

Full Length Research Paper

Urinary tract infection during pregnancy at Al-khoms, Libya

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Urinary tract infections (UTI) are the most common bacterial infections during pregnancy. Untreated UTI can be associated with serious obstetric complications. To determine the prevalence and identify the etiological agents associated with asymptomatic bacteriuria in antenatal mothers in two private hospitals (Gynecology and obstetrics department) at Alkhoms City, Libya. Anti-microbial sensitivity patterns of the common uropathogen were also determined. A total of 300 pregnant women were enrolled. UTI was diagnosed using mid stream urine culture on standard culture media and urinalysis was done using microscopic examination. The prevalence of bacteriuria among the pregnant women was 30%. It was clear from the results that there was an association of gestational age, education, age, sexual activity, previous history of UTI and socio-economic conditions with bacteriuria. *Escherichia coli* was the most common (64.4%) bacterial isolate followed by *Proteus spp.* (16.7%), *Klebsiella spp.* (13.3%) and *Pseudomonas aeruginosae* (5.6). *E. coli*, *Proteus spp.* and *Klebsiella spp.* were highly sensitive to nitrofurantoin, ofloxacin, cefotaxim, ciprofloxacin, norfloxacin and amikacin. Greater degree of resistance was seen to ampicillin and cotrimoxazole. *Pseudomonas aeruginosae* isolates were resistant to all tested antimicrobial agents except amikacin and nitrofurantoin. All pregnant women should be screened for UTI with a urine culture, treated with antibiotics if the culture is positive and then retested for cure to prevent complications with all the added benefits to the mother and the fetus. In addition, health education has recommended to all pregnant females specifically those of low socio-economic level.

Key words: Urinary tract infection (UTI), pregnancy, bacteria, antenatal, urinalysis, pregnant women, urine culture.

INTRODUCTION

Urinary tract infections "UTIs" are one of the frequently encountered problems facing the family physician. UTIs during pregnancy are among the commonest health problems worldwide, especially in developing countries (John and Michael, 2000). Urinary tract infections (UTI), which are caused by the presence and growth of microorganisms in the urinary tract, are perhaps the single commonest bacterial infections of mankind and in pregnancy; it may involve the lower urinary tract or the bladder. UTI has been reported among 20% of the pregnant women and it is the most common cause of admission in obstetrical wards (Theodor, 2007).

UTI is defined as the presence of at least 100,000 organisms per milliliter of urine in an asymptomatic patient, or as more than 100 organisms/ml. of urine with accompanying pyuria (>5 WBCs/HPF) in a symptomatic patient. Particularly in asymptomatic patients, a diagnosis of UTI should be supported by a positive culture for a uropathogen (Emilie and Edward, 2011). Several physiological, anatomical and personal factors contribute to this problem during pregnancy. For example, urethral dilatation, increased bladder volume and decreased bladder tone with increased urinary stasis. Also physiologic increases in plasma volume decreases urine concentration with up to 70% of pregnant women develop glycosuria which encourages bacterial growth (Lucas and Cunningham, 1993). Urinary tract infection during pregnancy contributes significantly to maternal and perinatal morbidity. Abortion, small birth size, maternal

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anemia, hypertension, preterm labour, phlebitis, thrombosis and chronic pyelonephritis are related to urinary tract infection during pregnancy (Onuh et al., 2006). All pregnant women should be screened for bacteriuria and subsequently treated with appropriate antibiotic therapy. This study aims to determine the prevalence and identify the etiological agents associated with asymptomatic bacteriuria and its sensitivity test to various antibiotics in antenatal mothers in two private hospitals (Gynecology and obstetrics department) at Alkhoms City, Libya.

MATERIALS AND METHODS

Urinary tract infections (UTI) study was conducted in two private hospitals (Gynecology and obstetric department) at Alkhoms City, Libya between March 2012 and September 2012. Antenatal women who presented at the antenatal clinics of the above mentioned hospitals during the study period were randomly recruited into the study upon informed consent, either had any of the symptoms suggestive of urinary tract infections or without any symptoms. Three hundred pregnant women with or without symptoms of UTI were included in this study. Pregnant women having renal disease or on antibiotic therapy within 72 hours to the study days were excluded due to the fact that the antibiotic must have inhibited or destroyed the pathogens. Verbal informed consent was obtained from each woman before the commencement of the research. Socio-demographic data such as age, occupation and duration of gestation were obtained from the pregnant women using standard questionnaires. Early morning clean-catch midstream urine was collected from each pregnant woman into a wide-mouthed sterile screw capped container. With a calibrated micro-loop, 0.001 ml. of urine was cultured on to a Blood agar, MacConkey agar and Muller Hinton Agar (Oxoid, UK) plates. After overnight incubation at 37° C for 24 hours, colony counts yielding bacterial growth of $\geq 10^5$ / ml was taken as being significant in both symptomatic and asymptomatic pregnant women. The centrifuged (T5 centrifuge, Clinlab, Egypt) urine deposit was examined microscopically at high magnification for pus cells, red blood cells, epithelial cells, casts, crystals, yeast-like cells. Pus cells >5 /HPF were also considered significant for infection (Leigh, 1989). Antibiotic susceptibility of an isolated species namely, *Escherichia coli*, *Klebsiella spp.*, *Proteus spp.*, and *Pseudomonas aeruginosae* were tested for their susceptibility to some antibiotics (Amikacin, Ciprofloxacin, Cefotaxime, Ofloxacin, Norfloxacin, Nitrofurantoin, Ampicillin and Cotrimoxazole (all were product of Oxoid, UK) by modified disc-agar diffusion technique (Kirby-Bauer method) according to the National Committee for Clinical Laboratory Standards (NCCLS, 2003).

RESULTS AND DISCUSSION

Three hundred (300) urine samples were collected and analyzed during the study period. The study pointed out that an incidence of urinary tract infection was 30% among pregnant women (ninety cases) who were followed up in the antenatal care clinic. This high rate compared to that in developed countries, (8% and 7.7%) (Mikhail and Anyaegbunam, 1995), was found concordant with other studies in developing countries. It was 30% in a study in Yemen (Al-Haddad, 2005), 28.5% in a Pakistani study (Sheikh et al., 2000), and between 22-28.8% in some studies in Egypt (Maqlad, 1992). This high incidence highlights the size of the problem which necessitates a rapid interference especially UTI is incriminated in different adverse outcomes of pregnancy. The prevalence of infection in relation to age are also shown in table 1, individuals of the age group 21-25 years had the highest incidence of infection (12.7 %). Followed by an age group 26-30 years (10 %), 31-35 years (4%) and those less than 20 years (2%). While the age group 36-40 years had the lowest incidence of infection (1.3 %).

The highest incidence is 21-25 years followed by 26-30 years and 31-35 years. The aforementioned age groups having the highest were also observed in previous studies (Leigh, 1989 and Bandyopadhyay et al., 2005). The reason could be due to the fact that many women within this age group are likely to have had many children before the present pregnancy and it has been reported that multiparity is a risk factor for acquiring bacteriuria in pregnancy. Sexual activity and certain contraceptive methods are also said to increase the risk and women are mostly sexually active at this age (Sharma et al., 2009 and Gulfareen et al., 2009).

There was higher rate of infection (Table 2) in the third trimester (67.8%) compared to second trimester (25.5 %) and first trimester (6.7%). The results of the current study are in agreement with previous study (Leigh, 1989). However, this report does not agree with other study; in which a higher prevalence of urinary tract infection in the second trimester compared to the third trimester (Onuh et al., 2006). Scientific explanation of increasing risk of UTI in and peaking during weeks 26 to 40, was due to urethral dilatation, decreased tone, decreased urine concentration and increased stasis, plus hormonal changes (progesterone and estrogens), all these factors contribute to the increased risk with an increased pregnancy duration (Patterson and Andriole, 1987).

Frequency of urinary tract infection in pregnant women in relation to socio-demographic and other factors is presented in table 3. Prevalence of bacteriuria in "good" status women is found to be 9% and 21% in case of poor pregnant women. The significance of education has been evidenced by the fact that only 7.2% of the examined cases suffering from bacteriuria are educated while

Table 1. Prevalence of urinary tract infection in pregnant women in relation to an age.

Age groups (Years)	Number of examined cases	Number of positive infection	% ⁺ Positive infection
Less than 20	22	6	2
21-25	88	38	12.7
26-30	90	30	10
31-35	60	12	4
36-40	40	4	1.3
Total	300	90	30

N.B: %⁺ were correlated to the total number of cases involved in the study (300).

Table 2. Prevalence of urinary tract infection in pregnant women in relation to gestational age.

Gestational age (weeks)	Number of examined cases	Number of positive infection	% ⁺ Positive infection
1-12	40	6	6.7
13-25	70	23	25.5
26-40	190	61	67.8
Total	300	90	100

N.B:%⁺were correlated to the total number of infected cases involved in the study (90)

Table 3. Frequency of urinary tract infection in pregnant women in relation to socio-demographic and other factors.

Socio-demographic factors		Number of examined cases	% ⁺ Positive infection
Status	Good	210	09
	Poor	90	21
Education level	Educated	130	7.2
	Uneducated	170	22.8
Past history of urinary tract infection	Repeated infection	220	25.3
	First time	80	4.7
Sexual activity	Active age	260	28.7
	Less active age	40	1.3

N.B: %⁺ were correlated to the total number of cases involved in the study (300).

Table 4. Percentage of Isolation of various significant pathogens in urine of pregnant women.

Pathogens	Number of isolates	Percentage (%)
<i>Escherichia coli</i>	58	64.4
<i>Proteus spp.</i>	15	16.7
<i>Klebsiella spp.</i>	12	13.3
<i>Pseudomonas aerugiosae</i>	5	5.6
Total	90	100

N.B:%⁺were correlated to the total number of infected cases involved in the study (90).

Table 5. Antibiotic susceptibility pattern of *E. coli* (n=58)

Antibiotic	Sensitive isolates		Resistant isolates	
	No.	%	No.	%
Nitrofurantoin	58	100	0	0
Cefotaxim	56	96.6	2	3.4
Amikacin	55	95	3	5
Ofloxacin	55	95	3	5
Ciprofloxacin	52	90	6	10
Norfloxacin	48	83	10	17
Cotrimoxazole	22	38	36	62
Ampicillin	6	10	52	90

Table 6. Antibiotic susceptibility pattern of *Proteus spp.* (n=15).

Antibiotic	Sensitive isolates		Resistant isolates	
	No.	%	No.	%
Nitrofurantoin	10	67	5	33
Cefotaxim	15	93	1	7
Amikacin	15	100	0	0
Ofloxacin	15	100	0	0
Ciprofloxacin	15	100	0	0
Norfloxacin	13	87	2	13
Cotrimoxazole	5	33	10	67
Ampicillin	3	20	12	80

Table 7. Antibiotic susceptibility pattern of *Klebsiella spp.*(n=12).

Antibiotic	Sensitive isolates		Resistant isolates	
	No.	%	No.	%
Nitrofurantoin	9	75	3	25
Cefotaxim	10	83	2	17
Amikacin	12	100	0	0
Ofloxacin	12	100	0	0
Ciprofloxacin	12	100	0	0
Norfloxacin	12	100	0	0
Cotrimoxazole	4	33	8	67
Ampicillin	0	0	12	100

22.8% are uneducated. Assessing the risk of recurrence, past history of urinary tract infection was important risk factor as (25.3%) women among the studied cases had past history of urinary tract infection; meanwhile only (4.7%) without past history of urinary tract infection . Sexual activity as a risk factor of bacteriuria, was also

significant in this study as (28.7%) women were sexually active and (1.3%) were of less activity. In this study, past history of UTI was the significant risk factor. Most of the other studies acknowledge the significance of past episodes of UTI in causing recurrence in pregnancy (Duerden, 1990). Also sexual

activity was also significant risk factor. This has also been seen in previous published studies. The anatomical relationship of female's urethra and the vagina makes it liable to trauma during sexual intercourse as well as bacteria been massaged up the urethra into the bladder during pregnancy (Akerle et al., 2002 and Aseel et al., 2009).

Table 4 showed the frequency of various isolated pathogens. 210 samples had no growth. 90 samples were positive for urinary pathogens. Among the significant isolates, *E. coli* had the highest percentage of isolation (64.4%), while the lowest was *Pseudomonas aeruginosae* (5.6%). However; other pathogens as proteus spp. and *Klebsiella* spp. were isolated at rate of 16.7% and 13.3% respectively. These percentages were correlated to the total number of cases having urinary tract infection (90). *Escherichia coli* has identified as the most common pathogen isolated among the pregnant women in this study, which was consistent with the majority of the reported studies in literature (Sharifa, 2010, Al-Jiffri et al., 2011, Shazia et al., 2011 and El-Shokkary, 2011). With respect to the other uropathogens isolated in the current study, *Proteus* spp. was the second isolate. Different studies have shown the growth of *Proteus* in urine from 5.8% to 12.4 % (Kashef et al., 2010 and Chakupurakal et al., 2010). *Klebsiella* spp. was the third isolate in our study occupying 13.3% of the total isolate. Similar finding was also noted by different authors in studies done in various parts of the world where *Klebsiella* spp. was isolated in 15.7 % (Taneja et al., 2010) and 16.6 % (Karki et al., 2004). *Pseudomonas* spp. was isolated in only five cases (5.6%) in the present study. The very low growth of *Pseudomonas* spp. could be attributed to the fact that all these cases were from outpatient department and *Pseudomonas* spp. is more commonly acquired as nosocomial infection. John and Michael (2000) proposed that; increase in urinary progesterin and estrogens may lead to decreased ability of the lower urinary tract to resist invading bacteria beside decreased urethral tone that possibly allow some strains of bacteria to selectively grow.

Concerning antibiotic susceptibility of the isolated pathogens involved in the current study, the results were presented in tables 5, 6 and 7. In this study, most of the organisms isolated were highly sensitive to nitrofurantoin, amikacin, ofloxacin, ciprofloxacin and cefotaxim. Among these, *E. coli* showed sensitivity to nitrofurantoin in 100.0% and to cefotaxim, amikacin, ciprofloxacin and ofloxacin at the rate of over 90.0%. *E. coli* was resistant to ampicillin in 90% and cotrimoxazole in 62%. However, *E. coli* showed sensitivity norfloxacin in 83.0% . *Klebsiella* spp. and *Proteus* spp. showed 100.0% sensitivity to ciprofloxacin, ofloxacin and amikacin. However 87% of *Proteus* isolates were sensitive to norfloxacin , but 100% of *Klebsiella* spp. isolates were sensitive to norfloxacin. *Klebsiella* spp. was 100% resistant to ampicillin,

meanwhile 80% of *Proteus* spp. isolates were resistant to ampicillin. The effect of nitrofurantoin on *Klebsiella* spp. and *Proteus* spp. varied; where only 67% of *Proteus* spp. isolates and 75% of *Klebsiella* isolates were sensitive to nitrofurantoin in our study. *Klebsiella* isolates in the present study appear to be less sensitive towards the antibacterial effect of cefotaxim, compared with *Proteus* isolates, since only 83% of *Klebsiella* isolates were sensitive to cefotaxim while 93% *Proteus* isolates were sensitive to cefotaxim. Cotrimoxazole exert equal effects on both *Klebsiella* spp. and *Proteus* spp. uropathogen isolates. Finally all *Pseudomonas aeruginosae*., isolated in the present study were resistant to all tested antimicrobial agents except amikacin and nitrofurantoin; where the susceptibility *Pseudomonas* spp. isolates were 100% and 70% respectively. The above finding was comparable to the study done in one of the tertiary centers of eastern Nepal (Kumari et al., 2005).

CONCLUSION AND RECOMMENDATION

The physiological changes of pregnancy predisposed women to UTI were studied with other factors such as age, sexual activity, previous history of UTI and socio-economic conditions. So the results of the present study recommend

1. Health education about personal hygiene should be emphasized by the antenatal care physician to all pregnant females, specifically those of low socio-economic level.
2. Urine culture must be done at the first antenatal visit, and repeated cultures should be obtained at different trimesters, because the urine of treated patients may not remain sterile for the entire pregnancy.
3. Pregnant women should be treated when bacteriuria is identified with appropriate antibiotic therapy based on sensitivity test so as to avoid maternal-fetal complications.

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