

## **Risk factors of urinary tract infection in pregnancy**

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### **Abstract**

**Objectives:** To determine the frequency, risk factors and pattern of urinary complaints during pregnancy.

**Methods:** A descriptive study was conducted in the Obstetric and Gynaecology Department of Isra University Hospital, Hyderabad from 1st January to 30th August 2008. Total 232 women were selected to ascertain the frequency and pattern of urinary symptoms as well as the risk factors of urinary tract infection (UTI) such as age, parity, education, past history of UTI and haemoglobin among women attending an antenatal clinic. All pregnant women irrespective of age, parity and gestational age were included, while women with known underlying renal pathology, chronic renal disease, renal transplant, diabetes or taking immunosuppressant therapy were excluded. Informed consent was taken and data collected on a self designed proforma. All the women underwent complete examination of urine. Dipstick test was performed on midstream urine and urine was cultured incase of positive dipstick test and women with urinary symptoms. Data was analyzed on SPSS version 11. Odds ratio and 95% confidence interval were calculated among the categorical parameters by applying the Fisher's exact test.

**Results:** Out of 232 women, 108(46.5%) reported urinary symptoms which were due to pregnancy induced changes on urinary system as no growth was obtained on urine culture, while 10 (4.3%) were due to underlying UTI.

Most common urinary symptom in these women was abnormal voiding pattern 85(40.3%) followed by irritative symptoms and voiding difficulties.

Illiteracy, history of sexual activity, low socioeconomic (monthly income < Rs. 10,000 / month) group, past history of UTI and multiparity were found to be risk factors for UTI in these women.

On complete urine examination, 222 (95.6%) patients either did not reveal any pus cells or had less than 5 WBC/HPF. Out of 108 cultures, only 10 (4.3%) specimens showed growth. E-coli was the most commonly detected organism 7 (3%) followed by S-aureus in 3 (1.3%).

**Conclusion:** The common urinary symptoms encountered in the studied women were abnormal voiding pattern followed by irritative symptoms. Majority of urinary symptoms were due to pregnancy related changes in the urinary system. Past history of UTI, sexual activity, lower socioeconomic group and multi parity were significant risk factors for UTI (JPMA 60:213; 2010).

### **Introduction**

Urinary tract infection (UTI) is a common clinical problem, which can involve the urethra, bladder, and kidney.<sup>1</sup> UTI affects all age groups, but women are more susceptible than men, due to short urethra, absence of prostatic secretion, pregnancy and easy contamination of the urinary tract with faecal flora.<sup>2</sup> Additionally, the physiological increase in plasma volume during pregnancy decreases urine concentration and up to 70% pregnant women develop glucosuria, which

encourages bacterial growth in the urine.<sup>3</sup> Urogenital symptoms occur in almost all women during pregnancy. The frequency of overactive bladder symptoms starts from early pregnancy while urinary incontinence symptoms increase with gestational age although majority remain tolerable.<sup>4</sup> Lower urinary tract symptoms are almost universal in antenatal period and are transient. These symptoms may reflect pregnancy-induced changes in urinary bladder and urethra or may be manifestation of cystitis and urethritis. Frequency, nocturia and stress incontinences are the most common complaints.

Increased incidence of urge incontinence has also been quoted.<sup>5</sup> Urinary incontinence in pregnancy is ascribed to detrusor instability which improves after delivery.<sup>6,7</sup> Infections, particularly in pregnancy and in the elderly, can be asymptomatic,<sup>1</sup> but symptomatic bacteriuria is associated with an increased risk of intrauterine growth retardation and low birth weight.<sup>8</sup> Furthermore, untreated asymptomatic bacteriuria leads to the development of cystitis in approximately 30% of cases, and can lead to the development of pyelonephritis in about 50% cases.<sup>9</sup> In addition acute pyelonephritis has been associated with anaemia.<sup>10</sup> It is therefore essential to screen for urinary tract infection in pregnancy so that timely treatment could be offered.<sup>11-13</sup>

Sheikh et al demonstrated that, past history of urological problems was associated with an increased incidence of UTI in pregnancy.<sup>14</sup> The organisms that causes UTIs during pregnancy are the same as those found in non pregnant patients. Escherichia coli accounts for 80-90% of infections<sup>3,15</sup> and the rest are caused by proteus mirabilis, klebsiella aerogenes, pseudomonas spp: and streptococcus.<sup>16</sup>

The present study was undertaken to ascertain the frequency and pattern of urinary symptoms as well as the risk factors of UTI such as age, parity, education, past history of UTI and haemoglobin level among women attending an antenatal clinic.

### Patients and Methods

This descriptive study was conducted at the antenatal clinic of Isra University Hospital, Hyderabad Sindh from 1st January to 30th August 2008. The objective was to ascertain the frequency and pattern of urinary symptoms as well as the risk factors for UTI as age, haemoglobin level, education, past history of UTI and parity among women attending an antenatal clinic. All pregnant women irrespective of age, parity and gestational age were included, while women with known underlying renal pathology, chronic renal disease,

past history of UTI, sexual activity and socioeconomic status. Patients had thorough general physical and obstetrical examination.

Nutritional status was assessed by Hb estimation. Hb level was determined by Sahli's method and females with Hb level less than 11g/dl were classified as anaemic.

Socioeconomic status was divided into two categories. ( Low income group <Rs10,000 per month and upper income group > Rs10,000 ).

All the women underwent complete examination of urine. Dipstick test was performed on midstream urine and urine was cultured in case of positive dipstick test and women with urinary symptoms. Data was analyzed on SPSS version 11. Odds ratio and 95% confidence interval were calculated among the categorical parameters by applying the Fishers' exact test.

### Results

Out of 232 women, 108 (46.5 %) reported urinary complaints and 124 (53.4 %) had no urinary complaints. Only 10 (4.3%) patients had urinary tract infection diagnosed by urine culture.

Out of 108 women who presented with urinary complaints, the most common symptom was abnormal voiding pattern seen in 85 (40.3%) women followed by irritative manifestation in 81 (38.4%), urinary incontinence 36(17.1%) and voiding difficulties in 09 (4.3%) women.

Of the 10 women diagnosed with UTI, 6 (60%) belonged to age group of 20-30 years while 4 (40%) were between 31-40 years, showing no statistically significant difference (OR= 2.32, CI= 0.63, 8.4, P= 0.20) (Table-1).

Evaluation of UTI in relation to haemoglobin showed 9 (90%) women to be anaemic while 1 (10%) had haemoglobin level >11 gm/dl, showing (OR =2.41, CI=0.2, 19.5, P=0.69) (Table-1).

**Table-1: Distribution of study subjects for study variables found to have no association with UTI.**

Variable	UTI Present n = 10 (%)	UTI Absent n = 222 (%)	Odds Ratio	95% CI	P value
<b>Age in Groups:</b>					
20-30 years	6(60.0%)	87(39.2%)	2.32	0.63 – 8.48	0.2
31-40 years	4(40.0%)	135(60.8%)			
<b>Hb:</b>					
<11 g	9(90.0%)	175(78.8%)	2.41	0.29 – 19.5	0.69
>11 g	1(10.0%)	47(21.2%)			

renal transplant, diabetes or taking immunosuppression therapy were excluded. Informed consent was taken and data collected on self designed proforma, which included the information regarding age, parity, and gestational age, urinary symptoms,

Educational status was found to be important, as 09 (90%) patients were illiterate while 01(10%) was literate. ( OR 6.89 95%CI: 0.8,56.0 P<0.04) (Table-2).

Parity was found to be a significant variable as 6(60%)

**Table-2: Distribution of study subjects for study variables found to have association with UTI.**

Variable	UTI Present n = 10 (%)	UTI Absent n = 222 (%)	Odds Ratio	95% CI	P value
<b>Education:</b>					
Illiterate	9(90.0%)	125(56.3%)	6.98	0.87 – 56.06	0.04
Literate	1(10.0%)	97(43.7%)			
<b>Sexual activity:</b>					
Present	1(10.0%)	92(41.4%)	0.15	0.02 – 1.26	0.05
Not Present	9(90.0%)	130(58.6%)			
<b>Socio Economic:</b>					
Lower	8(80.0%)	89(40.1%)	5.97	1.24 – 28.8	0.01
Upper	2(20.0%)	133(59.9%)			
<b>Past history of UTI:</b>					
Present	9(90.0%)	83(37.4%)	15.07	1.87 – 121.1	< 0.001
Absent	1(10.0%)	139(62.6%)			
<b>Parity:</b>					
Multipara	6(60.0%)	53(23.9%)	4.78	1.30 – 17.5	0.01
Primigravida	4(40.0%)	169(76.1%)			

Lower Income Group: Less than Rs. 10,000/- per month. Upper Income Group: More than Rs. 10,000/- per month.

patients were multiparous while 4(40%) were primigravida (OR=4.78, CI= 1.3, 17.5, P=0.01) (Table-2).

Significant impact of socioeconomic class was seen with UTI as 8(80%) patients belonged to the lower socioeconomic group while 2 (20%) were from the upper socioeconomic group (OR= 5.97, CI= 1.2, 28.2, P= 0.01) (Table-2).

Sexual activity was found to be a significant risk factor for UTI as 1(10%) patient with UTI was sexually active (who had intercourse in last 8 months, atleast once per fifteen days) while 9 (90%) patients were not sexually inactive (no intercourse in last 8 months) (OR= 0.15, CI= 0.02, 1.2, P=0.05) (Table-2).

Assessing the risk of recurrence, past history of UTI was found to be the strongest risk factor with 9 (90%) patients having a previous episode of UTI. Only 1(10%) patient had no past history of UTI (OR=15.0, CI= 1.8, 121, P<0.01) (Table-2). (Past history of UTI was not during pregnancy. Patients with positive history of UTI had at least two episodes of infection in past. These patients had no underlying lower urinary tract structural / functional anomalies as patients with known renal pathology had been excluded.

On urine examination, 222 (95.6%) urine specimens had <5 WBC/HPF. Out of 108 cultures, only 10 specimens i.e. 4.3% showed bacterial growth. Escherichia coli was the most commonly detected organism which was seen in 7 (3%) patients, followed by staphylococcus aureus in 3 (1.3%) cases. All patients responded to antimicrobial therapy which was confirmed by repeat urine culture examination.

## Discussion

UTI are the commonest infections seen in hospital setting and the second commonest infections seen in

general population.<sup>17</sup> UTI is a serious problem for women and up to a third of all women experience UTI at some point in their life.<sup>18</sup> If left untreated it may lead to pyelonephritis, preterm labour or Group B Streptococcal infection in the newborn.<sup>18</sup>

In the present study, pregnancy related changes in the urinary system as well as urinary infections were the causative factors for the occurrence of lower urinary tract symptoms, in a frequency of 95.6% & 4.3 % respectively. These findings are comparable to the findings reported that 92% cases of urinary symptoms were due to pregnancy associated changes and 8% due to infections.<sup>7</sup>

In this study 46.5% women complained of single or multiple problems related to lower urinary tract. In a study carried out in Netherlands, 35% of pregnant women reported urinary symptoms.<sup>19</sup>

The relationship between the incidence of UTI and pregnancy has always been a subject of interest. In extensive studies by Sweet, the frequency of UTI during pregnancy was 2.5%-8.7%.<sup>20</sup> These figures are comparable to our study.

Past history of UTI was the strongest risk factor in our study. Pastore et al identified two strongest predictors of bacteriuria at prenatal care to be antepartum UTI prior to prenatal care and a prepregnancy history of UTI.<sup>21</sup> Same was observed by Sheikh et al.<sup>14</sup> This study also showed a high figure of UTI in women with a positive past history of UTI.

Maternal age was not found to be a significant risk factor in this study. In literature, only a slightly increasing risk of 1-2% is reported per decade of age which did not become evident probably due to a small sample size.

In this study, the frequency of UTI was higher in

lower socioeconomic group which is supported by a study from Saudi Arabia, which found a figure of 14.2% in this group.<sup>22</sup> Similarly, the incidence of UTI among pregnant women in Nigeria has been reported as 23.9%.<sup>23</sup> These studies suggest that the higher standards of living in the industrialized world may contribute to the lower incidence rates of UTI there. Maternal anaemia has also been reported to be associated with UTI.

Krcmery et al demonstrated that sexual activity is risk factor for UTI in women.<sup>25</sup> Our results also concur with this study.

### Conclusion

In this study the commonest urinary symptoms in pregnancy was abnormal voiding pattern followed by irritative manifestation. Majority of urinary symptoms were due to pregnancy related changes in urinary system. Past history of UTI, sexual activity, lower socioeconomic group and multi parity were significant risk factors for UTI.

UTI in pregnancy is clearly associated with the risk of developing symptomatic pyelonephritis late in pregnancy and may be associated with other maternal and foetal complications of pregnancy. Urine examination should be an integral investigation of antenatal care.

### References

1. Al-Dujaily AA, et al. Urinary tract infection during pregnancy in Tikrit. *Med J Tikrit* 2000; 6: 220-4.
2. Awaness AM, Al-Saadi MG, Aadoas SA. Antibiotics resistance in recurrent urinary tract infection. *Kufa Medical Journal* 2000; 3: 159.
3. Lucas MJ, Cunningham FG. Urinary tract infection in pregnancy. *Clin Obstet Gynecol* 1993; 36: 855-68.
4. van Brummen HJ, Bruinse HW, van der Bom JG, Heintz AP, van der Vaart CH. How do the prevalences of urogenital symptoms change during pregnancy? *Neurourol Urodyn* 2006; 25: 135-9.
5. Wijma J, Weis Potters AE, de Wolf BT, Tinga DJ, Aarneudse JG. Anatomical and functional changes in the lower urinary tract during pregnancy. *BJOG* 2001; 108: 726-32.
6. Miodrag A, Castleden CM, Vallnce TR. Sex hormones and the female lower urinary tract. *Drugs* 1998; 36: 491-504.
7. Cardozo LD, Cutner A. Lower urinary tract symptoms in pregnancy. *Br J Urol* 1997; 80 (Suppl 1): 14-23.
8. Harris RE, Thomas VL, Shelokor A. Asymptomatic bacteriuria in pregnancy: antibody coated bacteria, renal function and intrauterine growth retardation. *Am J Obstet Gynecol* 1976; 126: 20-5.
9. Kass EH. Pregnancy, pyelonephritis and prematurity. *Clin Obstet Gynecol* 1970; 13: 239-54.
10. Gilstreap LC, Leveno KJ, Cunningham FG, Whalley PJ, Roark ML. Renal infection and pregnancy outcome. *Am J Obstet Gynecol* 1981; 141: 709-16.
11. Andrades M, Paul R, Ambreen A, Dodani S, Dhanani RH, Qidwai W. Distribution of lower urinary tract symptoms (LUTS) in adult women. *J Coll Physicians Surg Pak* 2004; 14: 132-5.
12. Ahmad J, Shah A, Ali NS. Prevalence of urinary tract infection in pregnant women of Peshawar, N.W.F.P: a single center study. *J Postgrad Med Inst* 2003; 17: 168-76.
13. Farooqi BJ, Shareeq F, Rizvi QK, Qureshi HS, Ashfaq MK. Changing pattern of antimicrobial susceptibility of organisms causing community acquired urinary tract infections. *J Pak Med Assoc* 2000; 50: 369-73.
14. Sheikh MA, Khan MS, Khatoon A, Arain GM. Incidence of urinary tract infection during pregnancy. *East Mediterr Health J* 2000; 6: 265-71.
15. Barr JG, Ritchie JW, Henry O, el Sheikh M, el Deeb K. Microaerophilic/anaerobic bacteria as a cause of urinary tract infection in pregnancy. *Br J Obstet Gynecol* 1985; 92:506-10.
16. Chamberlin GVP. Urinary tract infection, obstetrics by ten teachers. 16th ed. London: Edward Arnold 1995; pp 234-7.
17. Valiquette L. Urinary tract infections in women. *Can J Urol* 2001; 8: 6-12.
18. Morgan KL. Management of UTIs during pregnancy. *MCN Am J Matern Child Nurs* 2004; 29:254-8.
19. Polivka BJ, Nickel JT, Wilkins JR. Urinary tract infection during pregnancy: a risk factor for cerebral palsy? *J Obstet Gynecol Neonatal Nurs* 1997; 26:405-13.
20. Debaun M, Rowley D, Province M, Stockbaver JW, Cole FS et al. Selected antepartum medical complications and very low birth weight infants among black and white women. *Am J Public health* 1994; 84: 1495-7.
21. Pastore LM, Savitz DA, Thorp JM Jr. Predictors of urinary tract infection at the first prenatal visit. *Epidemiology* 1999; 10: 282-7.
22. AL-sibai MH, Saha A, Rasheed P. Socio biological correlates of bacteriuria in Saubi pregnant women. *Public Health* 1989; 103: 113-21.
23. Olusanaya O, Ogunledun A, Fakoya TA. Asymptomatic significant bacteriuria among pregnant and non pregnant women in Sagamu, Nigeria. *West African J Med* 1993; 12: 27-33.
24. Krcmery S, Hromec J, Demesova D. Treatment of lower urinary tract infection in pregnancy. *Int J Antimicrob Agents* 2001; 17: 279-82.