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The Prevalence of Urinary Tract Infection among Pregnant Women Attending Antenatal Clinic at Atertiary Care Centrein AlRass, Al Qassim

Upendra Lele[1], Amjad Al Essa[2], Varsha Shahane[3]

[1, 2, 3]Qassim University, College of Business and Economics, Buraidah, Al Qassim51452, Kingdom of Saudi Arabia

Abstract: ***Urinary tract infection (UTI) is a common bacterial infection during pregnancy affecting women of any age. It may affect primigravida as well as multigravida women, and it may be symptomatic or asymptomatic. If not treated properly and adequately, the outcome of pregnancy may be abnormal. This cross-sectional studywas conducted during the year 2014 to determine the prevalence of UTI among pregnant women admitted to the antenatal clinic (ANC) at the tertiary care centre at Al Rass in Qassim region of Saudi Arabia and to examine the relation of factors such as age, gestation week, presence/absence of urinary complaints and obstetric status with UTI. This study assumed significance as there is no evidence of similar studies having been carried out in Qassim region. Data of 479 patients was collected from the medical records of the hospital by using consecutive sampling. The influence of the above mentioned factors on the prevalence of UTIwas examined using Chi Square test. Results showed that UTI was significantly prevalent (6.9%) among the sample patients. Age and Gestation week appeared to have a significant relation with UTI, while obstetric status has no influence on it. It also appeared that symptomatic UTI was more common than asymptomatic UTI.***

Keywords: Urinary Tract Infection (UTI), antenatal clinic, Gestation week , Obstetric status, Al Rass, AlQassim

1. Introduction

Urinary Tract Infection (UTI) is an infection caused by the presence and growth of microorganism in genitourinary system. Urinary tract infection is a common problem and can affect all women, particularly the aged and pregnant women. UTI has an estimated annual global incidence of 250 million. UTI is more common in females due to factors like short urethra, pregnancy and proximity to anal orifice. In pregnancy, additional factors like glycosuria, aminoaciduria, increased bladder volume with decreased tone and hence urinary stasisfavour UTI.[1]The diagnosis of urinary tract infection is made on the basis of symptoms and bacteriuria.[2]

Urinary tract infection in pregnancy is common and it is a serious cause of maternal and perinatal morbidity and mortality.Pregnant women should be screened for asymptomatic urinary tract infection and treated with appropriate antimicrobials to avoid complications .[3]

About 3% of all women in the world visit a physician at least once each year for UTI and at least 50% of women report at least one UTI in a lifetime.[4]The eastern region of Saudi Arabia has reported a prevalence of 14.2% UTI in pregnant women while it is 12.7% in southern region of Saudi Arabia .[5]We conducted this study to find out the prevalence of this infection in a major city of Al Qassim. Further studies may be required to know the magnitude of this health problem in the whole of Qassim province.

2. Literature Survey

Pregnancy causes numerous changes in the woman's body. Hormonal and mechanical changes increase the risk of urinary stasis and vesico ureteral reflux. These changes, along with an already short urethra (approximately 3-4 cm in females) and difficulty with hygiene due to a distended pregnant belly, increase the frequency of urinary tract infections (UTIs) in pregnant women. Indeed, UTIs are among the most common bacterial infections during pregnancy. In general, pregnant patients are considered immune compromised UTI hosts because of the physiologic changes associated with pregnancy. These changes increase the risk of serious infectious complications from symptomatic and asymptomatic urinary infections even in healthy pregnant women. [12]

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 (> 7 white blood cells [WBCs]/ml) in a symptomatic patient. A diagnosis of UTI should be supported by a positive culture for auropathogen, particularly in patients with vague symptoms. UTIs are associated with risks to both the fetus and the mother, including pyelonephritis, preterm birth, low birth weight, and increased perinatal mortality.[4]

Asymptomatic bacteriuria is commonly defined as the presence of more than 100,000 organisms/ml in 2 consecutive urine samples in the absence of declared symptoms. 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 women.[10]
Acute cystitis involves only the lower urinary tract; it is characterized by inflammation of the bladder as a result of bacterial or nonbacterial causes (eg, radiation or viral infection). Acute cystitis develops in approximately 1% of pregnant patients, of whom 60% have a negative result on initial screening. Signs and symptoms include hematuria, dysuria, suprapubic discomfort, frequency, urgency, and nocturia. These symptoms are often difficult to distinguish from those due to pregnancy itself.[13]

Pyelonephritis is the most common urinary tract complication in pregnant women, occurring in approximately 2% of all pregnancies. Acute pyelonephritis is characterized by fever, flank pain, and tenderness in addition to significant bacteriuria. Other symptoms may include nausea, vomiting, frequency, urgency, and dysuria. Furthermore, women with additional risk factors (eg, immunosuppression, diabetes, sickle cell anemia, neurogenic bladder, recurrent or persistent UTIs before pregnancy) are at an increased risk for a complicated UTI.[10]

3. Pathophysiology

Infections result from ascending colonization of the urinary tract, primarily by existing vaginal, perineal, and fecal flora. Various maternal physiologic and anatomic factors predispose to ascending infection. Such factors include urinary retention caused by the weight of the enlarging uterus and urinary stasis due to progesterone-induced ureteral smooth muscle relaxation. Blood-volume expansion is accompanied by increases in the glomerular filtration rate and urinary output.[8]

Loss of ureteral tone combined with increased urinary tract volume results in urinary stasis, which can lead to dilatation of the ureters, renal pelvis, and calyces. Urinary stasis and the presence of vesicoureteral reflux predispose some women to upper urinary tract infections (UTIs) and acute pyelonephritis.

Calyceal and ureteral dilatation are more common on the right side; in 86% of cases, the dilatation is localized to the right. The degree of calyceal dilatation is also more pronounced on the right than the left (average 15 mm vs 5 mm). This dilatation appears to begin by about 10 weeks' gestation and worsens throughout pregnancy. This is underscored by the distribution of cases of pyelonephritis during pregnancy: 2% during the first trimester, 52% during the second trimester, and 46% in the third trimester.[3]

Although the influence of progesterone causes relative dilatation of the ureters, ureteral tone progressively increases above the pelvic brim during pregnancy. However, whether bladder pressure increases or decreases during pregnancy is controversial.

Glycosuria and an increase in levels of urinary amino acids (aminoaciduria) during pregnancy are additional factors that lead to UTI. In many cases, glucose excretion increases during pregnancy over nonpregnant values of 100 mg/day. Glycosuria is due to impaired resorption by the collecting tubule and loop of Henle of the 5% of the filtered glucose, which escapes proximal convoluted tubular resorption.

The fractional excretion of alanine, glycine, histidine, serine, and threonine is increased throughout pregnancy. levels of cystine, leucine, lysine, phenylalanine, taurine, and tyrosine are elevated in the first half of pregnancy but return to reference range levels by the second half. The mechanism of selective aminoaciduria is unknown, although its presence has been postulated to affect the adherence of *Escherichia coli* to the urothelium.[8]

4. Epidemiology

The prevalence of UTI during pregnancy increases with maternal age.UTI is associated with preterm delivery in persons of all races. The adjusted odds ratio in infants with very low birth weight is 2.8 in blacks and 5.6 in whites, adjusted for parity, body mass index, maternal age, marital status, cigarette smoking, education, and prenatal care. [3]

Pregnancy outcomes

Many studies have described a relationship between maternal urinary tract infection, particularly asymptomatic bacteriuria, and adverse pregnancy outcomes. Studies have also suggested that acute pyelonephritis has a similar association, but there are several variables that potentially confound this association, such as socioeconomic status and previous preterm delivery. Untreated bacteriuria has been associated with an increased risk of preterm birth, low birth weight, and perinatal mortality. Other pregnancy complications have also been associated with bacteriuria.

No correlation has been clearly established between acute cystitis of pregnancy and increased risk of low birth weight, preterm delivery, or pyelonephritis , perhaps because pregnant women with symptomatic lower UTI usually receive treatment.

Pyelonephritis, however, has been associated with adverse pregnancy outcomes. . There were no differences in stillbirth or neonatal death. Other complications of pyelonephritis include anemia, sepsis, and respiratory distress . Maternal morbidity and obstetric outcomes with pyelonephritis do not appear to differ by trimester.[11]

Problem definition

The aim of this study was to estimate the prevalence of UTI in Al Rass region which is a prominent city in Al Qassim province in Saudi Arabia. The second objective was to address the question: to what extent do the factors namely age, gestation week, presence or absence of urinary complaints and obstetric status influence the prevalence of UTI among pregnant women.

5. Methodology

This was a cross sectional study conducted during January 2014-December 2014 to find out the prevalence of urinary tract infection (UTI) among pregnant women attending the antenatal clinic (ANC) at a tertiary care center in Al Rass , Al Qassim, Kingdom of Saudi Arabia (KSA). Data was collected by consecutive sampling from medical records of the hospital which contained all medical information of all pregnant women (479 women), including abortion cases, who attended the ANC during this year. We excluded pregnant women whose information was wrongly or incompletely entered in the medical record. The outcome variable was the prevalence of urinary tract infection among pregnant women and the exposure variables were the demographic characteristics of the sample - age (in years), gestational week (number of weeks), obstetric status - primigravida (Pg) (woman pregnant for the first time) or multigravida (Mg) (woman has been pregnant before) and presence of urinary complaints. Informed consent from the authorities of the hospital and ANC in-charge was obtained

for conducting this study. Confidentiality of patient identity and their personal information was assured. Descriptive statistics was used for presenting the demographic characteristics of the sample, namely - age, gestational week , obstetric status, presence/absence of UTI, and presence/absence of urinary complaints. Data entry and analysis was done using Microsoft Excel 2007. Chi square test was used to examine significance of the association of UTI among these pregnant women with age, gestation week, obstetric status and urinary complaints.

6. Results

Table 1 shows the descriptive statistics of the collected sample of patients. The mean age of the patients was 31.20 years, with a standard deviation of 6.46 years. It was observed that around 76% of the patients were in the age group 26 to 40 years. It was also observed that out of 33 patients (6.9%) diagnosed with UTI, 25 belonged to the age group 31 and above. This means that 75.8% of the UTI cases were found in patients above 30 years of age.

Table 1: Age wise distribution of patients

	UTI present (count)			UTI present (%)		
Age in years	No	Yes	Total	No	Yes	Total
Up to 20	23	0	23	4.8%	0.0%	4.8%
21 to 25	61	1	62	12.7%	0.2%	12.9%
26 to 30	130	7	137	27.1%	1.5%	28.6%
31 to 35	125	10	135	26.1%	2.1%	28.2%
36 to 40	82	10	92	17.1%	2.1%	19.2%
41 to 45	18	4	22	3.8%	0.8%	4.6%
46 and above	7	1	8	1.5%	0.2%	1.7%
Total	446	33	479	93.1%	6.9%	100.0%

As observed from Table 2, 33 out of 479 patients were having UTI. Out of these 33 UTI cases, 31 had urinary complaints, i.e. 93.9% of the patients had symptomatic UTI.

Table 2: Patients with urinary complaints and UTI

Patients with urinary complaints	*UTI present?*			
	No	*Yes*	*Total*	*%*
No	446	2	448	93.5%
Yes	0	31	31	6.5%
Total	**447**	**33**	**479**	**100.0%**

Table 3 shows the data of gestation weeks of the patients. The mean gestation period with UTI complaints was observed to be 9.60 weeks, with a Standard deviation of 4.42 weeks. This indicates that almost 67% of UTI cases are occurring between gestation week of 4.6 to 14.6 weeks.

Table 3: Gestation week of patients

Gestation week	*Presence of UTI*		*Total*
	No	*Yes*	
4	3	1	4
5	61	0	61
6	68	1	69
7	49	6	55
8	79	7	86
9	51	1	52
10	13	1	14
11	13	1	14
12	28	6	34
13	15	2	17
14	14	0	14
15	5	1	6
16	14	0	14
18	9	4	13
19	1	0	1
20	2	2	4
21	1	0	1
22	9	0	9
25	1	0	1
28	8	0	8
32	3	0	3
TOTAL	447	33	480

The obstetric status of the patients is presented in Table 4. The occurrence of UTI among primigravida cases was 7.1%, and that among multigravida cases was 6.8%. Thus it was observed that there was not much difference in presence of UTI among Pg and Mg cases.

Table 4: Obstetric status of patients

Obstetric status	*UTI*		*Total*	*% with UTI*
	No	*Yes*		
Pg	117	9	126	7.1%
Mg	330	24	354	6.8%
TOTAL	**447**	**33**	**480**	**6.9%**

(Pg = primigravida ; Mg = multigravida)

7. Hypotheses Tests

The relationship between presence of UTI with the various factors was analyzed using Chi Square test. The Null hypotheses are listed below.

Null hypotheses:
H01: Age of the patient has no relation with presence of UTI among patients.
H02: Presence of urinary complaints is not related to presence of UTI.
H03: Gestation week has no relation with presence of UTI.
H04: Obstetric status has no relation with UTI

The results of hypotheses teats are presented in Table 5. It was observed that except obstetric status, all other factors had a significant relationship with the presence of UTI among patients.

Table 5: Results of hypothesis tests

Null hypothesis	*Factor*	*Observed Chi Square*	*Degrees of Freedom*	*p Value*	*Conclusion*
H01	Age of the patient	81.22	30	1.32x10^-6	Reject H01
H02	Urinary complaints	3333.59	1	0	Reject H02
H03	Gestation week	149.54	20	7.7x10^-22	Reject H03
H04	Obstetric status	0.41	1	0.523	Accept H04

The results of H01 corroborate with the observations from Table 1 which indicate that the patients with age more than

31 years had a significantly higher percentage of UTI cases as compared to the younger patients. Result of H02 confirms the observation in Table 2 which indicates that symptomatic UTI is more common than asymptomatic UTI. If the result of H03 is examined in the context of Table 3, it again confirms the observation that patients in their gestation week from 4.6 to 14.6 have higher incidence of UTI as compared to those in very early or later stages.

8. Discussions

More than 50 % of women will have at least one UTI during their lifetime. UTIs are also a common problem in pregnancy due to the increase in sex hormones and physiological changes during pregnancy.[6] During pregnancy, the chemical composition of urine is also affected and this results in increased urinary substances e.g. glucose and amino acids which may facilitate bacterial growth in urine.[7]

This study observed a prevalence of 6.9% of UTI. This is much lower than that of Makkah, KSA (20 %).[8] However, a tertiary center in Jeddah, has reported UTI prevalence as low as 1.7%.[9] In a study conducted at the antenatal clinic of Abha General Hospital, KSA, during September 2012 to January 2013, 12.7% of 402 pregnant women were affected with UTI. They found that UTI was strongly affected by the presence of previous history of reproductive tract inflammation, history of previous UTI attacks, the presence of UTI related complaints, washing and drying the perineum area, the direction of washing and drying the perineum area, frequency of changing diaper during menstruation and the average of cleaning the bathtub. [3]
We have not studied the habits of women in our study which may have led to UTI, but it is interesting to note that improving personal hygiene and habits can help to avoid UTI.

Another study was carried out in Makkah, KSA where 200 pregnant women were studied for UTI with respective to their causative agents and drug resistance profiles. The results revealed that 20% of the pregnant women were positive for UTI with symptomatic UTI cases more than asymptomatic ones.[8] So this prevalence was also higher than our study. Also, the number of symptomatic UTI in our study (93.5%) is more than asymptomatic cases (6.5%) which is a similar finding to this study.

In Taif, a very high prevalence rate of UTI among pregnant patients was noted (63%). Sixty two percent of these were asymptomatic as against only 6% in our study. Also, unlike our observations, they found a significant association between advanced maternal age and multi-parity with UTI.[10]

Another study in Egypt pointed out that the prevalence of UTI was 31.3% among the 249 antenatal patients which is higher than ours. They found that UTI was commonest among those of first and third trimesters, unlike our women who had maximum occurrence of UTI during the first and second trimester.[11] Also, this study revealed that UTI was higher in multigravida women, whereas in our study, obstetric status was found to have no impact on the occurrence of UTI.

In Hail province, the prevalence of UTI was found to be higher in the age group 15-24 years and least in 35-45 years. Also, it was more common in the third trimester followed by second trimester.[12] In contrast, our study showed that majority of cases (75.8%) were above 31 years of age and it was more common in the first two trimesters.

9. Conclusions

1) Urinary tract infection seems to be significantly prevalent (6.9%) among pregnant women visiting the tertiary centre of Al-Rass general hospital during the year 2014.
2) Gestation week appears to have a significant relation with UTI.
3) The obstetric status has no influence on presence or absence of UTI
4) Age has an effect on UTI.

There is a strong association between urinary complaints and UTI.

10. Future Scope

Our study was limited to the women attending the antenatal clinic of the tertiary care center of Al Rass. It would be beneficial if we were to further extend this study to all women attending all antenatal clinics of the whole city. Data regarding this health problem in the whole of Qassim province should be maintained and reported from time to time. This would help us to understand the gravity of this problem in the entire Qassim region and perceive it better from the public health point of view.

Lastly, educating pregnant women regarding UTI would go a long way in preventing this health problem. Practice of post-coital voiding of urine, drinking plenty of fluids, the importance of avoiding skin allergens, tight clothing and bubble baths and ways to ensure personal hygiene should be a part of ante natal counselling.[13]

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Author Profile

Upendra Lele received the B..Tech. degree in Mechanical Engineering and M.Tech. degree in Industrial Engineering and Operations Research from Indian Institute of Technology Bombay in 1981 and 1983 respectively. He has three decades of professional experience in various industry sectors and academic field. Currently he teaches Research Methodology and Strategic Management at the College of Business and Economics in Qassim University.

Amjad Al Essa received the bachelor degree in Medical Laboratories from the College of Applied Medical Sciences in Qassim University in the year 2015. She is currently engaged in her internship at a healthcare center in Al Qassim, Saudi Arabia.

Varsha Shahane received her MBBS and MD in Medical Microbiology from Pune University in 1992 and 1997 respectively. She has 15 years of clinical research and teaching experience in India and Saudi Arabia. Currently she is working as an Associate Professor at the the College of Applied Medical Sciences in Qassim University.