STUDY OF RISK FACTOR ANALYSIS OF URINARY TRACT INFECTION IN FEMALE PATIENT ATTENDING CHATTOGRAM MEDICAL COLLEGE HOSPITAL

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Session: 2019-2020

A thesis submitted in the partial fulfilment of the requirements for the degree of Master of Science in Public Health

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This is to certify that we have examined the above Master's thesis and have found that is complete and satisfactory in all aspects, and that all revisions required by the thesis examination committee have been made

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Munmun Sen

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Abstract:

Urinary Tract Infection (UTI) is a common contagion among men and women with the incidence relatively higher among women due to their differing anatomy. An understanding of the risk factors implicated in UTIs may help the policy makers and public health professionals to take preventive measures. There may be variation in the risk factors distribution among different geographical location and between different populations. This study aimed to investigate the distribution of different socioeconomic, behavioral, and clinical risk factors of UTI among female patients with UTI attended a tertiary hospital of Chattogram, Bangladesh. This descriptive cross-sectional study included conveniently selected 96 females with a laboratory confirmed UTI from the outpatient Department of Medicine and Department of Gynae & Obstetrics of Chattogram Medical College Hospital from May 2021 to 31st October 2021. Data regarding demographic, socioeconomic characteristics, behavioral and clinical features were collected with a structured case record form. Descriptive statistics were used for the results. Age ranged between 18-70 years and the most frequent age group was 21-30 years with 32 (33.3%) participants. Thirty (31.3%) women were in postmenopausal state and 50 (52.1%) were pregnant. The most common co morbid condition was diabetes mellitus reported by 13 (13.5%) patients. Amongst ABO blood group system, the most common group was B +ve (31.0%) followed by, O+ve (30.5%), A +ve (19.8%), and AB+ve (16.6%). Most of the women had symptomatic UTI (86.5%). The most common urinary symptom presented was burning micturition (75.9%) followed by frequency (39.8%), urgency (30.1%), painful voiding (28.9%), difficulty (4.8%), and nocturnal incontinence (1.2%). Majority of the patients had bacteriuria (92.7%). Most of the women (83.3%) reported to drink 1.0-3.0 liter of water daily. Seventy-five (78.1%) of the women reported to drink caffeinated beverage daily. Thirty-five (36.5%), and 33 (34.4%) of the women, respectively reported to have sexual activity <1/week and ≥1/week. Twenty-one (21.9%) have recurrent episode and 76.2% of them did not comply the previous prescription completely. Out of 96 females with UTI, Most common Risk Factor was infrequent voiding 42 (43.8%) followed by Unhealthy Sexual Practice 20 (20.9%), Diabetes Mellitus 13 (13.5%), Residual Urine due to Incomplete voiding 12 (12.5%), Inadequate water Intake 5 (5.2%), Maltreatment 4 (4.2%).

Keywords: Risk Factors. Urinary Tract Infection (UTI), Female, Tertiary Hospital**.**

Chapter 1: Introduction

1.1 Introduction

A urinary tract infection (UTI) is an inflammatory response at the level of the urothelium to fight a bacterial infection. A UTI is almost always associated with bacteriuria, the presence of bacteria in urine, and pyuria, the presence of white blood cells in the urine (Abou Heidar et al., 2019). A common health-care problem worldwide, UTI represents a disease of significant impact on every country's economy, being the most common cause of hospitalization among elderly people and the most common cause of antibiotic prescription in primary care. Diagnosing and managing upper and lower UTI have always been a challenge to physicians, given its high prevalence, risk of recurrence and improper treatment, and the fact of worldwide increase in antibiotic resistance, necessitating implementation of a proper antibiotic stewardship. UTIs are twice more likely to occur in females compared to males and its prevalence increases with increasing age (Tandogdu and Wagenlehner 2016).

Urinary infections carry a big toll on an individual's health including his mental health and sense of well-being. More than half of patients with UTI suffer from clinical depression and 38.5% suffer from anxiety, with a significant improvement in the quality of life after proper treatment and prophylaxis (Renard et al., 2015).

For a urinary infection to occur, there are many superimposing factors that interplay including host factors, inoculum size, and the virulence of the infecting bug. The first event that leads to a UTI is the inoculation. The most common theorem for inoculation is the ascending route. Enteric bacteria colonize the perineum and ascend into the urethra and bladder (Foxman 2002).

As for the recurrence of a urinary infection, multiple factors play a role. On the microbiological level, one theory is the decrease of peroxide-producing lactobacilli, predisposing to increased colonization with pathogenic enteric bacteria (Mulvey 2001). Another theorem is the formation of intracellular clusters of bacteria that are not sensitive to antibiotics, while others postulate a change in the glycosaminoglycan

barrier of the urothelium that makes an individual more susceptible to enteropathogenic infection (Rizvi and Siddiqui 2010).

Poor fluid intake, infrequent voiding and obesity significantly increased the occurrence of UTI (Renko et al., 2022). On an individual level, the risk factors for recurrent UTI vary among young, middle-aged, and elderly women. In young women, spermicide use, and frequency of sexual intercourse are the main risk factors evidenced by increased urethral and vaginal colonization (ter Riet et al., 2012). In contrast, older women's predisposing risk factors are high urinary residue, atrophic vaginitis, and cystocele (Raz and Naber 2011).

Risk factors in premenopausal women include sexual intercourse, changes in bacterial flora, history of UTIs during childhood or family history of UTIs, and blood group. Specific risk factors related to sexual intercourse include frequency (four or more times per week), the use of spermicides that may alter vaginal pH and thus affect its flora (particularly the Lactobacilli component), and engagement with a new sexual partner within the last year (Hooton et al., 1996). In a prospective study there was a high incidence of symptomatic UTIs among sexually active young women; this was strongly and independently associated with recent sexual intercourse and use of a diaphragm with spermicide, as well as with a history of recurrent UTIs. Lack of postcoital urination, vaginal douches, use of hot tubs, restrictive underwear, and the hygiene and circumcision status of male partners have been proposed as risk factors but lack an evidence base (Hooton et al., 1996; Scholes et al., 2000).

Appropriate preventive measures are the best tactic to alleviate the burden of recurrent UTIs. Risk factors need to be assessed in the general population and applied when assessing individual patients with recurrent UTIs. Prospective studies in different patient populations are needed to better understand the risk factors of UTI. The present study was undertaken to ascertain the frequency and pattern of urinary symptoms as well as the risk factors of UTI among women with UTI attending a tertiary hospital in Bangladesh.

1.2 Objectives

1.2.1 General objective

- To analyze the frequency of different demographic, behavioral, and clinical risk factors of UTI among female patients with UTI attended a tertiary level Hospital in Bangladesh.

1.2.2 Specific objectives

1. To describe the sociodemographic characteristics of the participants
2. To describe the symptoms associated with UTI
3. To describe the menstrual, pregnancy, and sexual history of the participants
4. To determine the health care and sanitation related risk factors

Chapter 2: Review of Literature

Urinary tract infection (UTI) is a significant health-care problem worldwide, often seen in outpatient clinics, emergency department visits, as well as in hospitalized patients. Prevalence of UTI and its associated factors among female are underreported in Bangladesh. In the following sections the overview of UTI, its burden, and risk factors are described in brief.

2.1. Definition and classification of UTI:

UTI can be characterized into either first, unresolved, or recurrent infections. A first UTI is one that occurs in a person with no previous or a remote infection. An unresolved UTI is a re-infection with the same bug and similar antibiogram to a previous UTI treated with appropriate antibiotics. A recurrent UTI occurs after resolution of the previous infection. Conflicting definitions for recurrent UTIs exist; however, most specialists agree that to be considered recurrent, the patient needs to have suffered more than two episodes in the last 6 months or more than three episodes in the past year (Abou Heidar et al., 2019). UTIs can also be stratified as healthcareassociated urinary tract infection (HAUTI) and community-associated urinary tract infection (CAUTI). Location of the infection within the urinary tract is usually classified as cystitis, pyelonephritis and urosepsis (Tandogdu and Wagenlehner 2016).

2.2. UTI as a public health concern

2.2.1. Epidemiology of UTI

The prevalence of CAUTI is 0.7% (Tandogdu and Wagenlehner 2016). The treatment and diagnosis of UTI accounts for an approximate 6 billion US dollars of expenditures. Bladder infections or cystitis alone accounts for >10 million office visits and 1 million emergency department visits and >2 billion dollars as annual health-care cost in the US alone due to various prescriptions and diagnostic tests. A UTI is twice more likely to occur in women than men over all age groups and accounts for 1.2% of all office visits by women (Foxman 2014; Schappert and Rechtsteiner 2011). A third

of women are diagnosed with a UTI before the age of 24 years and half develop at least one episode by 35 years of age (Foster 2008). Up to 70% of women will suffer from a UTI during their lifetime, and of those, 30% will have recurrent UTIs (Albert et al., 2004).

2.2.2. Etiology of UTI:

The leading pathogen in uncomplicated CAUTI is Escherichia coli, followed by Proteus spp., Staphylococcus saprophyticus, Klebsiella spp. and other Enterobacteriaceae. P revalence of Proteus spp. is more frequent after the age of 50, whereas S. saprophyticus is less common in this age group. In patients with underlying complicating factors such as diabetes, spinal injury and other comorbidities, less virulent pathogens such as Candida spp. and Enterococcus spp. Become more prominent. The spectrum of pathogens is similar in upper and lower UTIs. Depending on the clinical case in CAUTIs, antibiotic choices are fosfomycin, nitrofurantoin, trimethoprim/ sulphamethoxazole, ciprofloxacin, gentamicin, cephalosporins and where available pivmecillinam. Resistance to these antibiotics depends on the geographical location. The lowest observed resistance was for fosfomycin (range: 0–2.9%), nitrofurantoin (range: 0–4.4%) and mecillinam (range: 0–4%). Resistance to almost all antibiotics in HAUTIs is above 20% and there is a significant geographical variation (Tandogdu and Wagenlehner 2016).

2.2.3. Risk factors of UTI:

Main risk factors identified for UTI in the community setting are age, previous history of UTI, sexual activity, and diabetes mellitus.

In women there is a trend of decrease in UTIs at middle ages (35–65) with a followed increase after the age of 65 (Griebling 2005). After 65 years of age in no ninstitutionalized people, the rate of UTI was 10.9% for men and 14% for women. In women after the age of 85, one-third were diagnosed with UTI within a 1-year period and two-thirds in a 5-year period. Specific risk factors in this group of patients were vertebral fractures, incontinence, rheumatic disease, and multi-infarct dementia (Eriksson et al., 2010).

History of previous UTI has been found to be associated with a higher risk of developing a CAUTI in young women. A study conducted among postmenopausal

women up to the age of 75 identified that a lifetime number of UTIs more than five was the strongest predictor of a new UTI (Jackson 2004).

Recent sexual intercourse within the past 48 hours both in young and postmenopausal women has been found to be an independent risk factor for acute symptomatic UTI (Hooton et al., 2000; Moore et al., 2008). In a recent study, frequency of sexual intercourse among young women was associated with higher rate of symptomatic UTI (Vincent et al., 2013). Additionally, this study identified a higher rate of caffeine intake in cases with UTI.

Foxman et al. (2001) conducted a case–control study to explore the role of health behavior and sexual and medical history on UTI risk among otherwise healthy women aged 40–65. Cases and controls were recruited from nine practices and clinics in Michigan and a single clinic in Israel. In both countries, several factors were reported significantly more frequently among UTI cases than controls: a previous UTI within 12 months, incontinence symptoms, a recent episode of 30-plus minutes of cold hands, feet, back or buttocks, and recent antibiotic use. Cases were less likely than controls to report recent estrogen use, but the results were only statistically significant in Michigan. Sexual activity during the previous 2 weeks and having ceased menses were modestly, but not statistically significantly, protective at both study sites.

Hooton et al. (1996) observed that among sexually active young women the incidence of symptomatic urinary tract infection is high, and the risk is strongly and independently associated with recent sexual intercourse, recent use of a diaphragm with spermicide, and a history of recurrent urinary tract infections.

Scholes et al. (2000) set out to define host factors associated with an increased risk of recurrent UTI, in a case-control study among university women and health maintenance organization enrollees. In a multivariate model, independent risk factors for recurrent UTI included recent 1-month intercourse frequency, 12-month spermicide use, and new sex partner during the past year. Two newly identified risk factors were age at first UTI $\leqslant$15 years and UTI history in the mother. Blood group and secretor phenotype were not associated with recurrent UTI. In young women, risk factors for sporadic UTI are also risk factors for recurrence. Two predictors suggest that genetic/long-term environmental exposures also predispose to recurrent UTI.

Geerlings et al. (2000) observed that independent risk factors for the development of a UTI include sexual intercourse in women with type 1 diabetes and asymptomatic bacteriuria at study entry in women with type 2 diabetes. Poor regulation of diabetes or the presence of neuropathy, bladder residue, macroalbuminuria, or macrovascular complications did not increase the risk of UTI development. Thus, the risk factors for UTI development in diabetic women are the same as those reported for women without diabetes.

Hu et al. (2004) conducted a population-based, case-control study of women aged between 55 and 75 years. Cases were identified using computerized laboratory and outpatient records. Controls were randomly selected from the plan's enrollment files. They interviewed subjects regarding their habits, general health, and potential risk factors for UTI. They observed that, like younger women, postmenopausal women with current UTI were more likely to be sexually active and have a history of UTI. Like older debilitated women, study subjects were more likely to have diabetes mellitus and to be incontinent. Oral estrogen replacement did not reduce UTI risk.

Haider et al. (2010) set out to determine the frequency, risk factors and pattern of urinary complaints during pregnancy. Out of 232 women, 46.5% reported urinary symptoms which were due to pregnancy induced changes on urinary system as no growth was obtained on urine culture, while 4.3% were due to underlying UTI. Most common urinary symptom in these women was abnormal voiding pattern 40.3% followed by irritative symptoms and voiding difficulties. Illiteracy, history of sexual activity, low socioeconomic (monthly income < Rs. 10,000 / month) group, past history of UTI and multiparity were found to be risk factors for UTI in these women.

From the above discussion, it was evident that female UTI is a significant health care problem. Risk factors associated with UTI differs among geographical regions and among different age groups. In this regard, to provide local evidence for the policymakers, clinicians, and public health professionals, this study was conducted in a tertiary level hospital in Chattogram, Bangladesh to determine the prevalence of different risk factors among female patients with UTI.

Chapter-3: Materials and Methods

Following approval by the Ethical and Research Committee of Chattogram Veterinary and Animal Sciences University (CVASU), an observational study was carried out to explore the determine the prevalence of different risk factors among female patients with UTI attended a tertiary level hospital in Chattogram, Bangladesh. Informed consent was obtained from the participants who were included in the study. The study was conducted based on the following methodology:

3.1. Study design: This was a descriptive type of cross-sectional study.

3.2. Study period: This was a 06 (six) months study commencing from May 2021 to 31st October 2021. For the study , the total study period was divided into different parts based on the tasks of the study , including topic selection, ethical approval, questionnaire development, data collection, data analysis, manuscript writing, etc., as detailed in appendix A.

3.3. Place of the study: The outpatient department of Chittagong Medical College Hospital (CMCH), Chattogram, Bangladesh. It is the second largest public tertiary level hospital in Bangladesh.

3.4. Reference population: Female patients attended the hospital with symptomatic or asymptomatic UTI.

3.5. Source population: Female patients attended the CMCH with symptomatic or asymptomatic UTI.

3.6. Sample size: Sample size was determined by the following formula:

$$n = \frac{z^2 \times p \times q}{d^2}$$

Where,

n= Expected sample size

z= 1.96, the standard normal deviation set as1.96 with 95% confidence interval.

p= proportion in the target population estimated to have a particular characteristic (Proportion of female having risk factor for UTI), 50%= 0.50 (Assumed)

q=1-p =1- 0.50 = 0.50

d= is degree of accuracy desired or maximum allowable difference from true proportion which was set at 0.1 (10%) at 95% confidence interval.

So,

$$n = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.10)^2} \cong 96$$

3.7. Sampling technique: Non-probability type of convenience sampling was done for the study.

3.8. Selection criteria

3.8.1 Inclusion criteria

1. Diagnosed case of UTI
2. Age more than 18 years
3. Agreed to participate in the study and gave their informed consent.

3.8.2 Exclusion criteria

1. Severely ill patients.
2. Patients unable to communicate
3. Patients not willing to give written consent.

3.9. Research Instrument: The study used structured, pretested, interview-administered questionnaires as its data collection tool.

3.10. Data processing and analysis

After collecting the data, these were checked and rechecked for omission, inconsistencies, and improbabilities. The researcher studied all questionnaires immediately after completion on site of data collection for missing fields. Obtained data were preserved in a secured place with strict confidentiality under the direct responsibility of the thesis applicant.

Then data was checked, followed by editing, coding, and entering the computer. Data analysis was performed by statistical package for social science (SPSS), version-25. An appropriate statistical method was used after encoding data. Descriptive statistics were used to describe demographic data. The student's t-test was used to compare the mean DASS-21 scores between the two groups. The result was presented with appropriate text, tables, and figures.

3.11Ethical considerations

- This study was conducted after approval from the Research cell and Ethical committee of Chattogram Veterinary and Animal Sciences University.
- Permission was taken from the factory's Human Resources (HR) department after explaining the study, its objectives, and methodology.
- Written informed consent was taken from each of the participants in this study. The participants were not influenced or insisted on responding. Participation in the study was entirely voluntary, and they received no benefit for the same. Participants were briefed about the purpose and procedure of the study in detail, the implications, and detailed study-related information was read out and explained in the local language from a printed handout. All aspects, including confidentiality and rights not to participate or withdraw from the study, were specially communicated. No identifying information was recorded in the questionnaire and kept in a separate file to which only the researchers have access. The research findings will be presented in sufficiently aggregated form to ensure no participants can be identified**.**

As per the rule of the Ethical Committee of CVASU-

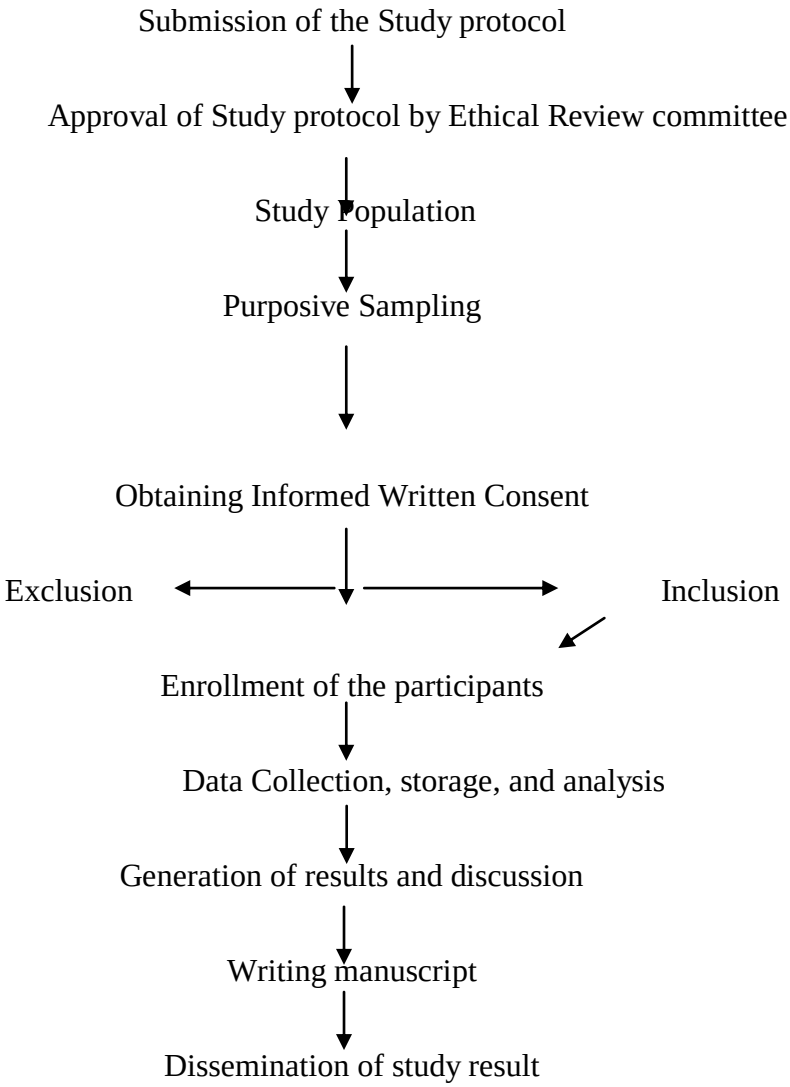
1. Participation was voluntary.
2. Consent was obtained after a brief study in Bangla, and technical terms were explained to all respondents wherever appropriate.
3. It was clear to them that they are free to take part/ withdraw from the study at any stage.
4. All personal information will be confidential and will not be disclosed. Other responses will be used solely for the study purpose.

5. Interview was taken at a suitable time convenient to the respondents.
6. The researcher did not intervene to establish any desired outcome.
7. The researcher informed the concerned authority when any problem or confusion arose.

3.12. Data collection procedure

The researcher herself collected the data from different outpatient departs of CMCH. All the interviews were conducted only upon receiving verbal consent from the participants considering low readability and high concerns about confidentiality in Bangladesh. Participants were free to stop the discussion anytime and refuse to answer any question they did not want. The data were collected by face-to-face interviews and revieing the medical records. A woman is said to have symptoms of UTI when she had one or more of any of the following symptoms on the basis of history: increased frequency of micturition, burning micturition, and painful micturition (Johansen et al., 2011). Asymptomatic bacteriuria was defined as the presence of more than 1×10^5 colony forming unit (CFU) per millilitre of one organism in a culture of clean voided midstream urine from a patient without fever or symptoms of UTI (Johansen et al., 2011). A woman was said to have symptomatic bacteriuria when any symptom of UTI was present, and the colony count in a single culture was 10^3 or more (Muthulakshmi et al., 2017). A woman was said to UTI when either of asymptomatic bacteriuria or symptomatic bacteriuria was present (Muthulakshmi et al., 2017).

3.13. Study flow chart



3.14. Study Variables

3.14.1. Sociodemographic variables

1. Age
2. Educational status
3. Monthly family income
4. Type of family
5. Number of children

3.14.2. Variables related to the symptoms of UTI

1. Dysuria
2. Frequency
3. Urgency
4. Hematuria
5. Painful voiding
6. Nocturnal incontinence

3.14.3. Variables related to menstruation and pregnancy

1. Menstrual history
2. Pregnancy status

3.14.4. Variables related to behaviour and sanitation

1. History related to sexual activity
2. Pregnancy status
3. Daily water consumption
4. Habit of caffeinated drink

3.14.5. Variables related to treatment and clinical condition

1. Type of UTI
2. Location of UTI
3. History of previous episode
4. Associated comorbid condition
5. Blood group

Chapter- 4: Results

Table I: Distribution of the participants by their age groups (n=96)

Age group	Frequency	Percentage
≤20 years	15	15.6
21-30 years	32	33.3
31-40 years	16	16.7
41-50 years	12	12.5
51-60 years	11	11.5
61-70 years	10	10.4

The minimum age of the participants was 18 years, and the maximum age was 70 years in the study. The most frequent age group was 21-30 years with 32 (33.3%) participants in this age group.

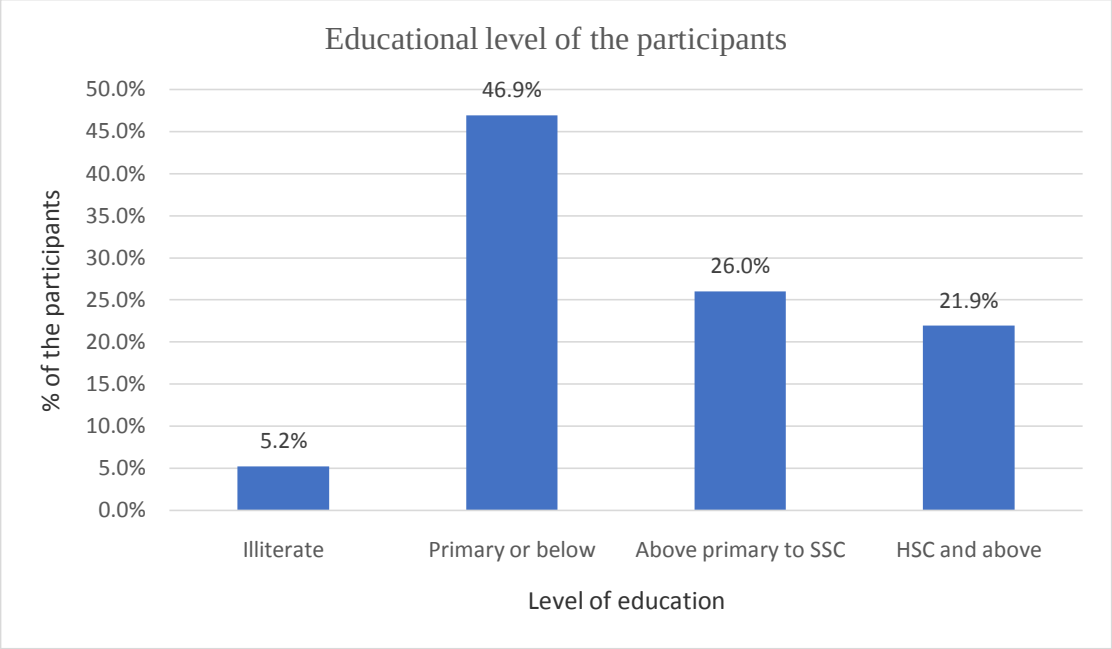


Figure 1: Educational status of the respondents (n=96)

The highest number of the respondents were educated up to primary level (45/96, 46.9%), while very few (5/96, 5.2%) reported to not having any formal education. Twenty-five (26.0%), and 21 (21.9%) of the participants, respectively had education above primary to SSC and HSC & above level were uneducated (Figure 1).

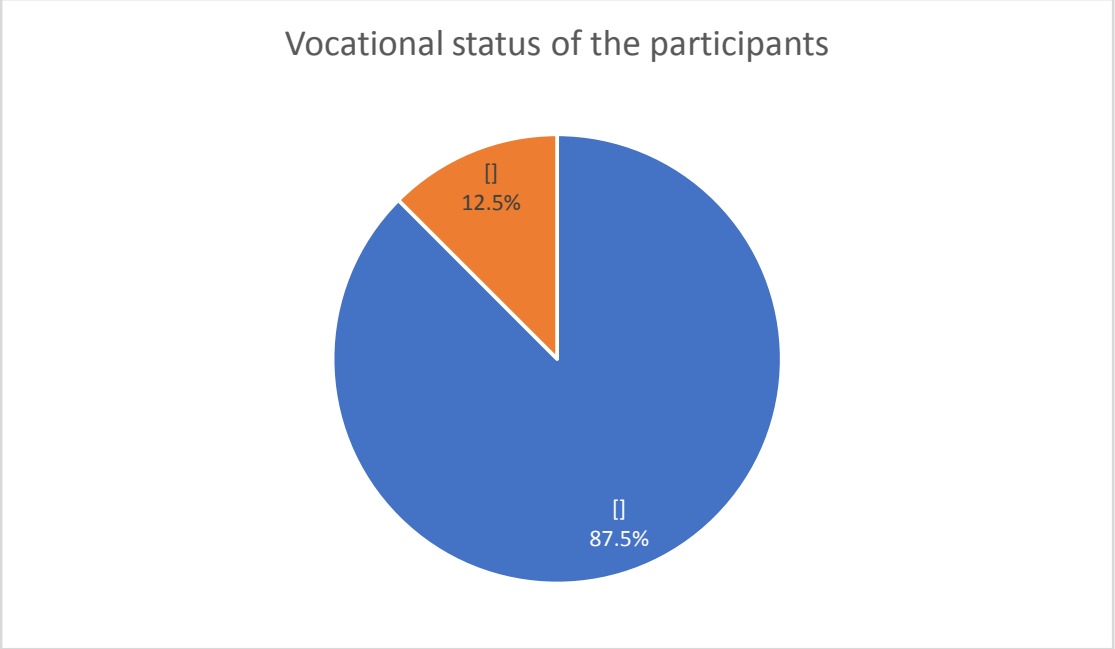


Figure 2: Vocational status of the participants (n=96)

Most of the women were housemaker (84/96, 87.5%) in the current study and only 12 (12.5%) reported to work outside home.

Table II: Family characteristics of the participants (n=96)

Characteristics	Frequency	Percentage
Type of family		
Nuclear	61	63.5
Joint	35	36.5
Monthly family income		
<5000 taka	6	6.3
5000-1000 taka	55	57.3
10000-20000 taka	25	26.0
>20000 taka	10	10.4
Total number of children		
No	11	11.5
1-2	70	72.9
>2	15	15.6

About two-third of the participants belonged to a nuclear family (61/96, 63.5%). Most of the participants (55/96, 57.3%) reported to have a monthly family income of 5000-10000 taka. Majority of the women (70/96, 72.9%) reported to have 1-2 children (Table 2).

Table III: Menstrual and pregnancy status of the participants (n=96)

Characteristics		Frequency	Percentage
Menstrual status			
	Premenopausal	66	68.8
	Postmenopausal	30	31.3
Pregnancy status			
	Pregnant	50	52.1
	Not pregnant	46	47.9

Out of 96 women, 30 (31.3%) were in postmenopausal state and 50 (52.1%) were pregnant (Table III).

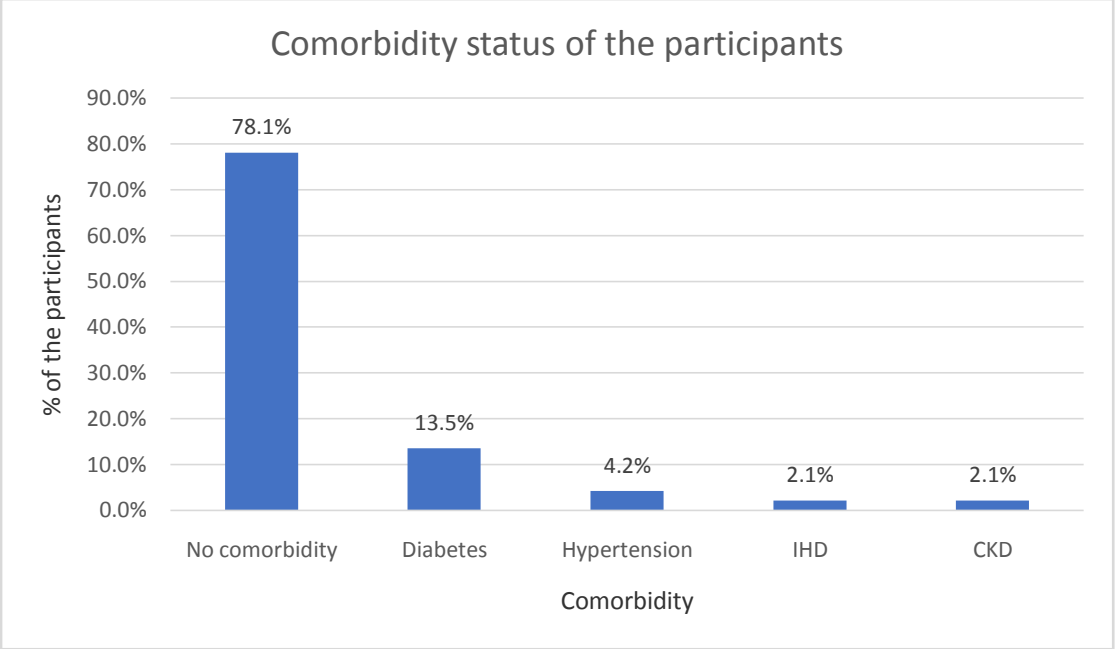


Figure 3: Comorbidity status of the patients

Most of the patients (75/96, 78.1%) had no associated comorbid condition. The most common comorbid condition was diabetes mellitus reported by 13 (13.5%) patients, followed by hypertension (4.5%), ischemic heart disease (2.1%), and chronic kidney disease (2.1%).

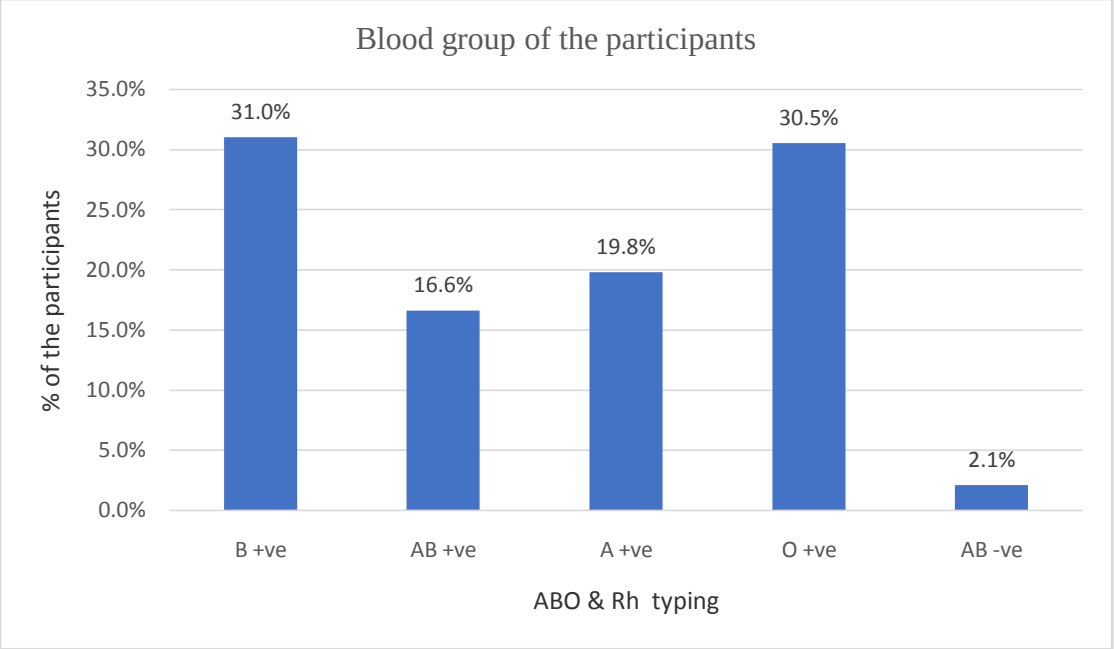


Figure 4: Distribution of ABO and Rhesus blood groups of study population

Amongst ABO blood group system, the most common group was B +ve (31.0%) followed by, O+ve (30.5%), A +ve (19.8%), and AB+ve (16.6%). Only two women were rhesus negative in this study (Figure 4).

Table IV: Symptoms, type, and location of UTI among the patients (n=96)

Characteristics	Frequency	Percentage
Type of UTI		
Asymptomatic	13	13.5
Symptomatic	83	86.5
Symptoms of UTI (n=83)		
Burning micturition	63	75.9
Frequency	33	39.8
Urgency	25	30.1
Painful voiding	24	28.9
Difficulty	4	4.8
Nocturnal incontinence	1	1.2
Location of UTI		
Bacteriuria/Urosepsis	89	92.7
Cystitis	4	4.2
Pyelonephritis	3	3.1

Most of the women had symptomatic UTI (83/96, 86.5%). The most common urinary symptom presented was burning micturition (75.9%) followed by frequency (39.8%), urgency (30.1%), painful voiding (28.9%), difficulty (4.8%), and nocturnal incontinence (1.2%). Majority of the patients had bacteriuria (89/96, 92.7%).

Table V: Behavioral, sexual and sanitation related characteristics of the participants

Characteristics	Frequency	Percentage
Daily water consumption		
0.5-1.0 liter	5	5.2
1.0-3.0 liter	80	83.3
>3.0 liter	11	11.5
Drink caffeinated beverage		
Yes	75	78.1
No	21	21.9
Sexual activity		
None	28	29.2
<1/week	35	36.5
≥1/week	33	34.4
Residential accommodation		
Damp	26	27.1
Fairly healthy	58	60.4
Clean residential area	12	12.5
Toilet		
Squatting	90	93.8
Sitting	6	6.3

Most of the women (80/96, 83.3%) reported to drink 1.0-3.0 liter of water daily and five (5.2%) reported to drink <1.0 l of water daily. Seventy-five (78.1%) of the women reported to drink caffeinated beverage daily. Thirty-five (36.5%), and 33 (34.4%) of the women, respectively reported to have sexual activity <1/week and ≥1/week.

Table VI: Previous UTI related treatment history of the participants (n=96)

Variables	Frequency	Percentage
History of UTI		
No	75	78.1
Yes	21	21.9
Compliance to previous treatment		
Took drugs according to prescription	5	23.8
Did not follow the prescription	16	76.2

Out of 96 females with UTI, 21 (21.9%) have recurrent episode. Most of the women (76.2%) having recurrent UTI reported that, they did not comply the previous prescription completely.

Table VII: Showing the Frequency of risk factors in Urinary tract infection (n=96)

Sl. No	Name of the Risk Factor	Frequency	Percentage
1	Infrequent voiding	42	43.8
2	Unhealthy Sexual Practice	20	20.9
3	Diabetes Mellitus	13	13.5
4	Residual Urine due to Incomplete voiding	12	12.5
5	Inadequate water intake	5	5.2
6	Maltreatment	4	4.2

Out of 96 females with UTI, Most common Risk Factor was infrequent voiding 42 (43.8%) followed by Unhealthy Sexual Practice 20 (20.9%), Diabetes Mellitus 13 (13.5%), Residual Urine due to Incomplete voiding 12 (12.5%), Inadequate water Intake 5 (5.2%), Maltreatment 4 (4.2%).

Chapter-5: Discussion

Risk factors for UTIs may be behavioral, anatomical, or genetic in nature, and will vary depending on both the population being considered and the form of UTI. The present study was conducted to the frequency of different risk factors of UTI among female patients with UTI attended a tertiary level hospital in Bangladesh. Ninety-six women with a diagnosis of UTI were included in the study from the OPD of CMCH.

The minimum age of the participants was 18 years, and the maximum age was 70 years in the study. The most frequent age group was 21-30 years with 32 (33.3%) participants in this age group. In a previous study (Muthulakshmi and Gopalakrishnan 2017) 44% females belonged to 15–24 years age group followed by 36% in 35-44 years age group and 20% in 25-34 years age group. Most of the women with UTI were in the reproductive age and sexually active.

The highest number of the respondents were educated up to primary level (46.9%), while very few (5.2%) reported to not having any formal education. Most of the women were housemaker (87.5%) in the current study and only 12 (12.5%) reported to work outside home. About two-third of the participants belonged to a nuclear family (63.5%). Most of the participants (57.3%) reported to have a monthly family income of 5000-10000 taka. Majority of the women (72.9%) reported to have 1-2 children. The study was conducted in a public tertiary hospital and the women from the low and lower middle-income groups are the usual client for this type of hospital in Bangladesh. The distribution of sociodemographic characteristics was found to be almost similar to the findings of other studies done in similar settings (Muthulakshmi and Gopalakrishnan 2017; Shaifali et al., 2012; Subhashini et al., 2016).

Out of 96 women, 31.3% were in postmenopausal state and 52.1% were pregnant. UTI is similarly prevalent in premenopausal and post-menopausal state due to different risk factors. Transient conditions such as pregnancy may predispose to UTI or increase the risk of serious complications from infection (Storme et al., 2019). A study from India (Kant et al., 2017) observed that the burden of UTI among pregnant women attending antenatal clinic of a sub-district hospital was considerable, more so among the women that presented with symptoms suggestive of UTI. Vulvovaginal

atrophy is a risk factor for UTI in menopausal age group. In addition, factors such as urinary incontinence, anterior vaginal wall prolapse, increased postvoid residual urine volume, and intermittent or permanent urinary catheterization predispose to complicated UTIs in menopausal women (Storme et al., 2019).

Most of the patients (78.1%) had no associated comorbid condition. The most common comorbid condition was diabetes mellitus reported by 13.5% of the patients, followed by hypertension (4.5%), ischemic heart disease (2.1%), and chronic kidney disease (2.1%). Urinary tract infections are more common, more severe, and carry worse outcomes in patients with type 2 diabetes mellitus. They are also more often caused by resistant pathogens (Nitzan et al., 2015). The increased risk of UTI among diabetic patients, coupled with the increase in the incidence of type 2 diabetes mellitus worldwide in recent years, may impose a substantial burden on medical costs (Yu et al., 2014).

Amongst ABO blood group system, the most common group was B +ve (31.0%) followed by, O+ve (30.5%), A +ve (19.8%), and AB+ve (16.6%). Only two women were rhesus negative in this study. The blood group distribution was similar to the general population of Bangladesh (Dipta et al., 2011). Recently, Al Sulaiman et al. (2022) observed from their retrospective analysis that patients with non-O group type were statistically significant associated with higher rate of recurrent catheter associated UTI and multidrug resistant organisms.

Most of the women had symptomatic UTI (86.5%). The most common urinary symptom presented was burning micturition (75.9%) followed by frequency (39.8%), urgency (30.1%), painful voiding (28.9%), difficulty (4.8%), and nocturnal incontinence (1.2%). Majority of the patients had bacteriuria (92.7%). In the study of Muthulakshmi (2017), out of 20.4% who had UTI, 76% had symptomatic bacteriuria and 24% had asymptomatic bacteriuria. The most common urinary symptom presented was dysuria micturition (73.4%) followed by frequency (43.9%), urgency (20.9%), painful voiding (20.1%), difficulty (5.0%), and nocturnal incontinence (1.4%) in another study from India (Shaifali et al., 2012).

Most of the women (83.3) reported to drink 1.0-3.0 liter of water daily and five (5.2%) reported to drink <1.0 l of water daily. Although primary and secondary intervention studies evaluating the impact of fluid intake are lacking, published data

from observational studies appears to suggest that chronic low fluid intake may be an important factor in the pathogenesis of different renal diseases including UTI (Lotan et al., 2013). Seventy-five (78.1%) of the women reported to drink caffeinated beverage daily. Previously it was observed that caffeinated beverage consumption also increased the risk of urinary tract infection (Vincent et al., 2013). Thirty-five (36.5%), and 33 (34.4%) of the women, respectively reported to have sexual activity <1/week and ≥1/week. Specific risk factors related to sexual intercourse include frequency (four or more times per week) (Storme 2019). Recent sexual activity, the frequency of that activity and the number of sexual partners pose an increased risk of urinary tract infection (Vincent et al., 2013).

Out of 96 females with UTI, 21 (21.9%) have recurrent episode. Most of the women (76.2%) having recurrent UTI reported that, they did not comply the previous prescription completely. Recurrent UTIs, presenting as dysuria or irritative voiding symptoms, are most commonly caused by reinfection with the original bacterial isolate in young, otherwise healthy women with no anatomic or functional abnormalities of the urinary tract. Frequency of sexual intercourse is the strongest predictor of recurrent urinary tract infections in patients presenting with recurrent dysuria. In those who have comorbid conditions or other predisposing factors, recurrent complicated urinary tract infections represent a risk for ascending infection or urosepsis (Kodner and Gupton 2010).

Out of 96 females with UTI, Most common Risk Factor was infrequent voiding 42 (43.8%) followed by Unhealthy Sexual Practice 20 (20.9%), Diabetes Mellitus 13 (13.5%), Residual Urine due to Incomplete voiding 12 (12.5%), Inadequate water Intake 5 (5.2%), Maltreatment 4 (4.2%). Poor fluid intake, infrequent voiding and obesity significantly increased the occurrence of UTI (Renko et al., 2022).In contrast, older women's predisposing risk factors are high urinary residue, atrophic vaginitis, and cystocele (Raz and Naber 2011). Lack of postcoital urination, vaginal douches, use of hot tubs, restrictive underwear, and the hygiene and circumcision status of male partners have been proposed as risk factors (Hooton et al., 1996; Scholes et al., 2000).

Chapter-6: Conclusions

6.1. Conclusion

In conclusion, this series of women with UTI was predominantly young adult, with one third in postmenopausal state and more than half were pregnant. The most common co morbid condition was diabetes mellitus. Most of the women had symptomatic Urinary tract infection. The most common urinary symptom presented was burning micturition. Majority of the patients had bacteriuria. Majority of them reported to drink caffeinated beverage daily and drinks adequate water. Most of them were sexually active. Twenty-one (21.9%) have recurrent episode and 76.2% of them did not comply the previous prescription completely. Most common Risk Factor was infrequent voiding followed by Unhealthy Sexual Practice, Diabetes Mellitus, Residual Urine due to Incomplete voiding, Inadequate water Intake, Maltreatment. The chances of urinary tract infection increase in the presence of risk factors. The risk factors should be avoided to prevent the development of urinary tract infection.

6.2. Limitations of the study

Results of the present study should be interpreted in the light of the following limitations:

- First, the sampling method adopted may hinder the generalizability of our results.
- Study findings may be subject to recall bias due to the self-reported nature of the survey.
- A cross-sectional design without any control group was not suitable for risk factor analysis.

Chapter-7: Recommendations and Future perspectives

The findings of the current study have important implications from the perspective of health policy. In the light of this research work, the researcher recommended the following

- Proper health educational program regarding the hygiene practice.
- Screening of the pregnant women, menopausal women, and diabetic women to diagnose UTI early for appropriate treatment.
- Prospective studies in different patient populations are needed to better understand the risk factors of UTI.

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Chapter – 8: Appendices

Appendix A: Schedule of works

Activities	1st month	2nd month	3rd month	4th month	5th month	6th month
Ethical Approval						
Designing the study						
Sample and Data collection, Microbiological study						
Data analysis and result generation						
Writing the manuscript						
Submission and Presentation of thesis						

Appendix B: Informed Consent form (English Version)

Title of the Study: "**Study of Risk Factor Analysis of Urinary Tract Infection In Female Patient attending Chittagong Medical College Hospital."**

Date and Time of Interview-

Name-

Address-

I know all the steps involved in this research. I am well explained the purpose, procedure, and the fate of the research data and also informed about how much time it will need to respond. I have understood the matter very well and am also satisfied with the explanation. I have provided a written information sheet with details of the study.

I have clearly understood that other participants and I will benefit by participating in this research. During any stage of the study, I can withdraw my consent, and this decision will not hamper my job.

I have also clearly understood that the researcher will be there to resolve the issue during the research activity if I have any queries or problems. I also know that my information will be kept confidential and anonymous. I know that only the study's results, not the personal information, will be published.

I have read or heard the paper explaining the research thoroughly and agreed to participate in the study as a respondent with a profound understanding.

_____ _____

Signature of the participant with date Signature of the researcher with date

Appendix B: Informed Consent form (Bengali version)

সম্মতিপত্র

গবেষণার শিরোনাম: "চট্টগ্রাম মেডিকেল কলেজ হাসপাতালে মহিলা রোগীর ইউটিআই-এর রিস্ক ফ্যাক্টর বিশ্লেষণের গবেষণা"

সাক্ষাৎকারের তারিখ ও সময়-

নাম-

ঠিকানা-

আমি এই গবেষণা জড়িত সব পদক্ষেপ জানি. আমি গবেষণা ডেটার উদ্দেশ্য, পদ্ধতি এবং ভাগ্য ভালভাবে ব্যাখ্যা করেছি এবং উত্তর দিতে কত সময় লাগবে সে সম্পর্কে অবহিত করেছি। আমি বিষয়টি খুব ভালোভাবে বুঝি এবং ব্যাখ্যায় সন্তুষ্ট। আমি অধ্যয়নের বিবরণ সহ একটি লিখিত তথ্য শীট প্রদান করেছি।

আমি স্পষ্টভাবে বুঝতে পেরেছি যে অন্যান্য অংশগ্রহণকারীরা এবং আমি এই গবেষণায় অংশগ্রহণ করে উপকৃত হব। সমীক্ষার যেকোনো পর্যায়ে, আমি আমার সম্মতি প্রত্যাহার করতে পারি এবং এই সিদ্ধান্ত আমার চাকরিতে বাধা সৃষ্টি করবে না।

আমি স্পষ্টভাবে বুঝতে পেরেছি যে গবেষণা কার্যক্রম চলাকালীন আমার কোনো প্রশ্ন বা সমস্যা থাকলে তা সমাধানের জন্য গবেষক সেখানে থাকবেন। আমি এটাও জানি যে আমার তথ্য গোপন ও বেনামী রাখা হবে। আমি জানি শুধুমাত্র সমীক্ষার ফলাফল প্রকাশ করা হবে, ব্যক্তিগত তথ্য নয়।

আমি গবেষণাটি পুঙ্খানুপুঙ্খভাবে ব্যাখ্যা করে পেপারটি পড়েছি বা শুনেছি এবং গভীর বোঝার সাথে উত্তরদাতা হিসাবে অধ্যয়নে অংশ নিতে সম্মত হয়েছি।

অংশগ্রহণকারীর নামঃ	**গবেষকের নামঃ**
স্বাক্ষরঃ	**স্বাক্ষরঃ**
তারিখঃ	**তারিখঃ**

Appendix C: Questionnaire

Study of Risk Factor Analysis of UTI In Female Patient attending Chittagong Medical College Hospital.

❖ **Section: 1 Patient's Demographic Data:**

Patients Name:

Age:

ABO- blood group: A+ ve/ A- ve/ / B+ ve/ / B- ve/ / O+ ve/ / O- ve/ / AB+ ve/ AB- ve

❖ Section-2: Patient's Socio-Economic Information:

Patients' occupation:

Patients educational Level: 1) Illiterate 2) Primary, 3) S.S.C 4) H.S.C. 5) Graduate 6) Post- Graduate

Name of the husband:

Husband's educational qualifications: 1) Illiterate 2) Primary, 3) S.S.C 4) H.S.C. 5) Graduate 6) Post- Graduate

Husband income:

Family status: • Very poor • Poor • Lower middle class • Upper class

How many children do you have?

Family type: Single family/joint family

❖ **Section 3: Physical problems of the patient:**

Feeling of pain or burning (embarrassment) during urine: Yes () No ()

It is often necessary to urinate more than usual: yes () (not)

Blood is released with urine: yes () (not)

Stomach or lower abdominal pain: yes () (not)

Is there any fever, sweating, urine leak (incompleteness)? Yes () not ()

Waking up from sleep to peer tendency: Yes () No ()

Having cloudy and abnormal strong and dirty smell? Yes () not ()

Delay from start of urine flow: Yes () No ()

❖ **Section-4: Patient Healthcare and Environmental Information:**

If the patient is pregnant

Which Trimester is Running: 1) 1st Trimester 2) Trimester 2nd 3) Trimester 3rd

Number of pregnancy: 1) 1st pregnancy 2) second pregnancy 3) 3rd pregnancy 4) more

Doing intercourse during pregnancy? Yes () not ()

Had UTI problem before pregnancy? Yes () not ()

Are you aware of UTI? Yes () not ()

Daily consumption of water: 1.3 liters (1 liter) (1.5 liter) (half liter) Other --------- ----

Are you having the given antibiotic properly? Yes () not ()

Patients' resident accommodation and environment: dirty () damp () fairly healthy () clean residential area

What kind of underwear are you using? 1) Synthetic 2) Cotton 3) Other…….

Before the pregnancy did the menstrual cycle be regular? Yes () not ()

Sanitary System: 1) High Commode 2) Low Commode 3) Toilet 4) Raw Bathroom

Do you wash your vaginal area after sexual Intercourse? Yes () not ()

Whether your Male Partner use Condom? Yes () not ()

❖ **Section-5: Patient's Treatment information from Doctors feedback:**

Type of UTI: 1) Asymptomic 2) Symptomic

Name of the UTI problem: 1) Bacteriuria 2) Acute Cystitis 3) Pyelonephritis

Antibiotic prescribed: 1) Ampicillin • 2) Ciprofloxacin • 3) Azithromycin • 4) Cefixime • 5) Cephalexin • 6) Nitrofurantoin • 7) Clindamycin

Recurrences after taking antibiotic: 1) Yes 2) NO

❖ **Section-6: Information about health care and sanitation:**

Are you following the routine you are getting from here? Yes () not ()

How much mental discomfort do you experience in bladder problems? Much more () more () rough () light mood () Not quite ()

Have you taken any medication for current symptoms? Yes () not ()

What kind of medicines you are having?

Are you taking any action at home? Yes () No ()

How long do you have to go for treatment if there is a problem of UTI? 3 days () per week () per month () year ()

Do you drink caffeinated drink? Soft drinks () coffee () tea () other.....

Have you tested for the UTI problem? Yes () not ()

Are you satisfied with the treatment given from this institute? Yes () not ()

Do you take the treatment for UTI earlier? Yes () not ()

Does UTI pain relief if you get hot heat? Yes () not ()

❖ **Section-7: Information about Associated Co-morbidity :**

Diabetes------- Yes () not ()

Immunosuppressive Diseases --------- Yes () not ()

Signature and date of data collectors:

Brief biography

I passed the Secondary School Certificate Examination in 2002 and Higher Secondary Certificate Examination in 2004. I obtained my MBBS in 2010 from the M.A.G Osmani Medical College, Sylhet. Bangladesh. Now, I am a Candidate for Thesis defense at One health Institute, Faculty of Veterinary Medicine, CVASU.