transport workers, businessmen or in the armed forces. The incidence of bacteriuria among women in their first trimester is 42.5%. This figure is higher than the prevalence rate of 2-9% reported by Nicolle (2003) in a similar study on pregnant women. This shows that symptomatic bacteriuria occurs in 17-20% of pregnancies. The findings of this study also showed that 58.3% of the women who had UTIs were in their 3$^{rd}$ pregnancy and above or have had more than 3 children; 43.7% were in their 2$^{nd}$ pregnancy and 42.5% were in their 1$^{st}$ pregnancy. This showed that parity is one of the possible factors affecting the incidence and prevalence rate of UTIs among women. This study also showed that women in their 6th month (50.0%) and 7th month (71.4%) of their pregnancy had the higher incidence of UTI while women in their early month of the pregnancy had no specific bacteria growth and shows no sign of UTIs. In this study, women in their 2$^{nd}$ and 3$^{rd}$ trimester were found to have the higher incidence of UTI; 41.4 and 55.1% respectively. Though fewer women were in their first trimester, they showed no specific bacteria growth and show no sign of UTIs. Vazquez and Villar (2000) also reported that 10- 30% of women with bacteriuria in the first trimester develop upper UTI in the second or third trimester. Thus, pregnant women should be screened for bacteriuria by urine culture at 12 to 16 weeks of gestation. The presence of 1 x105 CFU of bacteria per ml of urine should be considered significant.

Only 15 urine samples were observed to have pus cells, and 4 had *Schistosoma haematobium* and yeast cells. The pattern and frequency of occurrence of the bacterial isolates found in this study is similar to what has been previously reported. *E. coli* is also the most common pathogen among patients with uncomplicated UTIs (Kahlmeter, 2003). Other members of the family *Enterobacteriaceae* (such as some strains of *Klebsiella* spp.) and other organisms (such as *S. aureus*), can have similar requirements (Barker et al., 1978, Tena et al., 2008).

The most implicating organism causing urinary tract infections among these pregnant women in this study was *E. coli* and it was responsible for 42.1% of the cases of UTI. This was followed by *S. aureus* (28.9%), *K. aerogenes* (18.4%), *P. aeruginosa* (5.3%) and mixed cultures of *K. aerogenes* and *S. aureus* (5.3%). This finding is similar to other reports which suggest that gram negative bacteria, particularly *E. coli* is 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) and Aiyegoro et al. (2007) also reported in their study that *E. coli* was the most commonly isolated pathogen in significant bacteriuria. In a similar study by Nwanze et al. (2009) the commonest isolates were also *Escherichia coli* (51.2%), *S. aureus* (27.3%), and *K. pneumoniae* (12.8%) respectively. This same pattern was also reported by Kolawole et al. (2009). The 18.4% incidence rate reported for *K. aerogenes* 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).

According to Murray et al. (1998), *S. aureus* is believed to cause cystis in mainly young sexually active females, it was also found to constitute a recognizable percentage in this study. This confirms that this organism may be achieving prominence as an aetiological agent of UTI in pregnant women. In this study, a total of 38 isolates were obtained from the 38 pregnant women with positive cultures; only one bacterial species was isolated from each subject, suggesting a mono-microbial nature of urinary tract infection in the study population. A higher percentage of the organisms found in this study were isolated mainly from pregnant women with 26-30 years age group while a higher prevalence of UTI was found in age groups 36-40 years. This confirms the usual report that the risk of UTIs increases with age. The pattern of isolates reported in this study is consistent with the usually reported pattern, with *E. coli* being the most common organism isolated in cases of urinary tract infection followed by *S. auerus* and *K. pneumoniae. P. aerogunosa* was the least common isolates in this study.

The incidence of UTIs in this study group was 47.5% (38 women). The higher prevalence of urinary tract infections in pregnant women might be as a result of a variety of factors; women under 50 years of age with acute symptoms such as dysuria, urgency or frequency suggesting of lower UTI or loin pain suggesting of upper UTI are extremely likely to have bacteriuria. Asymptomatic bacteriuria becomes increasingly common with age, though prevalence in men is always lower than for women of the same age. Alternations in vaginal microflora also play a critical role in encouraging vaginal colonization with coliforms and this can lead to urinary tract infection (Hooton et al., 1995). The prevalence rate of 1-3% asymptomatic bacteriuria was reported in Sweden from neonatal period to school age (Hooton and Stamm, 1997) while 5.3% prevalence was reported in Saudi Arabia (Omar and ElHaj, 1992). In Nigeria, a prevalence rate of 2.1% was reported in Enugu (Okafor *et al*., 1993); in Ile-Ife, a prevalence rate of 24% and 6% was reported among rural and urban children respectively with an annual incidence rate of symptomatic bacteriuria of 6.5 per 1000 admissions (Aiyegoro *et al*., 2007), while Kolawole et al. (2009) reported 60% prevalence rate of UTI among patients attending Dalhatu Araf Specialist Hospital, Lafia, in Nasarawa State.

The high incidence rate of 47.5% reported in this study should be of great concern, as not only do UTI pose a threat to health, but they also impose an economic and social burden due to the stigma associated with these infections. The findings of this study revealed that the important infecting organisms were found to be the commensals of perianal and vaginal regions. This calls for increase in personal hygiene (Kolawole et al., 2009).This study has highlighted the need to raise awareness of UTIs and to expand services for prevention and treatment for pregnant women. To do this effectively, however, it may be necessary to improve the quality of health care provided at the community level. Since UTI may be symptomatic and asymptomatic in most cases, it is therefore suggested that routine screening of patients with unexplained sources of fever be done for UTI and the appropriate antimicrobials administered after sensitivity tests have been carried out in order to prevent the cases becoming symptomatic later with resultant renal damage.

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