

Original Article

Prevalence Of Urinary Tract Infection During Pregnancy

Dr. Kawser Parveen¹, Dr. Afroza Momen², Dr. Arzumath Ara Begum³, Dr. Monowara Begum⁴

¹Associate Prof. Pathology. Uttara Adhunik Medical College ²Associate Prof. Pharmacology, Dhaka National Medical College, ³Associate Prof Dept. Gyner & Obs. Dhaka National Medical College. ⁴ Asst.Prof. Microbiology. Dhaka National Medical College.

Abstract

Urinary tract infections (UTI) are the most common bacterial infections during pregnancy. Untreated UTI can be associated with serious obstetric complications. This cross-sectional study was carried out to determine the prevalence of UTI among pregnant women attending in two private tertiary medical college hospital of Dhaka. A total of 250 pregnant women were enrolled in this study. UTI was diagnosed using mid stream urine (MSU) culture. Using $> 10^5$ colony forming unit per milliliter as significant level of bacteriuria, the prevalence was found to be 26.0%. There was a high incidence in 21–25 years age group (44.61%). There was also high incidence of infection in the third trimester of pregnancy (78.46%) compared to first (9.23%) and second trimester (12.30%). Multiparity is associated with increased urinary tract infection in pregnancy. Regarding education 10% were literate and 90% were illiterate. Prevalence of bacteriuria was 94% in women who had past history of urinary tract infection. 80% were sexually active. E.coli was the most frequently isolated pathogen (88.15%). These findings underscore the importance of screening all pregnant women for significant bacteriuria, so that positive cases should be treated subsequently with antibiotics in order to reduce the adverse effects on both maternal and fetal health

Introduction

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 mankind¹ and in pregnancy, it may involve the lower urinary tract or the bladder². UTI has been reported among 20% of the pregnant women and it is the most common cause of admission in obstetrical wards³.

Anatomically UTI can be classified into lower urinary tract infection involving the bladder and urethra and upper urinary tract infection involving the kidney, pelvis, and ureter. The majority of the UTI occur due to ascending infection^{4,5}. Three common clinical manifestations of UTIs in pregnancy are: asymptomatic bacteriuria, acute cystitis and acute pyelonephritis⁶.

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/mL) in a symptomatic patient. Particularly in asymptomatic patients, a diagnosis of UTI should be supported by a positive culture for a uropathogen⁷. Untreated asymptomatic bacteriuria is a risk factor for acute cystitis (40%) and pyelonephritis (25-30%) in pregnancy. These cases account for 70% of all cases of symptomatic UTI among unscreened pregnant women⁷. Symptomatic and asymptomatic bacteriuria have been reported among 17.9% and 13.0% pregnant women, respectively⁸.

Pregnancy increases the risk of UTI. At around 6th week of pregnancy, due to the physiological changes of pregnancy the ureters begin to dilate. This is also known as "hydronephrosis of pregnancy", which peaks at 22-26 weeks and continues to persist until delivery. Both progesterone and estrogens levels

increase during pregnancy and these will lead to decreased ureteral and bladder tone. Increased plasma volume during pregnancy leads to decrease urine concentration and increased bladder volume. The combination of all these factors lead to urinary stasis and uretero-vesical reflux⁴. Additionally, the apparent reduction in immunity of pregnant women appears to encourage the growth of both commensal and non-commensal microorganisms⁹. The physiological increase in plasma volume during pregnancy decreases urine concentration and up to 70% pregnant women develop glucosurea, which encourages bacterial growth in the urine^{10,11}.

Female gender itself is a risk factor because of short urethra, its proximity to vagina and anus and inability of women to empty their bladder completely. High incidence is seen in lower socioeconomic group¹². Sexual activity and certain contraceptive methods are also said to increase the risk.¹³ 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/child birth^{14,15}. Abnormalities of urinary tract or stones, diabetes mellitus, immunosuppression and past history of UTI tend to increase the risk^{16,17}.

Urinary tract infection during pregnancy contributes significantly to maternal and perinatal morbidity¹⁸. Abortion, small birth size, maternal anemia, hypertension, preterm labour, phlebitis, thrombosis and chronic pyelonephritis are related to urinary tract infection during pregnancy^{18,20}.

E. coli remains the predominant organism implicated in urinary tract infection in pregnancy, though recent reports show changes in pattern of the infection²⁰. Recent studies in Nigeria show an increasing involvement of *Klebsiella* Spp. *Staphylococcus aureus*, *Proteus* spp., and *Pseudomonas* spp. in urinary tract infection in pregnancy¹⁹.

Studies have also shown that treatment of bacteriuria during pregnancy reduces the incidence of these complications²¹ and lowers the long-term risk of sequelae following asymptomatic bacteriuria²².

Materials And Methods

This cross-sectional study was conducted in two private tertiary Medical College hospital of Dhaka (Gynaecology and obstetric department) between January 2009 to January

2011. Consecutive booked antenatal women who presented at the antenatal clinics of the above mentioned hospital 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. A consecutive 250 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 women before the commencement of the research. Socio-demographic data such as age, occupation, parity and duration of gestation were collected from the pregnant women using standard questionnaires and kept confidential during the research.

Early morning clean-catch midstream urine was collected from each pregnant women 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 & a MacConkey agar plate. 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. Centrifuged 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. On the basis of family income, women were divided in low (less than Tk. 5000/month, middle Tk. 5000 to Tk.15000 and upper social class more than Rs.15000 per month or more respectively.

Results

Two hundred and fifty (250) urine samples were collected and analyzed during the study period. Sixty five (65) samples showed significant growth, which amounted to a prevalence of 26.0 % (Table 5). 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 (44.61 %). Followed by age group 26-30 years (27.69 %), 31-35 years (16.92%) and 16 -20 years (6.15%). While the age group 36-40 years had the lowest incidence of infection (4.61%).

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

Age groups (Years)	Number examined	Number positive	% Positive
16-20	20	4	6.15
21-25	74	29	44.61
26-30	106	18	27.69
31-35	36	11	16.92
36-40	14	3	4.61

There was higher rate of infection in the third trimester (78.46%) compared to second trimester (12.30 %) and first trimester (9.23%) .

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

Gestational age(weeks)	Number examined	Number positive	%Positive
1-12	30	6	9.23
13-25	47	8	12.30
26-40	173	51	78.46
Total	250	65	100.00

There was a high frequency of infection occurring in those having >4 children (49.23%). Followed by those having 2-3 children (32.30%) while the lowest frequency of infection occurred in those with 0-1children (18.46 %) as shown in table 3.

Table 3: Prevalence of urinary tract infection in pregnant women in relation to Parity.

Parity	Number examined	Number Infected	% Positive
0 – 1	96	12	18.46
1 – 2	85	21	32.30
> 4	69	32	49.23
Total	250	65	100.00

Prevalence of other UTI related significant factors is shown in table 4. Prevalence of bacteriuria (65) in “well” status women is found to be 25%. The significance of education has been evidenced by the fact that only10% of the patients suffering from bacteriuria are educated while 90% are illiterate. Assessing the risk of recurrence, past history of urinary tract infection was important risk factor as 61 women (94%) among 65 cases had past history of urinary tract infection.

Sexual activity as a risk factor of bacteriuria ,was also significant in this study as (80%) women were sexually active and (20%) were not

Table 4: Frequency of other UTI related significant factors.

Factors		% of Bacteriuria
1.Status	Well	25
	Poor	75
2.Education	Educated	10
	Illiterate	90
3.Past history of UTI	Present	94
	Absent	6
4.Sexual activity	Active	80
	Not active	20

The gold standard for detecting bacteriuria in pregnancy is urine culture. Table 5. showed the frequency of various isolated pathogens. 185 samples had no growth. 65 samples were positive for urinary pathogens. Among the significant isolates, E.coli had the highest percentage of isolation (86.15%), while the lowest was Proteus species (4.61 %).

Table 5: Percentage of Isolation of various significant pathogens in urine of pregnant women.

Pathogens	Number isolated	Percentage (%)
E. coli	36	86.15
Klebsiella spp	5	7.69
Proteus spp	4	4.61
Total	65	100.00

Discussion

Maternal age was not found to be a significant risk factor in this study. In literature, only a significant increasing risk of 1-2% is reported per decade of age ^{2,4}, which did not become evident in this study, probably due to small sample size The highest incidence is 20-25 years followed by 26-30 years and 31-40 years. The aforementioned age groups having the highest was also observed in previous studies ^{17,20}. 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^{21,22}. Sexual activity and certain contraceptive methods are also said to increase the risk ¹³ and women are mostly sexually active at this age. The report of this study is also similar to that of Leigh ²⁴ and Onuh et al ²⁰, who also found the similar age group has

highest incidence in developing urinary tract infection in pregnancy.

Multiparity has an increased risk factor of developing bacteriuria among pregnant women. Leigh²⁴ and Sharma J.B. et al²⁵ had similar observation regarding the risk of urinary incontinence and other urinary problem which according to them increases by 37.04% with parity of > 3 as compared to 18.75% in nulliparous but disagreement was evident with the findings of Onuh et al,²⁰ who reported that there was no relationship to parity. These differences may be as a result of the different locations in which these studies were being carried out.

In this study, sixty five (65) urine samples gave significant growth amounting to 26.0% prevalence, which is nearly similar to Akinloye et al,²⁶ who reported a prevalence of 21.7%. This study does not agree with that of Onuh and colleagues²⁰ who reported 32.7%, a bit higher to the present study. Furthermore, the prevalence of this study does not agree with that of Onyemelukwe et al²⁷ who reported a prevalence of 12.7% and also with Leigh²⁴, Brook et al²⁸ who reported a prevalence of 1-10%. This difference may be due to the inclusion of both symptomatic and asymptomatic pregnant woman in this study or as a result of difference socioeconomic status of the pregnant women.

In this study, the frequency of urinary tract infection was higher in the third trimester compared to the first and second trimester. This is in agreement with Leigh,²⁴ who reported an increased frequency of urinary tract infection in the third trimester compared to the first and second trimester of pregnancy. However, this report does not agree with Onuh et al,²⁰ who reported a higher prevalence of urinary tract infection in the second trimester compared to the third trimester. This difference may be as a result of either change in urinary stasis and vesicoureteral reflux or decrease in urinary progesterones and oestrogens in the various trimester of pregnancy.

In this study, past history of UTI was the significant risk factor. In our study 94% women had past history of UTI. In study of Gulfareen Haider et al,²³ prevalence of bacteriuria was 100% in women who had previous bouts of UTI. Most of the other studies acknowledge the significance of past episodes of UTI in causing recurrence in pregnancy²⁴.

In this study sexual activity was also significant risk factor. About 80% women were sexually active during pregnancy and most of them around 91% were between the age group of 21-35 yrs. This has also been seen in study of Gulfareen Haider et al²³. Similarly, study conducted by Patterson²¹

showed that prevalence of UTI increases in women who are sexually active. 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/child birth^{14,15}

Other factors like low socio-economic status, not washing genitals before and after coitus, not voiding urine postcoitus and washing genitals from back to front have observed as risk factors for UTI during pregnancy^{29,30}. Prevalence of bacteriuria (65) in well status women is found to be 25% in our study. Others are in poor socio-economic status.

Conclusion

The physiological changes of pregnancy predispose women to UT so does other factors such as age, sexual activity, multiparity, previous history of UTI and socio-economic conditions. 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. The goal of early diagnosis and treatment of UTI during pregnancy is to prevent complications with all the added benefits to the mother and the Fetus.

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