



PREVALENCE OF URINARY TRACT INFECTIONS (UTI) AMONG PREGNANT WOMEN IN UNIVERSITY OF BENIN TEACHING HOSPITAL (UBTH) BENIN CITY, NIGERIA

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ABSTRACT

The aim of the study is to determine the frequency of urinary tract infection during pregnancy, the susceptibility profile of isolates and the trimester of peak infection. The study which was prospective and cross-sectional was carried out at University of Benin Teaching Hospital (UBTH), Benin City, Nigeria. The urine samples of two hundred antenatal women attending clinics in UBTH were subjected to culture and sensitivity during the period January to August 2011. Samples were collected alongside questionnaires to indicate age, any antibiotic treatment in the last three weeks, the gestational age and the number of previous births. Sample collections were done on the busiest antenatal clinics to ensure maximum coverage of patients. The specimens were cultured immediately on McConkey and Cysteine lactose electrolyte deficient (CLED) agars and the microscopy recorded. After an overnight incubation isolates were identified by colonial morphology characteristics and biochemical tests. The isolates include Escherichia coli, Proteus vulgaris, Alcaligenes faecalis, Providencia stuartii, Klebsiella pneumoniae, Proteus morganii, Proteus mirabilis, Acinetobacter calcoaceticus. All the isolates except Proteus vulgaris were susceptible to nitrofurantoin and resistant to all other antibiotics. The relatively high prevalence of urinary tract infection during pregnancy and the desire to avoid pregnancy complications resulting from urinary tract infection justify screening pregnant women for urinary tract infection.

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Contribution/ Originality

The isolates in this study were all of faecal origin, indicating poor hygiene. The study also established that the highest infection rate occurred in the third trimester contrary to second claimed by literature reports. Pregnant women therefore are encouraged to be more hygiene conscious especially at the third trimester.

1. INTRODUCTION

Urinary tract infection (UTI) is rampant during pregnancy [1]. This is due to hormonal and mechanical changes during pregnancy [2]. The uterus sits directly on top of the urinary bladder. As the uterus grows its increased weight blocks the drainage of urine from the bladder thus causing urinary stasis which leads to infection of the urinary tract [3]. Most pregnant women develop uterus dilatation which remains until delivery. Increased bladder volume and decreased bladder tone along with decreased urethral tone contribute to increased urinary stasis and ureterovesical reflux [4].

Urinary tract infection can be symptomatic in which signs of inflammation are shown or asymptomatic in which infection exists in the absence of disease symptoms. Gratacos, et al. [5] Significant bacteriurea may exist in asymptomatic patients. There is increased risk of developing pyelonephritis in women with asymptomatic bacteriurea and so routine screening of bacteriurea is recommended during pregnancy [6]. It has been observed that untreated asymptomatic bacteriurea has a tendency to lead to development of cystitis and pyelonephritis which will cost more to treat than treating bacteriurea [7]. Asymptomatic bacteriurea is associated with an elevated risk of intra uterine growth retardation and low birth weight infants [8]. All pregnant women should be screened for both symptomatic and asymptomatic bacteriurea to prevent the development of pyelonephritis which could be a life-threatening illness with increased risk of perinatal and neonatal morbidity [9].

Urinary tract infection occurs in about 8% of all pregnant women and peaking in about 90% during the period of about 24 weeks of gestation [10]. About 70% of pregnant women have urethral dilatation which remains until delivery in addition to having glucosurea which enhances bacterial growth in urine [11].

Symptoms associated with urinary tract infection include – pain or burning (discomfort) sensation at urinating; a feeling of urgency at urination; cramps or pain in the lower abdomen; the need to urinate more often than usual; urine that looks turbid and has foul smell; pain, pressure or tenderness in the area of the bladder and when bacteria spread to the kidneys, there can be back pain, chills, fever, nausea and vomiting [1].

The objective of this study is to determine the frequency of urinary tract infection during pregnancy, the organisms associated with infection, the susceptibility of isolates and the trimester of peak infection in Benin City, Nigeria.

2. MATERIALS AND METHODS

University Of Benin Teaching Hospital is a tertiary-care health centre which serves the whole of Edo State plus the neighboring states of Ondo, Kogi, Delta and Anambra. It has one of the best antenatal care facilities in the country. Antenatal women usually register in the first trimester. They

are usually screened for urinary tract infection upon registration and subsequently treated with antibiotics and placed on monthly prophylaxis. They are placed on monthly appointment until delivery.

Midstream urine samples were collected from the participants. Sample collection was done with the aid of a questionnaire to indicate age, any antibiotic treatment in the last three weeks, gestational age and number of previous births. No participant was screened more than once and the study period lasted from January to August 2011. The number of antenatal women attending clinics during the period of study was two hundred participants.

The media used were purchased and prepared according to the manufacturer's instruction. The media include McConkey agar (Antec laboratories UK) Cysteine electrolyte deficient (CLED) agar (LAB 6, LABMTM) Mueller Hinton Agar (LABM 39, England), Peptone water powder (Oxoid Ltd USA) Urea broth base (Oxoid Ltd USA) Koser citrate (Oxoid Ltd USA).

The antibiotic discs were produced by Abtek Biological Ltd, Liverpool L9 7AR, UK. The antibiotic discs and their disc concentration were amoxicillin clavulanate 20µg, Ofloxacin 5µg; gentamycin 10µg, Nalidixic acid 30µg, Furadantoin 200µg, Cotrimoxazole 25µg, Amoxicillin 25µg, Tetracycline 25µg.

3. URINE CULTURE

All urine samples were processed according to standard procedure [12]. Microscopic examination was done on all the urine samples. Each wellmixed urine sample was inoculated into the appropriate media with a standard wire loop which has 30 mouse gauge and has a diameter of 3.26cm. After the urine have been cultured on McConkey agar and Cysteine lactose Electrolyte deficient agar, 10ml of each urine sample was span in the centrifuge to separate the deposit. A drop of the deposit was put on a clean grease-free slide and examined with the light microscope for the presence of pus cells, red blood cells, bacteria and yeast cells. The result of the deposit is recorded because it is used to determine the significance of the culture yield. The culture agar plates are incubated aerobically at 37⁰C overnight. The incubator must be checked to ensure proper quality control. There must be quality control on all media, reagents and equipments. Emergent colonies from culture were identified using colonial morphology and Biochemical characteristics [13].

The inoculums on the plate were streaked out to obtain discrete colonies with a sterile wire loop using the standard method [12].

The plates were incubated at 37⁰C overnight. The emergent colonies were identified using colonial morphology and biochemical characteristics using the standard techniques [13].

3.1. Antibiotic Susceptibility Testing

The antibiotic susceptibility pattern of all isolates was determined by the modified Kirby – Bauer diffusion techniques [12]. A standard sensitive strain of *Eschericia coli* CW3310 was used as the control organism. The antibiotic discs and their disc concentrations were Amoxicillin clavulanate 20µg; Ofloxacin 5µg, Gentamycin 10µg; Nalidixic acid 30µg; Nitrofuradantoin 300µg; contrimoxazole 25, Amoxicillin 25µg Tetracycline 25mg. The inoculated plates carrying the

antibiotic discs were incubated at 37°C overnight. The diameter of the zone of inhibition around each antibiotic was measured and isolates were classified as resistant or sensitive based on the standard intermediate chart updated according to the current NCCLS standard and Fluke zone interpretative chart in accordance with WHO requirements [3].

4. RESULTS

Forty two (21%) urine samples out of 200 samples yielded growth of organisms. Some specimens yielded more than one isolate. Eight different organisms were isolated and they included *Providencia stuartii*, *Escherichia coli*, *proteus morgani*, *proteus vulgaris*, *klebsiella pneumoniae*, *proteus mirabilis*, *Acinetobacter calcoaceticus* and *Alcaligenes faecalis* (Table 1).

A total of 54 organisms were isolated because some specimens yielded more than one isolate. and these included *Esch. coli* 10 (18.52%); *Proteus vulgaris* 7(12.96%); *Proteus morgani* 8(14.81%). *Proteus mirabilis* 4 (7.41%); *Alcaligenes faecalis* 2 (3.71%); *Providencia stuartii* 14 (25.92%); *Klebsiella pneumoniae* 6 (11.11%); *Acinetobacter calcoaceticus* 3 (5.55%). The prevalence of isolates as regards the gestational age was determined (Table 2). 6 (14.2%) isolates were observed in the first trimester. 12 (28.6%) were observed in the second trimester while 24 (57.1%) isolates were recorded in the third trimester.

The isolates showed high resistance to all the antibiotics except nitrofurantoin which demonstrated strong antibacterial activity on the isolates except *Proteus vulgaris* which resistant to the antibiotic (table 3).

Table-1. Prevalence and percentage of bacteria Isolates

Isolates	Number of Isolates	Percentage (%)
Escherichia coli	10	18.52
Proteus vulgaris	7	12.96
Alcaligenes faecalis	2	3.71
Providencia stuartii	14	25.92
Klebsiella pneumoniae	6	11.11
Proteus morgani	8	14.81
Proteus mirabilis	4	7.41
Acinetobacter calcoaceticus	3	5.55
Total	54	100%

Table-2. Gestational Age and Number of Infections

Gestational Age	Number of Isolates
1-12 weeks	6 (14.2%)
13-24 weeks	12 (28.6%)
25-39 weeks	24 (57.1%)

Table-3. Antibiotic Sensitivity Pattern of Bacterial Isolates

Isolates (n)	No of Isolates	Amoxycillin clavulante	Ofloxacin	Gentamicin	Nalidixic Acid	Nitrofurantion	Cotrimoxazole	Amoxycillin	Tetracycline
Proteus Vulgaris	7	NIL	5(71.42%)	4(57.14%)	NIL	1(14.29%)	NIL	NIL	NIL
Alcaligenes spp	2	NIL	1(50%)	1(50%)	NIL	2(100%)	NIL	NIL	NIL
Providencia	14	NIL	6(42.85%)	4(28.57%)	1(7.14%)	7(50.80%)	NIL	NIL	NIL
K. pneumoniae	6	NIL	4(66.67%)	4(66.67%)	1(16.67%)	5(83.33%)	1(16.67%)	NIL	NIL
Proteus morgani	8	NIL	2(25.00%)	3(37.50%)	1(12.50%)	6(75.00%)	NIL	NIL	NIL
Esch. coli	10	NIL	2(20.00%)	2(20.00%)	2(20.00%)	8(80.00%)	NIL	NIL	NIL
Acinetobacter calcoaceticus	3	NIL	1(33.33%)	1(33.33%)	NIL	3(100%)	NIL	NIL	NIL
Proteus maribilis	5	NIL	NIL	NIL	NIL	3(60.00%)	NIL	NIL	NIL

5. DISCUSSION

This study clearly showed that urinary tract infection is rampant during pregnancy. This observation correlates with the results in the literature [1].

The increased susceptibility to urinary tract infection may not be unconnected with the physiological, hormonal and mechanical changes during pregnancy [2]. Pregnancy has been observed to have numerous changes in the woman's body. Hormonal and mechanical changes increase the risk of urinary stasis and vesicoureteral reflux. These changes combined with the already short urethra (approximately 3-4 cm in females) and the difficulty with maintaining proper hygiene due to a distended pregnant belly enhance the frequency of urinary tract infections during pregnancy [1]. Pregnancy and urinary tract infections often go hand in hand since pregnant women are at an increased risk to develop urinary tract infection. Pregnancy hormones cause changes in the urinary tract which predisposed women to infections. In addition, as the uterus grows it presses on the bladder and can mechanically prevent complete emptying of urine. The stagnant urine is likely to be a source of infection. About 70% of pregnant women develop glycosuria which encourages bacterial growth in the urine [1].

One interesting observation is the peak of infection which literature reports claimed to occur in the second trimester [14]. However the results in this study indicated that the peak of infection occurred in the third trimester. This observation may not be unconnected with the high level of Hormones, which in this case is progesterone. The high level of the hormone relaxes the urinary tract and the bladder. This causes urine to remain longer in the system. This becomes a perfect breeding ground where bacteria have the chance to accumulate and grow in large number. This condition, in addition with the weight of the growing uterus on the bladder, results in urinary stasis, increases the risk of infection during pregnancy [1].

Isolates from this study were mainly members of enterobacteriaceae thus meaning that infection was a result of poor hygiene as the isolates were all of faecal origin. This may be connected to the anatomy proximity of the anus to the vagina of females [15].

Basically, bacteria from the rectum travel up the urethra into bladder where they stay and multiply.

The number of various isolates in this study varied from some literature reports [16, 17]. *Esch. coli* was the most frequently isolated organisms 19.7% and 49.1% respectively while *Providencia stuartii* was only 1.0% 3.5% respectively. However in this study *Providencia stuartii* was the most frequently isolated organism in this study scoring 25.92%. In the two literature reports above in which *Providaci stuartii* was 1.0% and 3.5% respectively, is it that conditions during pregnancy enhance the growth factors of *Providencia stuartii*? Further investigations are needed to ascertain the observation.

The sensitivity profile of the isolates was poor. It was only Nitrofurantoin that showed promise in the management of urinary tract infection during pregnancy. The antibiotic activity of furadantoin corresponds with literature claims [7]. Furadantoin continues to be the drug of choice for the coliforms from urinary tract infections. However furadantoin has an adverse effect for its burning sensation in the stomach, thus making it difficult for compliance.

6. CONCLUSION

This study has demonstrated that isolates from urinary tract infection are mainly of faecal origin, suggesting poor hygiene amongst pregnant women. Therefore the need for personal hygiene should be stressed as symptomatic and asymptomatic bacteriurea can lead to cystitis and pyelonephritis. Screening for urinary tract infection during pregnancy and adequate antibiotic therapy to prevent pregnancy complications are justified and can not be overemphasized.

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