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ORIGINAL ARTICLE

Prevalence of Urinary Tract Infection during Pregnancy at Tertiary Care Hospital: A Cross-Sectional Study

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ABSTRACT

Aim: the aim of this study was to determine the prevalence of urinary tract infection during pregnancy and the microorganism associated with it.
Study design: A cross-sectional study
Place and Duration: This study was conducted at CDF Hospital Hyderabad, Pakistan from June 2020 to June 2021
Methodology: A total of 150 women were included in this study. All the women were pregnant and aged between 18 to 50 years. Urine samples were collected from all the participants. From each sample, bacteria were isolated, and then the isolated bacteria were stained. Also, indole test, catalase test, voges proskauer test, urease test, citrate utilization test, methyl-red test, and coagulation test were performed for the identification of the bacteria.
Results: The results of this study showed that almost 16 percent of pregnant women had urinary tract infections. Women aged from 20 years to 30 years showed a higher incidence of urinary tract infection. Urinary tract infection was more prevalent in unemployed participants than in employed participants. In the same way, participants belonging to rural areas had a higher urinary tract infection rate as compared to patients belonging to urban areas. Educated women showed less incidence of UTI as compared to uneducated or less educated women. The results also showed that the women in the third trimester of their pregnancy had the highest prevalence of UTI. Escherichia coli was the most common cause of UTI in our study. The least common cause of UTI was Staphylococcus epidermidis.
Conclusion: This study concluded urinary tract infection is one of the most common complications during the gestational period.
Keywords: urinary tract infection, bacteria, pregnancy, prevalence.

INTRODUCTION

Urinary tract infection (UTI) is a disease in which microbes grow in the urinary tract and cause inflammation. The urinary tract consists of kidneys, ureters, bladder, and urethra. UTI can cause inflammation of the urethra that is called urethritis, inflammation of kidneys called pyelonephritis, and inflammation of the bladder called cystitis. It is the most common type of infection to occur in the human body at any age. It is especially common during the gestation period. Mostly gram-negative bacteria cause urinary tract infection. The most common gram-negative bacteria causing UTI is E. coli, responsible for almost 60 to 70 percent of the UTIs. Other gram-negative bacteria causing UTI are Klebsiella responsible for 10 percent of infections, Proteus responsible for 5 to 10 percent infections, and Pseudomonas responsible for 2 to 5 percent infections. Sometimes gram-positive bacteria can also cause UTI, it includes Staphylococcus species such as group B staphylococcus. [1, 2]

According to a study, E. coli, pseudomonas aeruginosa, klebsiella, and staphylococcus aureus are the common causes of urinary tract infections [3]. These microbes are usually present in the genitourinary system, gastrointestinal tract (GIT), and rectum. Mostly lower urinary tract and bladder are involved in UTI [4]. The causative agent of the UTI first attaches to the urethra and then from there ascends into the bladder and into the kidney. From the kidney, the bacteria reaches the systemic blood circulation eventually causing bacteremia [5]. Urinary tracts with obstruction and other pathologies are at increased risk of urinary tract infections [6].

One of the most common and widespread complications of pregnancy is urinary tract infections. In almost 20 percent of pregnancies, UTI occurs. UTIs are also responsible for 10 percent of hospital admission during pregnancy [7, 8]. The prevalence of symptomatic UTI during the gestation period is 1 to 18 percent. The prevalence of asymptomatic UTI during the gestation period varies from country to country. In India, this prevalence is 6.2 percent, 14.6 percent in Nigeria, 10 percent in Iran, 6 percent in Singapore, 12 percent in Bangladesh, and 4.3 percent in Malaysia [9].

Women, in general, are at higher risk of urinary tract infection than men because of the short length of the urethra and easy contamination by fecal flora. This risk increase even more during pregnancy due to polyuria, glycosuria, and pregnancy hormones. In almost 8 percent of all pregnant women, UTIs occur and 90 percent of the UTIs occur at 24 weeks of pregnancy [10].

The presence of bacteria in urine during pregnancy increases with the number of births, social and economic status, urinary retention, sexual activity, sickle cell anemia, and diabetes mellitus. Other than this, history of urinary tract infection, bladder dysfunction, renal calculus, young age, catheterization of the bladder, and structural abnormalities of urinary tract increase UTI risk [11, 12].

Symptoms of urinary tract infections are loin pain, dysuria, urine urgency, polyuria, foul-smelling and cloudy urine, pain and tenderness in the lower abdomen, back pain, fever, vomiting, nausea, and chills [13].

Tests should be conducted for the diagnosis of UTI during pregnancy and antibiotics should be prescribed for treatment. Untreated UTI during pregnancy can cause premature delivery, growth abnormalities of the fetus, anemia, and low birth weight of the infant. Upper urinary tract infection i.e. pyelonephritis can progress into renal failure and maternal sepsis. Reoccurring infection during pregnancy is managed by prophylactic treatment. UTIs are the most common cause of morbidity during pregnancy and a burden on the health care system. [14]

The aim of this study was to evaluate the occurrence of urinary tract infection during pregnancy and the microorganism associated with it.

METHODOLOGY

This study was conducted in our hospital. A total of 150 women were included in this study. All the women were pregnant and aged between 18 to 50 years. Consent was taken from all the participants of this study and the aim of the study was explained to them in detail. Permission was taken from the ethical review committee of the institute. Inclusive criteria of this study were pregnant women with abdominal pain. The exclusive criteria were the use of antibiotics. Demographic information of all the participants was collected.

Sterilized airtight plastic containers were used to collect midstream urine samples from all the participants. All the containers

were labeled with a specific code designated to the certain participant. During the transport of the collected sample to the lab, samples were stored in the cold box. All the samples were then analyzed in the lab by urine analysis and urine culture.

All the urine samples were streaked by platinum wire loop on top of the cysteine lactose electrolyte deficient agar, nutrient agar, and MacConkey agar (MAC). The agar containing samples was then incubated for 24 hours at 37 degrees Celsius. This was done to isolate the microbe. Isolated bacteria were then stained. Also, indole test, catalase test, voges proskauer test, urease test, citrate utilization test, methyl-red test, and coagulation test were performed for the identification of the bacteria.

SPSS version 23 was used to analyze the data. A Chi-square test was also performed. P-value less than 0.05 was considered statically significant.

RESULTS

Table 1 shows the distribution of demographic data of all the participants. A total of 150 pregnant women were included in this study. The basis of their categorization was age, gestational age, residential area, social-economic status, and education level. The urine test results reported that out of 150 women, 16 percent of women had positive urinary tract infection tests. The summary of this result is shown in Figure 1.

The prevalence of urinary tract infection in pregnant women of different ages, gestational age, residential areas, social-economic statuses, and education levels are shown in Table 2. The results showed that out of a total of 150 women, almost 16 percent had urinary tract infections. Women aged from 20 years to 30 years showed a higher incidence of urinary tract infection. The results also showed that the women in the third trimester of their pregnancy had the highest prevalence of UTI. On the basis of a residential area, participants belonging to rural areas had higher urinary tract infection rates as compared to patients belonging to urban areas. Educated women showed less incidence of UTI as compared to uneducated or lesser-educated women. Urinary tract infection was more prevalent in unemployed participants than in employed participants.

Table 1: Demographic information of participants

Variable	Percentage
Age (Years)	
Less than 20	14
20 to 30	69
31 to 40	12
41 to 50	5
Gestational age	
1st trimester	25
2nd trimester	45
3rd trimester	30
Residential area	
Urban	64
Rural	36
Socio economic status	
Employed	19
Unemployed	81
Educational level	
None	21
Primary	27
Secondary	30
Tertiary	22

Table 3 shows the frequency of different microorganisms associated with infection among pregnant women. According to these results, E. coli was the most common causative agent of UTI. It caused 26 percent of cases of UTI, followed by Staphylococcus aureus which caused 21 percent cases. Klebsiella caused 15 percent cases, Pseudomonas aeruginosa 15 percent cases, Proteus species 14 percent cases, and Staphylococcus epidermidis 9 percent cases.

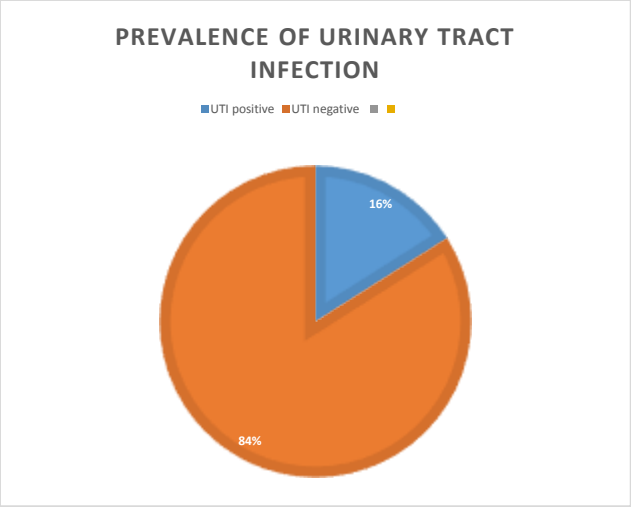

Figure 1: Results of urine test

Table 2: Prevalence of UTI in pregnant women of different categories

Variable	Percentage	UTI Positive (percentage)	UTI Negative (percentage)	X^2
Age (Years)				1.4150
Less than 20	14	6	94	
20 to 30	69	15.8	84.2	
31 to 40	12	10	90	
41 to 50	5	8	92	
Gestational age				6.3782
1st trimester	25	15	85	
2nd trimester	45	16	84	
3rd trimester	30	20	80	
Residential area				7.4125
Urban	64	9.6	90.4	
Rural	36	27	73	
Socio economic status				3.6650
Employed	19	3.7	96.3	
Unemployed	81	18.6	81.4	
Educational level				12.4723
None	21	35.5	64.5	
Primary	27	15.4	84.6	
Secondary	30	8.8	91.2	
Tertiary	22	6.7	93.3	

Table 3: Prevalence of microbes associated with UTI

Microbes	Percentage
Escherichia coli	26
Staphylococcus aureus	21
Klebsiella	15
Pseudomonas aeruginosa	15
Proteus	14
Staphylococcus epidermidis	9

DISCUSSION

Due to the anatomical and physiological changes in the body during the gestational period, women become more prone to urinary tract infections. That's why it is the most common complication during pregnancy. This increased vulnerability can lead to bacteriuria and pyelonephritis. Such conditions during pregnancy can lead to morbidities in pregnant women and fetal complications [15]. The aim of this study was to evaluate the occurrence of urinary tract infection during pregnancy and the microorganism associated with it. A sample size of 150 women was considered in this study. Out of which 16 percent were UTI positive and 84 percent were UTI

negative, concluding overall 16 percent UTI prevalence. In another study, results of urinary tract infection incidence were similar. This study conducted by Ashok Kumar Devoor and Umashankar KM, reported 15 percent, of pregnant women, with urinary tract infections [14]. Mohamed and Fareid's study reported an almost 14.6 percent prevalence of urinary tract infection in pregnant women [16].

Alternatively, Nabbugodi et al.'s study results are not quite similar to ours. This study reported an almost 26.7 percent prevalence rate of urinary tract infection in pregnant women [17]. This difference can be because of differences in the social hierarchy, habits, educational level, residential conditions, and personal hygiene of the study population.

In our study, according to the age, women between 20 to 30 year-olds showed the highest incidence of urinary tract infection as compared to women of younger or older age. Kumar Devoor and Umashankar KM's study reported the highest prevalence of UTI in women aged from 21 to 25 years [14]. Ali M, Abdallah MS's study showed the highest prevalence in the age group 26 to 30 years old [12]. Our study showed compiled results of both of these studies [12, 14]. The reason behind this can be the active sexual life of women during this time period, which increases the risk of urinary tract infections.

Our study reported the most positive UTI cases in unemployed patients. This showed the association of unemployment with urinary tract infections. This is because unemployment leads to a poor living standard that promotes infections. The rural population also dominated the positive UTI percentage. Rural areas are generally associated with poor sanitation and hygienic conditions. This can be the reason for the high number of UTI patients coming from rural areas. The study of Nworie A and Eze UA supports these results [18]. This study reported that the poor living and hygienic conditions in the rural areas was a cause of high urinary tract infection rate [18].

Patients without formal education showed more cases of urinary tract infections in our study. Also, the patients in the first trimester of their pregnancy reported the least cases of UTI. These cases went up with the increase in gestational age and third-trimester patients reported the highest number of cases. The study of Ranjan et al supported these results of our study [19]. This study also reported a high number of cases in third-trimester women. Ashok Kumar Devoor and Ali M, Abdallah MS's studies also reported that women in the third trimester of pregnancy had more UTI cases [12, 13]. The reason for this can be an increase in the mechanical obstruction of urine during the third trimester due to a heavily enlarged uterus.

According to the results of our study, E. coli was the most common causative agent of UTI. It caused 26 percent of cases of UTI, followed by Staphylococcus aureus which caused 21 percent cases. Klebsiella caused 15 percent cases, Pseudomonas aeruginosa 15 percent cases, Proteus species 14 percent cases, and Staphylococcus epidermidis 10 percent cases. Many other studies with the objective of finding the prevalence of different types of bacteria involved in urinary tract infection reported Escherichia coli, Klebsiella, Proteus, Staphylococcus aureus, and Pseudomonas the most common cause [12, 20].

Escherichia coli, Proteus, and Klebsiella are Enterobacteriaceae species of bacteria. These pathogens being the cause of urinary tract infection indicates that the infection was a result of poor hygienic conditions. This is because these microbes originate from human waste.

During the gestation period, amino acids and lactose levels in the body increase. This encourages the growth of Escherichia coli bacteria, which is a gram-negative bacteria, leading to the high prevalence of urinary tract infections.

CONCLUSION

This study concluded urinary tract infection is one of the most common complications during the gestational period. The overall incidence of UTI was 16 percent among pregnant women complaining of abdominal pain. Women aged from 20 years to 30 years showed a higher incidence of urinary tract infection. Also, the women in the third trimester of their pregnancy had the highest prevalence of UTIs. On the basis of the residential area, participants belonging to rural areas had a higher urinary tract infection rate as compared to patients belonging to urban areas. Educated women showed less incidence of UTI as compared to uneducated or lesser-educated women. Urinary tract infection was more prevalent in unemployed participants than in employed participants. Escherichia coli was the most common cause of UTI in our study, followed by Staphylococcus aureus. The least common cause of UTI was Staphylococcus epidermidis.

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