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Urinary Tract Infection and Its Risk Factors in a Tertiary Care Hospital

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ABSTRACT

Background: Urinary tract infection (UTI) is common health issue all over the world and several factors predispose the people to urinary tract infection.

Objective: The study aimed at determining the incidence of Urinary tract infection and factors associated with it.

Material and Methods: This cross-sectional study was performed among 205 patients in a tertiary care hospital of Rawalpindi, Pakistan. Simple convenient sampling and an established inclusion and exclusion criteria was applied to select the participants. After obtaining the informed consent from all participants, data was acquired via a self-designed proforma. Data analysis was carried out through SPSS version 25. Chi square test was applied to check the association between urinary tract infection and predisposing factors. The p-value less than 0.05 was taken as statistically significant.

Results: The incidence of urinary tract infection was 12.68%. Urinary tract infection was significantly associated age group (p=0.003), gender (p=0.001), marital status (p=0.004), educational status (p=0.0001), socioeconomic status (p=0.005), previous history of UTI (p=0.0002), family history of UTI (p=0.0004), history of stone in urinary tract (p=0.003), history of recent use of antibiotics (p=0.04), history of catheterization (p=0.001), hygienic condition of external genitalia (p=0.0005), frequency of intercourse (p=0.04), history of diabetes mellitus (p=0.002), and hydration status (p=0.0007), whereas, association of urinary tract infection with holding urine was insignificant (p=0.05).

Conclusion: The incidence of urinary tract infection was high among research population. Risk factors that could lead to UTI were young age, female gender, married marital status, lower educational status, lower socioeconomic status, previous history of UTI, family history of UTI, history of stone in urinary tract, history of recent use of antibiotics, history of catheterization, poor hygienic condition of external genitalia, high frequency of intercourse, history of diabetes mellitus, and dehydration.

Recommendations: People should be educated about the UTI and its causes and prevention. People should also take special care when they are on antibiotics or when they are diabetics, to prevent UTI. People should maintain hygiene when they are catheterized and during intercourse. People should stay hydrated.

Keywords: *Urinary Tract, Infection, Risk Factors, Tertiary Care Hospital.*

INTRODUCTION

Inflammation of the urinary tract which may incorporate any part of the urinary tract such as parenchymal tissue of kidney, pelvis of the kidney, ureter, urinary bladder, and urethra, is known as urinary tract infection (UTI). UTI develops when a typical growth of the pathogenic bacteria occurs due to the break in the immune system of the body and especially of urinary tract.[1] Urinary tract infection has two kinds. One is community acquired UTI that develops in the setting of community or patient with UTI has history of hospital admission shorter than 48 hours, while the other one is nosocomial UTI which occurs after 48 hours of admission of patients or within 3 days of discharge from hospital.[2,3]

Patients with UTI may present with symptoms and signs which include fever, burning micturition, urgency, increased frequency, lower abdominal pain, and suprapubic tenderness.[1,4] Urinary tract infections (UTI), are very frequent infection in almost every part of the world, therefore, these infections lead to over burden on the resources of the hospitals globally. It has been estimated that more than 150 million people get affected by UTI and the cost of treatment for these patients is about 6 billion US dollars.[5] Therefore, it impacts negatively the economy of the world and developing countries get more affected as they have restricted resources for their health systems. The quality of life of people also affected badly by UTI. Furthermore, persistent UTI could lead to some complications in urinary tract like abscess formation, emphysematous cystitis, and renal scarring.[6]

In literature, most common pathogenic bacteria for UTI is Escherichia coli and it is followed by Klebsiella pneumoniae, Staphylococcus aureus, Proteus mirabilis, Pseudomonas aeruginosa, Enterococcus faecalis, and Enterobacter.[4,7] Many factors have been shown to predispose people to UTI and these included gender, age, marital status, socioeconomic status, previous history of UTI, family history, history of stones in urinary tract, history of holding urine, history of recent use of antibiotics, urinary catheterization, poor hygienic condition of external genitalia, frequency of intercourse, diabetes mellitus, and dehydration.[8,10,11,12,13,14] Some of these factors are preventable, whereas, others need some specific intervention to be in control or at least get their minimum negative impact in causation of UTI.

Although, several researches that were conducted around the globe on UTI, however, literature shows that work on UTI in Pakistan is insufficient, therefore our study with the objectives to check, the recent incidence of UTI and predisposing factors of it. After identifying the risk factors that rise the UTI incidence, we may be able to prevent or reduce the UTI incidence by the application of suitable interventions for the prevention of these factors. The decrease in the incidence of UTI, resultantly could bring positive changes in lives of people affected by UTI and decrease in load on the limited reserves of the hospitals of under-developed countries.

MATERIAL AND METHODS

This comparative cross-sectional study was performed in urology department of Benazir Bhutto Hospital, Rawalpindi, Pakistan. It was conducted among the patients who had been presented with burning or painful urination, increased urination frequency especially at night, increased or persistent urge to urine, cloudy urine, brown colored urine, urine with strong smell, fever, lower abdominal pain. Additionally, it was conducted among the patients whose urine analysis was also carried out to exclude UTI, from November 2021 to January 2022. Study population size was

calculated via the WHO calculator and it was 205 along with confidence interval of 95%. Participants of research were recruited via non probability convenient sampling and a set inclusion and exclusion criteria. Patients with the age range between 14 years to 60 years and who were willing to participate in the study were enrolled in the study. Patients with age under 14 years and more than 60 years, had any congenital abnormality of genitourinary tract, and who were not willing to participate were excluded from the study. Data was collected through self-structured proforma. Ethical approval and informed consent were obtained before the beginning of data collection. Proforma had two portions, first was related to socio-demographics information of patients, while second was about the potential risk factors of UTI other than socio-demographic related factors.

Patients information included, gender (male or female), age group (young = between 14 to 35years while elder = between 39 and 60 years), marital status (single or married), educational status (below matric or matric or above), socioeconomic status based on monthly family income (lower = 30,000 Pkr per month or middle = above 30,000 Pkr per month), previous history of UTI, family history of UTI (yes or no), history of stone in urinary tract infection or diagnosed case of stone in urinary tract (yes or no), history of holding urine (yes or no), history of recent use of antibiotics (yes or no), history of catheterization (yes or no), hygienic condition of external genitalia (good or poor), frequency of intercourse in last week (high = daily or two times or low = once or none), diabetes mellitus (yes or no), hydration status of patient (dehydrated or no dehydration). Patients who had at least burning or painful urination, increased frequency, urgency, and fever along with any of the following feature WBC 10 or more on high power field, leukocyte esterase positive, bacteria, or nitrite positive, in urine analysis were considered to have UTI, while patients who had none of these symptoms which included, burning or painful urination, increased frequency, urgency, or fever and had other above mentioned symptoms, furthermore none of features of urine analysis mentioned above, were labelled to have no UTI.

Data analysis was carried out through IMB SPSS version 25. In current study, descriptive and inferential statistics were applied. Descriptive statistics were utilized to determine the frequency, percentages and means of the study variables, while, inferential statistics used to assess that either, included potential risk factors were correlated or not with UTI. Inferential statistics were applied through Chi-square test. The value of p less than 0.05 was set statistically significant.

RESULTS

From the total of 205 participants, 123(60.00%) were females, while 82(40.00%) were males. The mean age of study population was 39.43 years with standard deviation (SD) of ±9.09years. The incidence of UTI in study population was 12.68% (26 participants had UTI). The incidence of UTI was higher among females 65.39% (17females had UTI) as compared to males 34.61% (9 males had UTI).

Figure 1 shows the patient division based on their gender. Figure 2 manifests the incidence of urinary tract infection among study population. Table 1 indicates that UTI was significantly correlated with age group (p=0.003), gender (p=0.001), marital status (p=0.004), educational status (p=0.0001), socioeconomic status (p=0.005), previous history of UTI (p=0.0002), family history of UTI (p=0.0004), history of stone in urinary tract (p=0.003), history of recent use of antibiotics (p=0.04), history of catheterization (p=0.001), hygienic condition of external genitalia (p=0.0005), frequency of intercourse (p=0.04), history of diabetes mellitus (p=0.002), and hydration status

(p=0.0007) while, UTI was not linked with the history of holding urine statistically significant (p=0.05). This current study indicates that UTI incidence was higher among the patients who had young age, female gender, married marital status, lower educational status, lower socioeconomic status, previous history of UTI, family history of UTI, history of stone in urinary tract, history of recent use of antibiotics, history of catheterization, poor hygienic condition of external genitalia, high frequency of intercourse, history of diabetes mellitus, and dehydration. In contrast, patients who had advanced age, male gender, single marital status, higher educational status, middle socioeconomic status, no previous history of UTI, no family history of UTI, no history of stone in urinary tract, no history of recent use of antibiotics, no history of catheterization, good hygienic condition of external genitalia, low frequency of intercourse, no history of diabetes mellitus, and no dehydration had lower UTI incidence. In case of history of holding urine, the incidence was comparatively higher in the patients who had history of holding urine in contrast to who had no history of holding urine, however, history of holding urine was not associated with UTI incidence significantly.

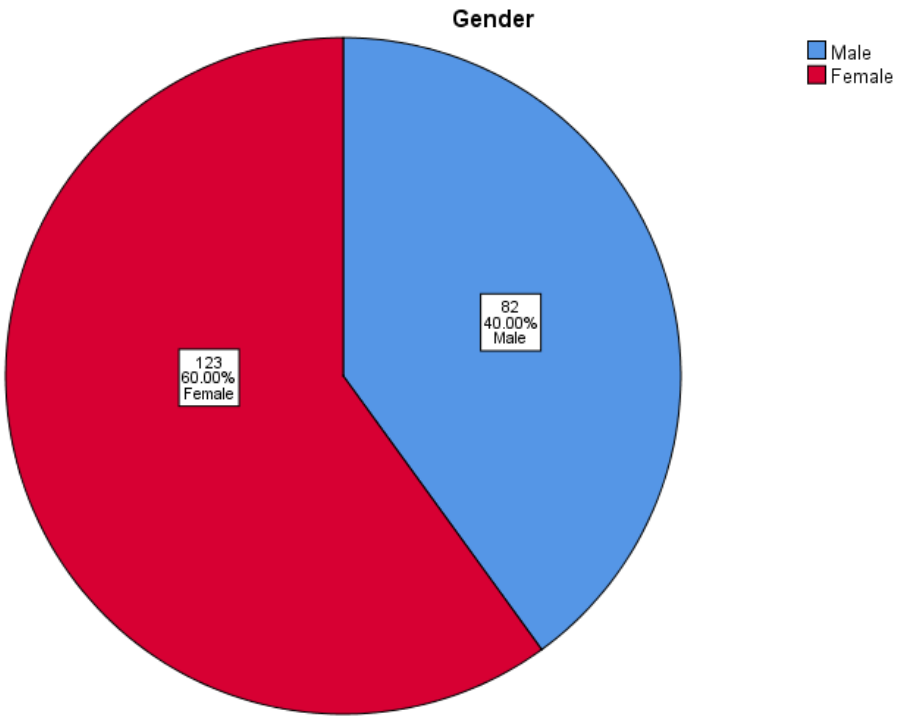

Figure 1: Gender based distribution of study participants.

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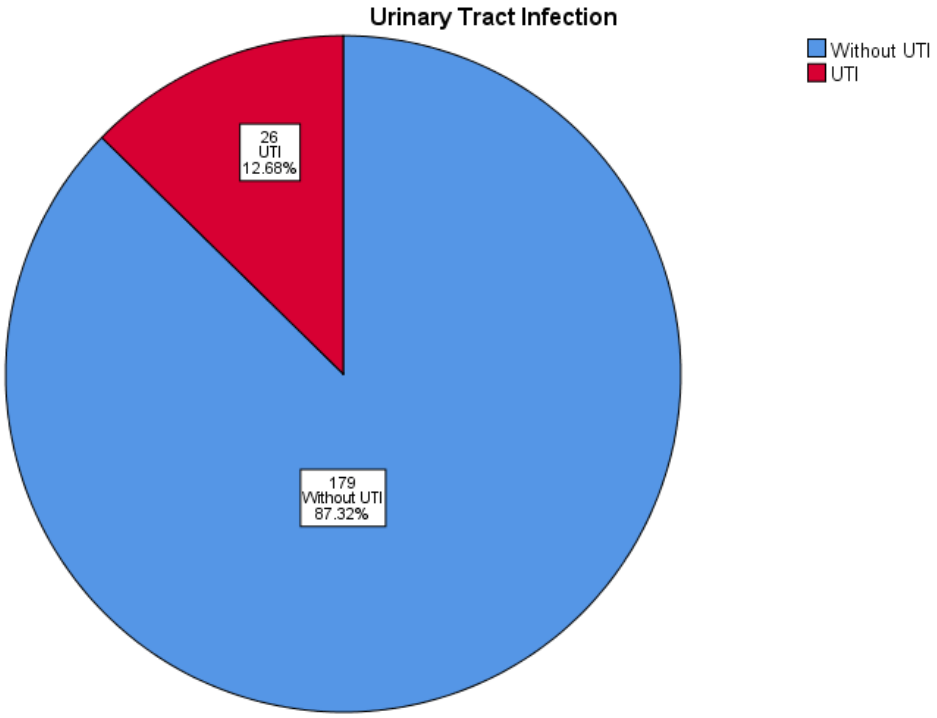

Figure 2: Study population with and without UTI.

Table 1: Association of risk factors with UTI.

Cross Tabulation and Chi-square Analysis				
Parameter Total(n)=205		**Patient groups**		**Chi-Square analysis**
		Group with UTI	**Group without UTI**	
		26 (12.68%)	179 (87.32%)	p-value
Age Group	Young n= 128 (62.43%)	16(61.53%)	112(62.56%)	0.003
	Elder n= 77 (37.57%)	10(38.47%)	67(37.44%)	
Gender	Male n= 82 (40.00%)	9(34.61%)	73(40.78%)	0.001
	Female n= 123 (60.00%)	17(65.39%)	106(59.22%)	
Marital Status	Single n= 80 (39.02%)	8(30.76%)	72(40.22%)	0.004
	Married n=125 (60.98%)	18(69.24%)	107(59.78%)	
Educational Status	Below Matric n= 146 (71.21%)	20(76.92%)	126(70.39%)	0.0001
	Above Matric n= 59 (28.79%)	6(33.08%)	53(29.61%)	

Socioeconomic Status	Lower Class n= 152 (74.14%)	15(57.69%)	137(76.53%)	0.005
	Middle Class n= 53 (25.86%)	11(42.31%)	42(23.47%)	
Previous Hx of UTI	Yes n= 32 (15.60%)	19(73.07%)	13(7.20%)	0.0002
	No n= 173 (84.40%)	7(26.93%)	166(92.80%)	
Family Hx of UTI	Yes n= 41 (20.00%)	17(65.38%)	24(13.40%)	0.0004
	No n= 164 (80.00%)	9(34.62%)	155(86.60%)	
Stone Hx/present in Urinary Tract	Yes n=10 (4.87%)	8(30.76%)	2(1.11%)	0.003
	No n=195 (95.13%)	18(69.24%)	177(98.89%)	
Hx of Holding Urine	Yes n=38 (18.53%)	14(53.84%)	24(13.40%)	0.05
	No n=167 (81.47%)	12(46.12%)	155(86.60%)	
Hx of recent use of Antibiotics	Yes n= 12 (5.85%)	4(15.38%)	8(4.46%)	0.04
	No n=193 (94.15%)	22(84.62%)	171(95.54%)	
Hx of Catheterization	Yes n= 16 (7.80%)	15(57.69%)	1(0.55%)	0.001
	No n=189 (92.20%)	11(42.31%)	178(99.45%)	
Hygienic Condition of External Genitalia	Good n=141(68.78%)	3(11.53%)	138(77.09%)	0.0005
	Poor n=64 (31.22%)	23(88.47%)	41(22.91%)	
Frequency of Intercourse	High n= 63 (30.73%)	18(69.23%)	45(25.13%)	0.04
	Low n= 142 (69.27%)	8(30.77%)	134(74.87%)	
Hx of Diabetes Mellitus	Yes n= 29 (14.14%)	17(65.38%)	12(6.70%)	0.002
	No n= 176 (85.86%)	9(33.62%)	167(93.30%)	
Hydration Status	No Dehydration n= 167 (81.46%)	5(19.23%)	162(90.50%)	0.0007
	Dehydration n= 38 (18.53%)	21(80.77%)	17(9.50%)	

DISCUSSION

This study showed the incidence of UTI in population of Rawalpindi, Pakistan, and factors that were associated with the UTI. The incidence of UTI in current study population was 12.68%. A study that was also conducted in Pakistan reported a little less prevalence of UTI in its study population (11.60%).[15] Higher prevalence (32.20%) of UTI has been noted in a study that was conducted in Uganda.[4] Higher prevalence might be due to more prevalence of factors among the study population of Uganda that predispose to UTI. A higher prevalence could be due to racial difference in the UTI as in literature, racial difference in the UTI prevalence has been mentioned.[16] Therefore, different strategies are required in different races for the prevention of the UTI.

UTI was significantly correlated with age group, gender, marital status, educational status, socioeconomic status, previous history of UTI, family history of UTI, history of stone in urinary

tract, history of recent use of antibiotics, history of catheterization, hygienic condition of external genitalia, frequency of intercourse, history of diabetes mellitus, and hydration status, while, UTI was not linked with the history of holding urine significantly. This current study indicates that UTI incidence was higher among the patients who had young age, female gender, married marital status, lower educational status, lower socioeconomic status, previous history of UTI, family history of UTI, history of stone in urinary tract, history of recent use of antibiotics, history of catheterization, poor hygienic condition of external genitalia, high frequency of intercourse, history of diabetes mellitus, and dehydration. In contrast patients who had advanced age, male gender, single marital status, higher educational status, middle socioeconomic status, no previous history of UTI, no family history of UTI, no history of stone in urinary tract, no history of recent use of antibiotics, no history of catheterization, good hygienic condition of external genitalia, low frequency of intercourse, no history of diabetes mellitus, and no dehydration had lower UTI incidence. In case of history of holding urine, the incidence was comparatively higher in the patients who had history of holding urine, in contrast to who had no history of holding urine, however, history of holding urine was not associated with UTI incidence significantly.

A study of Uganda showed similar results regarding the impact of age, gender, marital status as this current study indicated.[4] Significant association between UTI and educational status was also noted in a study that was conducted in Nigeria while a study of Ethiopia reported conflicting results about the link between UTI and educational status.[17,10] Lower socioeconomic status was also found to predispose people to UTI.[10] Previous history of UTI and family history of UTI were also found significant risk factors in a study, similar to current study.[11] A study that was conducted in United States of America supported the finding of this study regarding the link between urinary tract stone and UTI.[8] Recent use of antibiotics was also correlated with UTI in a study that was conducted at Jordan.[14] Catheterization was also found significant risk factor in another study as well just like this study.[11] Different studies presented similar consist results about influence of the poor genitalia hygiene and high frequency of intercourse on UTI incidence.[10,11,13] Diabetes mellitus also observed to predispose people to UTI in a research article.[4] A study that was carried out in United Kingdom support the result of current study that dehydration could lead to UTI.[12] Current study showed insignificant association between UTI and holding urine, whereas, a study in literature reported conflicting results and showed that holding urine could lead to UTI significantly.[11]

After comparing the results of this study with several studies in literature, it is agreeable that current study has highlighted essential points about the risk factors of UTI. A multidisciplinary team should develop a plan for the prevention of the UTI by modifying the modifiable risk factors of UTI and by application of special measures for the non-modifiable risk factors of UTI. By the reduction in UTI incidence, the quality of life of people could be improved and over load on hospitals could be reduced.

LIMITATIONS

Although, current study has put light on an important and common issue of the public, this study has a limitation which is its cross-sectional study design. Because of this, the current study could not find how these factors cause the UTI or predispose people to UTI. Further researches are required to assess and highlight how these factors could lead to UTI.

CONCLUSION

This current study showed high incidence of UTI in study population. Furthermore, it manifested that UTI incidence was higher among the patients who had young age, female gender, married marital status, lower educational status, lower socioeconomic status, previous history of UTI, family history of UTI, history of stone in urinary tract , history of recent use of antibiotics, history of catheterization, poor hygienic condition of external genitalia, high frequency of intercourse, history of diabetes mellitus, and dehydration, and these risk factors were linked with UTI incidence significantly. Association between history of holding urine and UTI was insignificant, even though, the incidence was comparatively higher in the patients who had history of holding urine, as compared to patients had no history of holding urine. Interventions are needed to prevent UTI by controlling the controllable factors and applying the special measures for non-modifiable factors.

RECOMMENDATIONS

People should be educated about the UTI and its causes and prevention. People should take special care when they are on antibiotics or when they are diabetics, to prevent UTI. People should maintain hygiene when they are catheterized and during intercourse. People should stay hydrated.

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