

Prevalence of Urinary Tract Infection Among Pregnant Women and its Complications in Their Newborns During the Birth in the Hospitals of Dezful City, Iran, 2012 - 2013

Marziyeh Amiri¹; Zohreh Lavasani²; Reza Norouzirad³; Reza Najibpour⁴; Masoomeh Mohamadpour⁵; Amin Reza Nikpoor⁶; Mohammad Raeisi⁷; Hadi Zare Marzouni^{1,4,*}

¹Student Research Committee, Dezful University of Medical Sciences, Dezful, IR Iran

²Department of Obstetrics and Gynecology, Islamic Azad University, Tehran Medical Sciences Branch, Tehran, IR Iran

³Department of Biochemistry, Dezful University of Medical Sciences, Dezful, IR Iran

⁴Student Research Committee, Tehran Medical Sciences Branch, Islamic Azad University, Tehran, IR Iran

⁵Department of Anatomy, Histomorphometry and Stereology Research Centre, Shiraz University of Medical Sciences, Shiraz, IR Iran

⁶Department of Immunology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, IR Iran

⁷Department of Immunology, Shiraz University of Medical Sciences, Shiraz, IR Iran

*Corresponding Author: Hadi Zare Marzouni, Student Research Committee, Tehran Medical Sciences Branch, Islamic Azad University, Tehran, IR Iran. P. O. Box 4718183583, Tel: +98-9118612103, Fax: +98-6416269730, E-mail: zaremh931@mums.ac.ir

Received: February 15, 2015; Accepted: June 6, 2015

Background: Urinary tract infection (UTI) is the most common disorder caused by bacterial agents in pregnancy, which can lead to important complications in newborn of such mothers in case of inappropriate diagnosis and treatment.

Objectives: The purpose of this study was to study the prevalence of UTI among pregnant women and its complications in their newborns during the birth in the hospitals of Dezful City, Iran, during 2012 - 2013.

Patients and Methods: In this cross-sectional retrospective study, 1132 women admitted to Dr. Ganjavian and Ayatollah Nabavi Hospitals in Dezful City, Iran, during 2012 - 2013 were randomly allocated into the case and control groups and were matched based on their age, numbers of pregnancy, sex and diseases of their children. UTI was the only difference between the two groups.

Results: Twenty-two thousand six hundred deliveries occurred within the course of this study. Due to UTI, 5% of deliveries led to hospitalization of mothers (1132 patients). Weight and height of newborn infants of mothers afflicted with UTI ($P < 0.001$) were significantly lower compared to newborns of healthy women ($P < 0.001$). There was a significant association between the two groups of pregnant women with UTI in terms of type of delivery (normal and caesarean section) ($P < 0.008$).

Conclusions: The lower incidence of UTI in pregnant women compared to other areas of Iran represents the role of climate and weather in the prevalence of UTI. In addition, the increased number of low-birth-weight infants had a remarkable correlation with UTI, which can influence the health of the next generation.

Keywords: Urinary Tract Infections; Pregnant Women; Newborn

1. Background

Various microorganisms are able to invade the urinary tract and can be involved in the pathogenesis of urinary tract infection (UTI) (1-4). As one of the most common recurrent acquired infections, UTI has a conspicuous role in increasing the number of stillbirth deliveries (5-7).

Urinary tract infection and its associated complications are the cause of nearly 150 million deaths per year worldwide. The disease can be developed in 40% - 50% of women and 5% of men (8). After anemia, UTIs are the second common complications in pregnant women, which if not controlled well, can adversely affect the health of infant or the pregnant mother (9, 10). Pregnancy UTI is classified into two categories of symptomatic and asymptomatic (11, 12): A) The involvement of the lower urinary

tract, leading to asymptomatic bacteriuria is the most common cause of UTI during pregnancy. B) The involvement of the upper urinary tract can lead to symptomatic bacteriuria and is characterized by acute Pyelonephritis (13). Based on performed researches, the prevalence of symptomatic urinary tract infection in pregnant women has been 17.9% and asymptomatic form in 13%. If asymptomatic infection is not treated, it leads to some clinical manifestations in mother and newborn (12, 14).

Increased age, number of childbirths, number of intercourses per week, diabetes, recessive sickle cell anemia, previous history of UTI, immunodeficiency and urinary tract abnormalities can increase the risk of UTI in pregnant women (15, 16). Bacterial organisms, which cause

this disease, include *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus*, *Acinetobacter*, *Saprophyticus Staphylococcus*, *Streptococcus* Group B and *Pseudomonas aeruginosa* (13, 15-17). The incidence of UTI increases by pregnancy. Based on previous researches, the probability of UTI initiated by the sixth week. This probability peaks at 22 - 24 weeks of gestational age. The reasons for increased probability of infection in pregnant women are probably increased bladder volume and its expansion and expanded ureter (15, 18). Anatomical and physiological changes occurring during pregnancy alter the course of bacteriuria and make pregnant women more susceptible to UTI complications such as pyelonephritis (19).

Studies have indicated that 25% - 40% of untreated pregnant women with asymptomatic bacteriuria will eventually develop to acute pyelonephritis as the most common cause of pre-delivery hospitalization (19). Furthermore, even if pyelonephritis is treated immediately, the condition significantly increases mortality and the number of infants with low-birth weights. In addition, anemia, preeclampsia and premature rupture of fetal membranes, respiratory failure and risk of septicemia and shock are other risk factors in UTI pregnancy. Moreover, children born with mothers with pyelonephritis are much more prone to impairment of mental and motor development (3). There is a significant statistical correlation between UTI and congenital retardation (20). In addition, according to some studies, UTIs are associated with premature delivery, low-birth-weight infants, cesarean delivery, morphological abnormalities and infant mortality (13, 21, 22). It should be noted that according to the studies, UTI in pregnant women begins in the 6th week of pregnancy and reaches its peak in weeks 22 - 24 and about 90% of these women develop urethral dilation. In pregnant women, due to an increase in the volume of urine and dilation of urethra, the disease causes increased stasis of urine in the bladder, reflux of the urine to the urethra and causes a physiological increase in plasma volume, which will eventually reduce the urinary concentration. Another common reason is glycosuria, which is present in 70% of pregnant women, increases the urinary level of estrogen and progesterone, and decreases the patient's ability to fight invasive bacteria. All these factors may contribute to the development of UTI in pregnancy (13, 23). In the recent studies, different reasons were mentioned for this disorder in pregnancy. The commonest microbial agent for this disease has been *E. coli* resistant species, which needs special attention (24, 25).

2. Objectives

Considering the importance of UTI in pregnant women which is responsible for several complications, its diagnosis and treatment are essential to maintain the health of mother and baby. Therefore, the purpose of this study was to examine the prevalence of UTI among pregnant

women and its complications in their newborns during the birth in the hospitals of Dezful city during 2012 - 2013.

3. Patients and Methods

In this cross-sectional retrospective study, 1132 women admitted to Dr. Ganjavian and Ayatollah Nabavi hospitals in Dezful city, Iran, during 2012 - 2013 were randomly allocated into case and control groups and their medical records were studied. This study was conducted after the approval of the ethics committee of the University. In this study, the inclusion criteria for pregnant women during the 20th - 26th weeks of pregnancy in the case group was the positive urine cultures of bacteria (more than 10⁵ colonies growth in a standard positive urine culture) as well as more than 12×10^9 /liter leukocytes in their blood sample (23, 25, 26). Also, the inclusion criteria for the pregnant women during the 20th - 26th weeks of pregnancy in the control group was the negative urine culture and the presence of normal levels of leukocytes ($4.4 - 11.3 \times 10^9$ L). These tests were conducted in the bacteriology and hematology departments of the central laboratory of Dr. Ganjavian and Ayatollah Nabavi hospitals in Dezful city and they have been confirmed.

The number of pregnant women hospitalized during the 20th - 26th weeks of their pregnancy due to the treatment of UTIs was determined after studying. The records of all pregnant women of this city were studied during 2011 - 2012. Then parameters such as type of delivery, cause of UTI and infants' height and weight at birth were studied from their medical record and the frequency of each parameter was specified. To compare the complications and impact of UTI on the factors measured in this study, two groups of case and control were chosen and studied.

The study group (case group) consisted of all the pregnant women referred to and hospitalized in one of the two hospitals of Dezful city due to UTI during the 20th to 26th weeks of their pregnancy between 2012 and 2013 and the control group consisted of the same number of pregnant women who did not have UTIs during the 20th - 26th week of their pregnancy and referred to one of the two hospitals of Dezful city to give birth during 2012 - 2013. Selection of subjects among eligible population in the case group was through census and was through simple random sampling in the control group. In addition, the two groups were reviewed and matched in terms of age, number of pregnancies, underlying disease in the mother and the gender of the infant. Weight below 2500 g was considered lower than normal (25). In this study, existing software was used to analyze data. In the descriptive statistics, average indices and absolute and relative frequency and in the inferential statistics, to test the relationship between the variables, independent-sample test and chi-square test were used. P value < 0.05 was considered as statistically significant. The ethics committee of Dezfoul university of medical sciences approved the study protocol. The code of ethical approval is DURs100.

4. Results

Based on the results obtained during 2012-2013, 22600 women have given birth in the hospitals of Dezful city (15200 women in Dr. Ganjavian hospital and 7400 women in Ayatollah Nabavi hospital) and 5% of them (1132 women) were hospitalized due to UTI and they had medical records in both archive department and registration office in the central laboratory of Dr. Ganjavian and Ayatollah Nabavi hospitals. The achieved results showed that 812 of 1132 women with UTI were hospitalized in Dr. Ganjavian Hospital and 320 women in Ayatollah Nabavi Hospital. The prevalence of UTI among pregnant women was different based on the hospital and the time of admission. Furthermore, 462 cases (56.8%) from 812 women admitted to Dr. Ganjavian hospital were infected during the year 2012 whereas there was a decline in the number of infected women in 2013 which was 350 (43.1%). There was no significant difference in the number of infected women between the two years of admission ($P < 0.001$). From a total of 320 women, 115 (35.9%) and 205 (64%) cases were admitted to Ayatollah Nabavi Hospital in the years of 2012 and 2013, respectively. There was no significant difference in the number of infected women between the two years of admission ($P < 0.001$).

The mean age of women with UTI in this city was 27.32 ± 1.26 years and the maximum age group with UTI was

in the range over 30 years (5.91%) and the minimum age group ranged from 25-30 years (4.64%). As shown in Table 1, the highest rate of UTIs in terms of the type of delivery was in the women with the second type (6.49%) ($P < 0.001$). The highest rates of UTIs among pregnant women of this city were in the winter (55.12%) and the lowest rates were in the summer (8.3%) ($P < 0.001$) (Table 2). The city has the highest rate of UTI in pregnant women (57.25%), due to the presence of *E. coli* ($P < 0.001$). Bacterial agents causing UTI in pregnant women were different in number and percentage. *Escherichia coli* and *Klebsiella* species with the total number of 648 (57.25%) and 236 (20.85%) were found as the most frequent types of bacteria, respectively. The frequency rates of Coagulase-negative staphylococci, *Streptococcus* species, *Acinetobacter*, *Proteus Mirabilis*, *Staphylococcus aureus*, *Enterobacter aerogenes* were 95 (8.39%), 75 (6.63%), 28 (2.47%), 27 (2.38%), 19 (1.68%) and 4 cases (0.35%), respectively. The rate of cesarean section in pregnant women with UTI was 47.96% (543 women) ($P < 0.001$). The major reason resulting in performing cesarean section was *Klebsiella* bacteria and 72% of the cases infected with *klebsiella* were undergone cesarean section ($P < 0.001$). *Escherichia coli* rates after *Klebsiella* accounted for 48.3% of the cases (Its frequency is expressed in Table 3 with resolution).

Table 1. The Demographic Characteristics of Pregnant Women in Dezful City Regarding Urinary Tract Infections During 2012 - 2013 ^{a,b}

Hospital Demographic Characteristics	Dr. Ganjavian Hospital	Ayatollah Nabavi Hospital	Total	
	Frequency of UTI, (Total Number)	Frequency of UTI, (Total Number)	Frequency of UTI, (Total Number)	Percentages
Age				
Less than 25 years	221 (3210)	68 (2010)	289 (5220)	5.53
Between 25 and 30 years	452 (9850)	204 (4270)	656 (14120)	4.64
More than 30 years	139 (2040)	48 (1120)	187 (3160)	5.91
Sum	812 (15200)	320 (7400)	1132 (22600)	5
Gravidity				
Once	267 (5150)	73 (2015)	340 (7165)	4.74
Twice	430 (6360)	187 (3140)	617 (9500)	6.49
Thrice and more	115 (3690)	60 (2245)	175 (5935)	2.64
Sum	812 (15200)	320 (7400)	1132 (2260)	5

^a Abbreviation: UTI, urinary tract infection.

^b All data are presented as No. (%).

In this study, in order to compare the complications and effects of UTIs, 2264 pregnant women participated and 1132 of them had UTI with positive culture (in the case group) and 1132 of them had negative urine culture (in the control group). By describing the data collected in this study, findings indicated that there was no sig-

nificant difference between the two groups (the case and control) in terms of demographic variables (Table 4 shows the frequency of demographic characteristics between the two groups.). The average number of pregnancies was 1.79 in the case group and 1.94 in the control group.

Table 2. The Frequency of Urinary Tract Infections Based on the Season in Pregnant Women of Dezful City During 2012 - 2013

Season	Dr. Ganjavian ^a		Ayatollah Nabavi ^b		Total	Percentage ^c
	2012	2013	2012	2013		
Spring	115	41	25	29	210	18.55
Summer	50	31	3	11	95	8.30
Autumn	82	76	13	32	203	18
Winter	215	202	74	133	624	55.12
Total	462	350	115	205	1132	100.00

^a P. value (Chi-square) is < 0.0001.

^b P. value (Chi-square) is 0.189.

^c All data are presented as No. (%).

Table 3. The Frequency of Factors Causing Urinary Tract Infections With the Type of Delivery in Pregnant Women of Dezful City During 2012 - 2013^{a,b}

Type of the Bacteria	Normal Delivery	Cesarean Delivery
<i>Escherichia coli</i>	335 (51.70)	313 (48.30)
<i>Klebsiella</i>	66 (28)	177 (72)
<i>Coagulase-negative staphylococci</i>	64 (67.4)	31 (32.60)
<i>Streptococcus species</i>	63 (84)	12 (16)
<i>Acinetobacter</i>	22 (78.60)	6 (21.40)
<i>Proteus mirabilis</i>	20 (74.10)	7 (25.90)
<i>Staphylococcus aureus</i>	15 (80)	4 (20)

^a P value is < 0.001.

^b All values are presented No. (%).

Table 4. Demographic Characteristics of Patients With Urinary Tract Infections and Control Participants^a

Demographic characteristics	Case Group	Control Group	Total
Age			
Less than 25 years	289 (25.53)	400 (35.35)	689 (30.43)
Between 25 and 30 years	656 (57.95)	560 (49.46)	1216 (53.71)
More than 30 years	187 (16.52)	172 (15.19)	359 (15.86)
Sum	1132 (100)	1132 (100)	2264 (100)
Numbers of pregnancies			
Once	340 (30)	410 (36.22)	750 (33.12)
Twice	617 (54.50)	552 (48.76)	1169 (51.64)
Thrice and more	175 (15.50)	170 (15.02)	345 (15.24)
Sum	1132 (100)	1132 (100)	2264 (100)
Gender of the infants			
Male	641 (56.63)	613 (54.15)	1254 (55.39)
Female	491 (43.37)	519 (45.85)	1010 (44.61)
Sum	1132 (100)	1132 (100)	2264 (100)

^a All values are presented as No. (%).

The average weight of the infants at birth was 3169.16 g in newborns with healthy mothers and 2886.66 g in newborns of mothers with UTI ($P < 0.001$). The highest and the lowest weights of the infants in the case group were 4750 g and 750 g, respectively and for the infants in the control group were 5100 and 900 g, respectively. Weights of the infants of mothers with UTI were significantly lower than the weights of the infants with healthy mothers ($P < 0.001$) and 43.28% of the children in the case group have weights below normal (2500 grams) and their frequency is shown in Table 5.

There was a significant relationship between the two

groups of pregnant women in terms of types of delivery (normal and cesarean section) ($P = 0.008$); so that the rate of cesarean section in women with UTI (the case group) is reduced to 47.96% and in women without UTI (the control group) to 31.71% (359 women). Their frequency is expressed in Table 6. The highest rates of cesarean delivery in both case and control groups were (60.97%) and (53.22%), respectively. It has been in the range of 25 - 30 years of age and in the second pregnancy (Table 7 shows their frequency). As depicted in Table 8, the average height of these infants in the case group was 48.52 cm which was 2.46 cm shorter than the heights of the infants of healthy mothers ($P < 0.001$).

Table 5. Frequency of Infants Based on Their Weights at Birth in the Case (Mothers With Urinary Tract Infection) and Control Groups (Mothers Without Urinary Tract Infection) in Dr. Ganjavian Hospital in Dezful City During 2012 - 2013 ^{a,b}

Weight, gr	Urinary Infection		Total
	Case group	Control group	
< 2500	490 (44.43)	210 (18.55)	700
2500 - 5000	622 (54.94)	679 (59.98)	1301
> 5000	20 (1.72)	243 (21.47)	263
Sum	1132 (100)	1132 (100)	2264

^a $P < 0.001$.

^b All values are presented No. (%).

Table 6. Frequency and Percentage of Types of Delivery in the Case and Control Groups in Dr. Ganjavian Hospital in Dezful During 2012 - 2013 ^{a,b}

Type of Delivery	Urinary Infection		Total
	Case Group	Control Group	
Normal delivery	589 (52)	773 (68)	1362 (60.16)
Cesarean delivery	543 (47.97)	359 (31.71)	902 (39.84)
Sum	1132 (100)	1132 (100)	2264 (100)

^a P value is 0.008.

^b All values are presented as No. (%).

Table 7. Frequency and Percentage of Age and Gravidity in Pregnant Women With Cesarean Delivery in Dezful City During 2012 - 2013 ^a

Hospital Demographic Characteristics	Case Group	Control Group
Age ^b		
Less than 25 years	71 (13.07)	68 (21.25)
Between 25 and 30 years	331 (60.96)	331 (63.75)
More than 30 years	141 (25.97)	48 (15)
Sum	543 (100)	325 (100)
Gravidity ^c		
Once	152 (27.99)	73 (22.81)
Twice	264 (48.62)	187 (58.44)
Thrice and more	127 (23.39)	60 (18.75)
Sum	543 (100)	320 (100)

^a All values are presented as No. (%).

^b $P < 0.0001$.

^c P value is 0.0204.

Table 8. Frequency and Percentage of Infants' Height at Birth in the Case (Mothers With Urinary Tract Infection) and Control Groups (Mothers Without Urinary Tract Infection) in Dr. Ganjavian Hospital in Dezful During 2012 - 2013 ^a

Height, Cm	Urinary Infection		Total
	Case Group	Control Group	
45	189 (16.70)	5 (0.44)	194 (8.30)
46	112 (9.89)	4 (0.35)	116 (5)
47	98 (8.60)	7 (0.61)	105 (4.20)
48	226 (19.96)	19 (1.67)	245 (10.80)
49	117 (10.34)	211 (18.78)	328 (8.30)
50	132 (11.66)	215 (18.99)	347 (15.80)
51	112 (9.89)	284 (25.08)	396 (22.50)
52	57 (5.04)	196 (17.31)	253 (11.70)
53	16 (1.41)	131 (11.57)	147 (6.70)
54	56 (4.95)	44 (3.88)	100 (5)
55	17 (1.50)	16 (1.41)	33 (1.70)
Total	1132 (100)	1132 (100)	2264 (100)
Average	48.52 cm	50.98 cm	49.7 cm
P-value	< 0.001	< 0.001	

^a All values are presented as No. (%).

5. Discussion

This study investigated the incidence of UTI in pregnant women and its impact on the health and growth of their infants for the first time in the Dezful city, Iran. The results of our study showed that 5% of the pregnant women of this city were infected with UTIs during their pregnancy between 2012 and 2013 and were hospitalized in Dr. Ganjavian and Ayatollah Nabavi Hospitals due to UTI. The incidence of UTI was 12.3% in a study done by Soleymanizadeh et al. on 1500 pregnant women in the city of Bam (27). In another study conducted by Mobbasheri et al. on 900 pregnant women in the city of Gorgan, the incidence of UTI was 3.7% among them (28). In addition, in studies conducted in different regions of the world, Bookallil et al. study in Australia (29), Turpin study in Ghana (30), Hernandez study in Mexico (31), and Tadesse in North West Ethiopia (32) can be pointed out which results indicated UTI of 4.9%, 7.3%, 8.4%, 9.8% in those areas, respectively. Thus, according to the findings of this study, the prevalence of UTI in this city is lower than other areas and according to statistics of the incidence of UTI in different seasons of the year and a dramatic reduction of the infection in summer, this lower prevalence of UTI in Dezful city may be due to climate conditions and hot weather of this city. Decreased incidence of UTI may also be a result of the subject selection method, treatment in other medical centers, selecting subjects with symptomatic UTI and cultural and social characteristics of each society. Generally, studies insist on the fact that UTI is one of the most important infectious diseases in Iran, which needs further attention (2).

Based on the results of this research, the highest rate of UTI among pregnant women in Dezful is in the ages over than 30 and the lowest rate of infection is between the age range of 25 - 30 years. In a study by Mobbasheri et al. in Gorgan, the highest age of infection in pregnant women has been in the age group over 35 years (8.4%) (28). In a study carried out by Al-Haddad AM in Yemen, the highest rate of infection (53.7%) in pregnant women was in the age range of 15 - 24 years (7).

According to the results of this study, the highest incidence of UTI among pregnant women of this city depending on the rank of the delivery was in the second pregnancy and the lowest rate of infections was after the third pregnancies; however, in a study conducted by Mobbasheri and et al. in Gorgan, the highest rate of infections was after the third pregnancies (4.73%) (28). The results from the studies of Mobbasheri et al. were consistent with the results from the study of Gibb et al. in America (33). Based on the results of this study, lowest rate of infections in pregnant women of this city was in summer and the highest rate of infection was in winter, which can demonstrate the effects of temperature on the incidence of UTI. The results from the study that John E Anderson did in Canada represents the fact that seasonal change is of the main factors affecting UTIs in women. Based on this study, it is reported that UTIs occur more in summer (the third quarter of the year) rather than in winter (34). Moreover, in a retrospective study done by Elo et al. during the years 1965 - 1974 in Finland, it was demonstrated that the highest rate of UTIs were in November (winter)

and the lowest rate of it were during the summer season. In addition in this study, the results from the analysis of climate conditions showed that unconventional climate such as cold and dry weather in autumn and warm and dry weather in spring is associated with obvious changes in the number of UTIs (35).

Findings of the present study demonstrated *E. coli* as the main cause of UTIs in pregnant women of this city (57.25%) and *Klebsiella* as the second cause of UTI (25.85%). In a study conducted by Amiri et al. in Babol city, *E. coli* was indicated to be the cause of 83% of UTIs in pregnant women and *staphylococcus saprophyticus* (10%), *enterococcus* (4%) and *proteus* (3%) were other causes of UTIs (36). Also, the results from the studies of Mobbasheri et al. in Gorgan mark that *E.coli* 33.3 % coagulase negative *staph* 30.3% and *klebsiella* 15.2% are the major causes of UTIs among pregnant women (28). The results from the study of Emamghorashi in Jahrom (13) also indicate the major role of *E. coli* in UTIs among pregnant women of those regions, which included more than 50% of all cases. Moreover, in studies conducted by Masinde in Tanzania (5), Al-Haddad in Yemen (7), Hamdan in Sudan (37) and Totsika in Australia (8), *E. coli* was the main cause of UTIs among women of those areas and the prevalence in those regions were 47.2%, 41.5%, 42.4%, respectively. These studies show that UTI caused by *E. coli* is more prevalent in Iran than other studied areas.

Based on the results of the present study, cesarean rate was 48.33% in the case group and 31.33% in the control group and a significant difference was seen between the rate of infection and type of delivery. In the study of Fathian et al. in Isfahan, cesarean rate was 52.4% in pregnant women. In this study performed during the second half of the year 2000, which was titled monitoring and evaluation of reproductive birth project, cesarean rate was 42.3% during this time nationwide. Also, according to world health organization (WHO) in 2010, only 10% to 15% of C-section cases were justified due to medical reasons (38); therefore, we conclude that in addition to the fact that rate of cesarean deliveries in the country is much higher than the WHO's standards, UTI is one of the main reasons causing cesarean deliveries and it has a direct correlation with C-section.

According to this study, the average weight of newborns whose mothers had UTI was 2886.66 gr and it was 282.5 gr lower than the newborns of healthy mothers. Furthermore, 43.33% of the infants in the case group have weight lower than normal. In the study of Emamghorashi and et al. in Jahrom, 21% of newborns whose mothers had UTI had weights lower than normal. Also, 11% of mothers under study with UTI had stillbirth (13). So, based on the results of this study and other similar studies, it can be concluded that UTI in pregnant women has an adverse effect on their babies. Moreover, the results from the recent studies have been shown that treatment of UTI may be of considerable importance not only to forestall complications in the mother, but also to reduce prematurity

and fetal mortality in the offspring.

In conclusion, one of the main limitations in the present study was the incomplete data of some of the patients, which lead to exclude them from the study. Also, we may miss some of the pregnant women with UTI, who admitted to our studied hospitals for their delivery, but admitted to other medical centers for treatment of UTI.

The results of the present study indicate a 5% prevalence of UTI in pregnant women in Dezful City and also show a significant correlation and the direct impact of this disease on the weight, growth and health of their infants at birth. In addition, according to the conducted studies, UTI in mothers is the major reason for low-birth-weight infants. It seems that policy makers and health planners of Dezful city can have a major role in reducing the risk of infection and complications in pregnant women by creating awareness regarding the causes and symptoms of UTI and prevention of the factors causing it especially with educating women before and during pregnancy.

Acknowledgements

We would like to extend our thanks to the staff of Dr. Ganjaviyan and Ayatollah Nabavi Hospitals. We appreciate the research deputy of Dezful University of Medical Sciences for providing the financial support. The authors have no conflicts of interest in this article.

Authors' Contributions

Marziyeh Amiri: Acquisition of data, implementation of the study, manuscript preparation, study conception, contributions to principal investigation, and critical revision of the manuscript, study supervision Zohreh Lavasani: manuscript preparation, revision of the manuscript for important intellectual content. Reza Norouzirad: Contributions to conceive the study, principal investigation, critical. Amin Reza Nikpoor: manuscript preparation, revision of the manuscript for important intellectual content, statistical analysis. Hadi Zare Marzouni: Contributions to conceive the study, analysis and interpretation of data, and statistical analysis. Masoomah Mohamadpour: principal investigation, revision of the manuscript for important intellectual content. Mohammad Raeisi: principal investigation, revision of the manuscript for important intellectual content Najibpour reza: Contributions to conceive the study, and submit the article.

Financial Disclosure

Authors have no relevant financial interests within the past 5 years and for the foreseeable future.

Funding/Support

This study was supported in part by research deputy of Dezful University of Medical Sciences (grant no: DURs100).

References

1. Rajaratnam A, Baby NM, Kuruvilla TS, Machado S. Diagnosis of asymptomatic bacteriuria and associated risk factors among pregnant women in mangalore, karnataka, India. *J Clin Diagn Res.* 2014;**8**(9):OC23-5.
2. Asadi KM, Oloomi M, Habibi M, Bouzari S. Cloning of fimH and fliC and expression of the fusion protein FimH/FliC from Uropathogenic Escherichia coli (UPEC) isolated in Iran. *Iran J Microbiol.* 2012;**4**(2):55-62.
3. Yasemi M, Peyman H, Asadollahi K, Feizi A, Soroush S, Hematian A, et al. Frequency of bacteria causing urinary tract infections and their antimicrobial resistance patterns among pediatric patients in Western Iran from 2007-2009. *J Biol Regul Homeost Agents.* 2014;**28**(3):443-8.
4. Gomi H, Goto Y, Laopaiboon M, Usui R, Mori R, Mori R. Routine blood cultures in the management of pyelonephritis in pregnancy for improving outcomes. *Cochrane Database Syst Rev.* 2015;**13**(2):CD009216.
5. Masinde A, Gumodoka B, Kilonzo A, Mshana SE. Prevalence of urinary tract infection among pregnant women at Bugando Medical Centre, Mwanza, Tanzania. *Tanzan J Health Res.* 2009;**11**(3):154-9.
6. Litza JA, Brill JR. Urinary tract infections. *Prim Care.* 2010;**37**(3):491-507.
7. Al-Haddad AM. Urinary tract infection among pregnant women in Al-Mukalla district, Yemen. *East Mediterr Health J.* 2005;**11**(3):505-10.
8. Totsika M, Moriel DG, Idris A, Rogers BA, Wurpel DJ, Phan MD, et al. Uropathogenic Escherichia coli mediated urinary tract infection. *Curr Drug Targets.* 2012;**13**(11):1386-99.
9. Franklin TL, Monif GR. Trichomonas vaginalis and bacterial vaginosis. Coexistence in vaginal wet mount preparations from pregnant women. *J Reprod Med.* 2000;**45**(2):131-4.
10. Mittal P, Wing DA. Urinary tract infections in pregnancy. *Clin Perinatol.* 2005;**32**(3):749-64.
11. Schnarr J, Smaill F. Asymptomatic bacteriuria and symptomatic urinary tract infections in pregnancy. *Eur J Clin Invest.* 2008;**38** Suppl 2:50-7.
12. Alemu A, Moges F, Shiferaw Y, Tafess K, Kassu A, Anagaw B, et al. Bacterial profile and drug susceptibility pattern of urinary tract infection in pregnant women at University of Gondar Teaching Hospital, Northwest Ethiopia. *BMC Res Notes.* 2012;**5**:197.
13. Emamghorashi F, Mahmoodi N, Tagarod Z, Heydari ST. Maternal urinary tract infection as a risk factor for neonatal urinary tract infection. *Iran J Kidney Dis.* 2012;**6**(3):178-80.
14. Jido TA. Urinary tract infections in pregnancy: evaluation of diagnostic framework. *Saudi J Kidney Dis Transpl.* 2014;**25**(1):85-90.
15. Giraldo PC, Araújo ED, Junior JE, Amaral RLGD, Passos MRL, Gonçalves AK. The Prevalence of Urogenital Infections in Pregnant Women Experiencing Preterm and Full-Term Labor. *Infect Dis Obstetrics Gynecol.* 2012;**2012**:1-4.
16. Raza S, Pandey S, Bhatt CP. Microbiological analysis of isolates in Kathmandu Medical College Teaching Hospital, Kathmandu, Nepal. *Kathmandu Univ Med J (KUMJ).* 2011;**9**(36):295-7.
17. Sujatha R, Nawani M. Prevalence of asymptomatic bacteriuria and its antibacterial susceptibility pattern among pregnant women attending the antenatal clinic at kanpur, India. *J Clin Diagn Res.* 2014;**8**(4):DC01-3.
18. Jahromi MS, Mure A, Gomez CS. UTIs in patients with neurogenic bladder. *Curr Urol Rep.* 2014;**15**(9):433.
19. Gilstrap LCCF, Whalley PJ. cute pyelonephritis. *pregnancy. Ananterspective study.:* Obstet&Gynecol; 2002. pp. 636-92.
20. McDermott S. Urinary tract infections during pregnancy and mental retardation and developmental delay. *Obstetrics Gynecol.* 2000;**96**(1):113-9.
21. Mazor-Dray E, Levy A, Schlaeffer F, Sheiner E. Maternal urinary tract infection: is it independently associated with adverse pregnancy outcome? *J Matern Fetal Neonatal Med.* 2009;**22**(2):124-8.
22. Kladensky J. [Urinary tract infections in pregnancy: when to treat, how to treat, and what to treat with]. *Ceska Gynecol.* 2012;**77**(2):167-71.
23. Rizvi M, Khan F, Shukla I, Malik A, Shaheen. Rising prevalence of antimicrobial resistance in urinary tract infections during pregnancy: necessity for exploring newer treatment options. *J Lab Physicians.* 2011;**3**(2):98-103.
24. Haider G, Zehra N, Munir AA, Haider A. Risk factors of urinary tract infection in pregnancy. *J Pak Med Assoc.* 2010;**60**(3):213-6.
25. Rahman SR, Ahmed MF, Begum A. Occurrence of Urinary Tract Infection in Adolescent and Adult Women of Shanty Town in Dhaka City, Bangladesh. *Ethiopian J Health Sci.* 2014;**24**(2):145.
26. Hutchison R EMR, Schexneider KL. chap 30. *Hematology, Coagulation, and Transfusion Medicine.*. Philadelphia: Saunders Elsevier; 2011.
27. SoleimaniZadeh LD, Basri N, Abaszadeh A, Arab M. [Assessment of high risk pregnancy in Bam Mahdieh maternity hospital, 2002]. *J Shahrekord Univ Med Sci.* 2004;**6**(2):67-73.
28. Mobbasheri ET, Ghaemi E, Moujlou M, Vakili MA. [Prevalence of bacteriuria during pregnancy in Gorgan, Iran]. *Gorgan Medical Journal.* 2001;**9**:42-7.
29. Bookallil M, Chalmers E, Andrew B. Challenges in preventing pyelonephritis in pregnant women in Indigenous communities. *Rural Remote Health.* 2005;**5**(3):395.
30. Turpin C, Minkah B, Danso K, Frimpong E. Asymptomatic bacteriuria in pregnant women attending antenatal clinic at komfo anokye teaching hospital, kumasi, ghana. *Ghana Med J.* 2007;**41**(1):26-9.
31. Hernandez Blas F, Lopez Carmona JM, Rodriguez Moctezuma JR, Peralta Pedrero ML, Rodriguez Gutierrez RS, Ortiz Aguirre AR. [Asymptomatic bacteriuria frequency in pregnant women and uropathogen in vitro antimicrobial sensitivity]. *Ginecol Obstet Mex.* 2007;**75**(6):325-31.
32. Tadesse A, Negash M, Ketema LS. Asymptomatic bacteriuria in pregnancy: assesment of prevalence, microbial agents and their antimicrobial sensitivity pattern in Gondar Teaching Hospital, north west Ethiopia. *Ethiop Med J.* 2007;**45**(2):143-9.
33. Gibbs RS, McGregor JA, Mead PB, Eschenbach DA, Hager WD, Sweet RL. A survey of practices in infectious diseases by obstetrician-gynecologists. *Obstet Gynecol.* 1994;**83**(4):631-6.
34. Anderson JE. Seasonality of symptomatic bacterial urinary infections in women. *J Epidemiol Community Health.* 1983;**37**(4):286-90.
35. Elo J, Sarna S, Tallgren LG. Seasonal variations in the occurrence of urinary tract infections among children in an urban area in Finland. *Ann Clin Res.* 1979;**11**(3):101-6.
36. Yaghobi RH, Roshan AZPZ, Hajiahmadi M, Nasirim Amiri F. [The role of hygienic behavior in incidence of urinary tract infection among pregnant women referred to health center, Babol, 2003-2005]. *J Babol Univ Med Sci.* 2006;**8**(2):56-62.
37. Hamdan HZ, Ziad AH, Ali SK, Adam I. Epidemiology of urinary tract infections and antibiotics sensitivity among pregnant women at Khartoum North Hospital. *Ann Clin Microbiol Antimicrob.* 2011;**10**:2.
38. Fathian ZS. Factors affecting delivery, Esfahan. *Health Policy.* 2008;**4**:786-93.