

# Prevalence and Risk Factors for Developing UTI in Women

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**Abstract:** *This article is written with the aim of presenting the results of a clinical trial, diagnosis and treatment of UTI in women. Characteristics of a common causative agent of uncomplicated UTI such as Escherichia coli, detected in about 80% of cases, and Staphylococcus saprophyticus, which causes the development of another 15% of cases, are given. In particular, the causes of complicated UTI were identified, the reason for their development is often bacteria that are extremely rare in uncomplicated forms, such as Pseudomonas aeruginosa and Proteus mirabilis, as well as group B streptococci.*

**Keywords:** *UTI in women, streptococci, Staphylococcus saprophyticus, Escherichia coli*

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## i. INTRODUCTION

Urinary tract infection (UTI) is one of the common urological diseases. Data from numerous studies indicate the widespread prevalence of UTI among both ambulatory and hospitalized patients. [1]

For example, in the USA, UTI accounts for more than 7 million visits to the doctor per year, of which more than 2 million are associated with cystitis, and is the cause of more than 100 thousand hospitalizations per year, mainly due to pyelonephritis. [2] The prevalence of UTI in Russia is about 1,000 cases per 100,000 populations per year. [3]

In Uzbekistan, the only epidemiological study on the prevalence of UTI that was conducted in the Aral Sea region (Republic of Karakalpakstan, Khorezm region) showed that the prevalence of UTI was 10.85% [4].

It should be noted that significant financial resources are spent on the diagnosis and treatment of UTI. Treatment of community-acquired UTI requires significant financial costs. Direct and indirect costs of community-based UTI exceed \$ 1.6 billion per year [2]. About 15% of all outpatients prescribed in the United States with antibiotics worth more than \$ 1 billion a year are prescribed for UTI. [5]

The most common causative agent of uncomplicated UTI continues to be Escherichia coli, detected in approximately 80% of cases, and Staphylococcus saprophyticus, which causes another 15% of cases [6,7,8]. As for complicated UTIs, the reason for their development is often bacteria that are extremely rare in uncomplicated forms, such as Pseudomonas aeruginosa and Proteus mirabilis, as well as group B streptococci [9, 10]. The most common causative agent of UTI in patients hospitalized in urgent order to the Department of Urology was E. Coli, which was detected in 55% of cases. [eleven]

Numerous studies have shown that the most common form of UTI is acute uncomplicated cystitis.

Every second woman suffers episodes of acute uncomplicated cystitis throughout her life, with a relapse in 30% percent. [12] A study in the Russian Federation showed that the occurrence of symptoms of acute uncomplicated cystitis was reported by 19.1% -21.1% of respondents, 22.9% -28.5% of women reported the development of 3 or more relapses of dysuria during of the year. [13]

According to a Brazilian study, UTI was detected in 16.55% of older women. Risk factors for the development of UTI in this case were the presence of a UTI in history, diabetes mellitus and vaginitis [14].

However, the bulk of the data on the prevalence of UTI available in the literature were obtained by reversibility. In this regard, it is impossible to confirm the reliability of data on the prevalence of UTI, including asymptomatic. Studying the prevalence and risk factors for developing UTI remains an urgent problem.

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Based on the foregoing, we conducted a population-based study among the female population of the city of Tashkent aged 1 year and older, the purpose of which was to study the prevalence and identification of risk factors for the development of UTI.

## **ii. MATERIALS AND METHODS**

A cross-sectional epidemiological study was conducted using the nest, a typological method. Clinical trials were based on medical sites geographically belonging to the Central Clinic of Shaykhontakhur and Family Clinic No.9 of Mirzo Ulugbek district of Tashkent. When choosing the bases, housing conditions, the level of social and living status of the population living in these areas were taken into account.

During the study, we took into account the social and household status of the respondents, which took into account such data as age, marital status (married), living conditions, education, occupation, height, weight. It also took into account the presence of bad habits such as smoking, alcohol and coffee abuse.

When collecting medical and obstetric history, which took into account data such as operations performed for urological diseases, operations performed for other diseases, chronic diseases, the use of antibacterial drugs for various inflammatory diseases, and the duration of medication. The number of births and their nature, information about what hygiene products are used during menstruation, and with what frequency they are replaced.

When collecting complaints characteristic of UTI, at the time of the survey, attention was drawn to such complaints as frequent urination, pain during urination, pain in the lumbar region, pain over the womb, pain in the perineum, nocturia, fever, chills. The effect of these symptoms on quality of life. When conducting the survey, we were also interested in whether the above complaints of the last year were noted and / or if so, how many times. Thus, we judged the presence of recurrent UTI.

A total of 1,093 women, aged 1 year and older, were surveyed, making up a reliable, representative sample of the general population. Of the polling cards received back, 24 (2.2%) were declared invalid and were excluded from the subsequent analysis. 1069 cards were analyzed.

All respondents surveyed underwent urine screening. The criterion for the presence of UTI was the detection of leukocyturia or bacteriuria. Before passing the urine test, the respondents were sure to be familiar with the rules for collecting urine into a disposable sterile vial. The collected material was checked using test strips (Combina 13) on a Combylizer 13 analyzer for leukocyturia and bacteriuria. In cases of UTI, a bacteriological study was performed.

We initially studied the prevalence of UTI. Then, to determine the frequency of the impact of the studied factors on the development of UTI from the women included in the study, according to the design of the case-control study, two similar (by parameters and signs) groups were identified - the first group of women who had a UTI (case) and the second group - women whose UTI is not detected (control).

In the process of processing and analysis of research materials, the principles and methods of evidence-based medicine and variation statistics were applied. A chi test was used to compare the prevalence of various symptoms among both groups and to evaluate possible factors associated with UTI. Multiple logistic regression analysis was used to determine the independent association between risk factors and UTI. Factors associated with UTI at the level ( $P < 0.01$ ) for simple regression were included in the multivariation model. Results are presented as OR with a 95% confidence interval. All analyzes were performed using the Stata 11 statistical software package. A level  $P$  below 0.05 was considered a statistical significant difference.

## **iii. EXPERIMENTAL RESULTS**

The average age of women included in the study ( $n = 1069$ ) was  $35.4 \pm 21.3$  (min 1, max 92). Most of the women - 636 (59.5%) were married, 433 (34%) were single, 69 (6.5%) were divorced or widows. 130 (12.2%) respondents received primary education, 348 (32.5%) - secondary, 200 (18.7%) secondary-specialized, 306 (28.6%) were those with higher education, those without education turned out to be 85 (8%) women. The majority of respondents 341 (32%) were housewives, working women were 236 (22%), retired women - 203 (19%), female students - 36 (3.4%), schoolgirls 166 (15.5%), children who 85 (7.9%) attend kindergarten, and the least unemployed were 2 (0.2%).

The number of respondents giving birth and not giving birth was the same: 536 (50.2%) and 533 (49.8%), respectively. Among women who gave birth, having from 1 to 2 births, there were 333 (31%), from 3 to 5 births were in 196 women (18.2%), more than 5 births were in 7 (0.7%) women.

Among women examined, UTI was detected in 157, which amounted to 14.6%. At the same time, the basis for establishing UTI in 91 (58%) cases were leukocyturia, in 56 (36%) - bacteriuria, and in 10 (6%) there was a combination of leukocyturia and bacteriuria. Bacteriological examination of urine, conducted by 92 women with established UTI, showed that in 91 (99%) cases the causative agent of UTI in women was *E. coli*, only in 1 (1%) cases the causative agent was *S. aureus*.

It should be noted that not a single woman with a UTI established during the study at the time of the survey had clinical manifestations of the disease.

Although, out of all the women examined, 332 (31%) had a history of acute cystitis. Of these, 124 (37.4%) had a UTI at the time of the study, while 208 (62.6%) did not. According to the questionnaire, 274 (82.5%) women noted from 1 to 3 episodes of cystitis during life, 36 (10.8%) episodes of cystitis had significantly more - from 4 to 6 times, 22 (6.6%) women suffered from cystitis more than 7 times.

Analysis of social factors of women's life included in the study showed that among the respondents who had a UTI, 70% were married, 25.5% were unmarried, 4.45% were divorced and widows. In the control group, the number of married women was 57.7%, 35.5% were single, divorced women and widows were 6.8%. As can be seen from the above data, in the group with UTI there were 1.21 times more married women than in the control group. And in the control group of unmarried women, it was 1.4 times more than in the group with UTI. This is apparently due to the fact that married women appear to have regular sexual intercourse. Which are known to provoke the development of UTI. (Table 1)

An analysis of educational status showed that persons with primary education in the group with UTI met in 2.3 less than in the control group. There were 1.36 more women with higher education in the group with UTI than in the control group, i.e., without UTI. For the remaining levels of education, there was no significant difference in the compared groups. Apparently, the presence of UTI in people with primary education is not so high due to a number of reasons: firstly, girls still do not have menstruation that require the use of appropriate personal hygiene products, and secondly, due to their young age, they do not have sexual intercourse. And why the increase in UTI cases in the group of women with higher education is not clear to us. (Table 1)

An analysis of the type of activity revealed that in the control group of schoolchildren it was 2.21 times less than in the group of schoolchildren with UTI. There was no significant difference in other levels of activity. (Table 1)

Table 1. Distribution of women examined in relation to social, educational, and labor statuses.

	Control (without UTI) (n = 912)	Happening (UTI) (n = 157)	$\chi^2$	Significan ce Level "p"
Family status				
Married	<b>526</b> (57,7%)	<b>110 (70%)</b>	<b>8,0241</b>	<b>0,0055</b>
Unmarrie d	<b>324</b> (35,5%)	<b>40</b> (25,5%)	<b>5,5840</b>	<b>0,0187</b>
Divorced / Widows	62 (6,8%)	7 (4,45%)	0,8582	0,3552
Education				
Without education	76 (8,5%)	9 (5,73%)	0,9085	0,3415
Initial	<b>121</b> (13,2%)	<b>9 (5,73%)</b>	<b>6,4318</b>	<b>0,0120</b>
Average	289 (31,6%)	59 (37,5%)	1,8577	0,1735

Medium special	178 (19,5%)	22 (14,04%)	2,3195	0,1281
Higher	<b>248</b> <b>(27,2%)</b>	<b>58 (37%)</b>	<b>5,7641</b>	<b>0,0170</b>
Occupation				
Working	196 (21,5%)	40 (25,4%)	1,0169	0,3143
Pensioner	165 (18%)	38 (24,7%)	2,8676	0,0904
A Housewife	290 (31,8%)	51 (32,5%)	0,0065	0,9390
Student	29 (3,17%)	7 (4,48%)	0,3379	0,5614
Schoolboy	<b>154</b> <b>(16,9%)</b>	<b>12</b> <b>(7,64%)</b>	<b>8,0331</b>	<b>0,0055</b>
Kindergarten	76 (8,41%)	9 (5,73%)	0,9085	0,3415
out of work	2 (0,22%)	0	0,0005	1,0005

An analysis of the obstetric and gynecological history showed that the number of births also influenced the incidence of UTI. According to our data, women who gave birth 1-2 times in the group with UTI are found in 48.4% of cases, and in the control group without UTI in 28%, i.e. 1.72 times less. It should also be noted that in the group without UTI, women who did not give birth were 1.7 times more than in the group of women with UTI. (table 2)

In addition, it must be emphasized that in a comparative analysis of women with natural delivery, in the group with UTI was 1.52 times more than in the control group. In the group of women who underwent caesarean, there were no significant differences. Apparently, when a newborn pass through the natural birth canal, the probability of infection in the urinary tract increases, which can explain our results. (table 2)

Analysis of the results of the study showed that among women using personal care products in the form of pads in the group of women with UTI was 48.4%, while in the control group without UTI it was 35.5%, which was 1.36 times less. Based on our results, we can say that the use of pads when not timely replaced, creates favorable conditions for infection in the urinary tract, thereby increasing the risk of developing UTI. (table 2)

Of all the respondents who had a UTI, vaginal discharge at the time of the survey was 31.8%, while in the control group this indicator was 3.67 times lower and was observed only in 8.66%. (table 2)

An analysis of anamnestic data also showed that inflammatory diseases of the female genital organs, manifested by vaginal discharge, were reported by respondents of the main group in 35%, which was 2.6 times less than the respondents in the control group, which amounted to 13.3%. Thus, it can be said that inflammatory diseases of the female genital organs, which are accompanied by vaginal discharge, are a favorable condition for the development of UTI in an ascending way (table 2).

The study revealed that women who have daily sexual contact in the group with UTI was 27.3%, while in the control group, for women without UTI, this indicator was 17%. Among women who have a UTI, the number of daily sexual contacts is 1.6 times higher than among women without a UTI, which may indicate that the number of sexual contacts has an effect and may lead to the development of UTI (table 2).

Table 2. Distribution of women examined in connection with the characteristics of obstetric and gynecological history

	Control (without UTI) (n = 912)	Happening (UTI) (n = 157)	$\chi^2$	Signifi- cance Level "p"
Number of births				
<b>0</b>	<b>484 (53%)</b>	<b>49</b> <b>(31,2%)</b>	<b>24,7359</b>	<b>0,0005</b>

1-2	257 (28%)	76 (48,4%)	24,6194	0,0005
3-5	165 (18%)	31 (19,7%)	0,1470	0,7020
More then 5	6 (0,65%)	1 (0,63%)	0,0005	1,0005
<b>Childbirth</b>				
Caesarea n	86 (9%)	17 (10,8%)	0,0986	0,7544
Independ ently	342 (38%)	91 (58%)	22,4301	0,0005
<b>Pregnancy</b>				
Favorable	346 (38%)	89 (56,6%)	18,0382	0,0005
With threats	69 (7,56%)	22 (14%)	6,3449	0,0125
Not pregnant	497 (54,4%)	46 (29,4%)	33,0217	0,0005
<b>Gaskets</b>				
There is	324 (35,5%)	76 (48,4%)	8,9492	0,0037
<b>Vaginal discharge</b>				
There is	79 (8,66%)	50 (31,8%)	65,6852	0,0005
<b>Female genital inflammatory diseases</b>				
There is	122 (13,3%)	55 (35%)	43,9073	0,0005
<b>The number of sexual acts per week</b>				
0	436 (47,9%)	69 (44%)	0,6530	0,4198
1-2	181(19,8%)	21(13,4%)	3,2498	0,0714
3,4,5	140(15,3%)	24(15,3%)	0,0005	1,0005
Every day	155(17%)	43(27,3%)	8,9107	0,0037

**Factors determining the integral risk of developing UTI in women.** To identify risk factors that determine the integral risk of developing UTI in women, we used multiple logistic regression analysis. Factors associated with UTI ( $P < 0.01$ ) for simple regression were included in the multivariation model. As a result, the following factors were included in the multidimensional model: the number of births, the type of delivery, the course of pregnancy, the number of miscarriages, the use of pads, vaginal discharge, inflammatory diseases of the female genital organs, and daily sexual contact (table 3).

The most significant risk factor for developing UTI in women was vaginal discharge: odds ratio (OR) - 3 (95% CI 1.96 - 4.85) A significant contribution to the integral indicator characterizing the chance of developing UTI in women was made by inflammatory diseases of the female genital organs - OR 2 (95% CI 1.35-3.15), during pregnancy - OSH 1.87 (95% CI 1.17-2.99) (table 3).

**Table 3. UTI Odds Risk Factors**

Factors	Odds Ratio	Standard error	P>	Confidence interval	
				Min	Max
Number of births	1,011257	0,0896991	0,900	0,8498838	1,203272
Childbirth	0,8827242	0,2011487	0,584	0,5647542	1,379719
Pregnancy	1,877912	0,4461797	0,008	1,178787	2,99168

Number of miscarriages	1,202465	0,2444215	0,364	0,8073298	1,790992
Gaskets	1,308171	0,2562238	0,170	0,8911372	1,920368
Vaginal discharge	<b>3,090373</b>	<b>0,7132214</b>	<b>0,000</b>	<b>1,96591</b>	<b>4,858007</b>
Inflammatory diseases	<b>2,067834</b>	<b>0,4449568</b>	<b>0,001</b>	<b>1,356295</b>	<b>3,152662</b>
daily	1,14896	0,2620515	0,543	0,7347935	1,796572

#### iv. CONCLUSION

Thus, our study showed that, among 1069 women examined, UTI was detected in 157, which amounted to 14.6%. E.coli was the main causative agent of UTI in 99%, and only S.aureus was the causative agent in only 1%. A history of acute cystitis was noted in 31% of the women examined. According to the results of the study, it can also be said that married women are more at risk of developing a UTI than unmarried. As for educational status, we can say that, according to a study of people with primary education, the risk of developing UTI is not high. In our opinion, this is due to a number of reasons: firstly, girls still do not have menstruation, which require the use of appropriate personal hygiene products, and secondly, due to their young age, they do not have sex. It should be noted that women with higher education in the group with UTI turned out to be 1.36 more than in the control, i.e. without UTI. And why the increase in UTI cases in the group of women with higher education is not clear to us.

The number of births also influenced the development of UTI. According to our data, women who gave birth 1-2 times in the group with UTI are found in 48.4% of cases, and in the control group without UTI in 28%, i.e. 1.72 times less. It should also be noted that in the group without UTI, women who did not give birth were 1.7 times more than in the group of women with UTI. In addition, it must be emphasized that in women giving birth on their own, in the group with UTI was 1.52 times more than in the control group. In the group of women who underwent caesarean, there were no significant differences. Apparently, when a newborn pass through the natural birth canal, the probability of infection in the urinary tract increases, which can explain our results.

The use of pads has also increased the risk of UTI. So in the group of women with UTI, the use of pads was 48.4%, while in the control group without UTI, 35.5%, which was 1.36 times less. Based on our results, we can say that the use of pads when not timely replaced, creates favorable conditions for infection in the urinary tract, thereby increasing the risk of developing UTI.

Vaginal discharge at the time of the survey was noted by 31.8% of the respondents, while in the respondents of the control group this indicator was 3.67 times lower and was observed only in 8.66%. Analysis of anamnestic data showed that inflammatory diseases of the female genital organs, manifested by vaginal discharge, were observed in the main group in 35%, which is 2.6 times less than in the control group (13.3%). In this regard, it can be said that inflammatory diseases of the female genital organs, which are accompanied by vaginal discharge, are a favorable condition for the development of UTI in an ascending way.

Daily sexual intercourse takes place in the development of UTI. Among women who have a UTI, the number of daily sexual contacts is 1.6 times higher than among women without a UTI.

Our multiple logistic regression analysis showed that the most adverse effect in the development of UTI was from vaginal discharge: odds ratio (OR) - 3 (95% CI 1.96 - 4.85). Inflammatory diseases of the female genital organs - OR 2 (95% CI 1.35-3.15), during pregnancy - OR 1.87 (95% CI 1.17-2) made a significant contribution to the integral indicator characterizing the chance of developing UTI in women.

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