Original Article

An Overview of the Predictors of Symptomatic Urinary Tract Infection Among Nursing Students

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Abstract

Background: Urinary tract infection (UTI) is the most common infection experienced by humans after respiratory and gastro-intestinal infections, and also the most common cause of nosocomial infections for patients admitted to hospitals indeed UTIs are the most frequent bacterial infection in women. **Aim:** The aim was to determine the prevalence of UTI and to identify factors associated with an increased risk of UTI among nursing students. **Subjects and Methods**: The cross-sectional study involved 177 unmarried nursing students aged 18–30 years studying in the SRMSIMS, Nursing College Bareilly. A structured questionnaire was used, and study subjects were asked regarding the symptoms of UTI in the previous 3 months. Chi-square test and Univariate Logistic Regression was used to analyze the data. **Results:** The overall prevalence of UTI was found to be 19.8% (35/177). Rural background, inadequate water intake, and unsatisfactory toilet habits were found to be strong predictors of UTI. **Conclusions:** There is an urgent need to sensitize the nursing students regarding the growing need of the issue so that they themselves become aware in addition to raising the awareness of other high-risk groups.

Keywords: Nursing students, Prevalence, Urinary tract infection

Introduction

Urinary tract infection (UTI) is one of the most important causes of morbidity in the general population and is the second most common cause of hospital visits.[1] Significantly, this health problem is contributing to the overall morbidity of females in all ages of their life.[2] They occur most frequently between the ages of 16 and 35 years, with 10% of women getting an infection yearly and 60% having an infection at some point in their lives.[3,4] It was found that UTI is a common health problem among women even in younger age group. It is associated with poor self-esteem, impaired quality-of-life, social isolation, and depression.[5] Due to the frequency, recurrence, and difficulty in eradication, UTI poses a stiff challenge to the medical professional.[6] While up to 90% of the patients with UTI complain of urinary tract symptoms, 1/3rd or more of the patients with these symptoms do not have bacteriuria. Dysuria and frequency together raise the probability of UTI to more than 90%, effectively ruling in the diagnosis by history alone.[7,8]

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Nursing students were chosen, as they are often the primary caregivers, form part of the health team, are more close to the community, comes in contact with the general population more often than clinicians and form an important part of referral system. In addition to it, once trained, nurses are in a position to help the other high-risk groups as adolescent girls to resolve basic health issues like UTI. Furthermore, there is paucity of epidemiological data on this segment of the population and hence, the prevalence and risk factors for UTI in nursing students were being studied so as to initiate early educational intervention to mitigate UTI problems not only among them but also in other risk groups. The aim of this study is to determine risk factors for UTI amongst nursing girls at the Department of Nursing, SRMSIMS Hospital, Bareilly.

Subjects and Methods

This cross-sectional descriptive study was carried out in the SRMS School of Nursing. from March 2011 to April 2011. All the nursing students were residing in the nursing hostel. Ethical

clearance was taken from the Institute's Ethical Committee prior to the conduction of the study. The inclusion criteria were all Unmarried Female Nursing students within the age group of 18–30 years. Exclusion criteria included all male students, girls who refused to take part in the study or refused to provide the necessary information or with incomplete information were non-co-operative or were married. The participation in the study was voluntary. Students were given the option to withdraw anytime from the study during the data collection without any fear or obligation if they felt to do so. Hence, a total of 177 nursing students was recruited for the study. The study tool was a predesigned pretested self-administered semi structured questionnaire containing questions related to risk factors for UTI and an episode of symptomatic UTI in the previous 3 months**.** Before distributing the questionnaires and seeking informed verbal consent, the purpose of the study and contents of the questionnaires were explained to the students. After ensuring confidentiality, students were given 45 min to complete the questionnaire without mutual consultation under the supervision of the investigator. The questionnaire contained questions on demographic data, frequency of water intake, voiding during a typical work day (shift), and clinical symptoms of UTI (voiding frequency, burning sensation during voiding) over the last 3 months. Subjects were required to complete all sections of the questionnaires and were requested to scrutinize the questionnaire for completeness before return and all doubts clarified subsequently.

For the purpose of this study, the operational definition of UTI was defined as**:**

Any girl complaining of:
- Burning micturition with/without
- Fever
- Increased frequency
- Flank pain.

Statistical analysis

The data entry was carried out using Microsoft Excel 2007 and software statistical package (SPSS 17 version). (Chicago, IL, USA). Analytical tests used were Pearson's Chi-square test to compare qualitative variables considering a significant level of $P < 0.05$. Univariate Regression Analysis to identify predictors of UTI was also applied.

Results

The study subjects were nulliparous, single, and not sexually active. All the nursing students studying in the SRMS School of Nursing were residing in the nursing hostel. The study was carried out for a period of 2 months, March–April 2011. The data obtained from 177 nursing students was analyzed. It was observed that almost 20% (35/177) of the nursing girls had a symptomatic episode within the last 3 months of which 23% (8/35) were found to be symptomatic at the time of study [Table 1]. Almost half of the girls 45.7% (16/35) had a single episode in the last 3 months and the most common clinical presentation cited in more than half of girls was frequency with dysuria, that is, 57% (20/35) [Table 1]. Age and Religion were not found to have a significant association with UTI [Table 2]. Majority of girls were taking 1–2 L of water in a day, whereas UTI was more common in girls whose water intake was <1 L a day. The association (Chi-square) was also found to be highly significant [Table 3]. A higher no of girls that is, 47.5% (84/177) were using toilet only 1–3 times in a day in whom the prevalence of UTI was also found to be the highest [Table 3]. There existed a significant association between the habit of holding urine and the occurrence of symptomatic episode in the last 3 months. A highly significant association was seen between occurrence of symptomatic UTI and girls who were in the habit of using western toilets, that is, 60% (21/35) and also among those girls who were using Public toilet usually/sometimes, that is, 57.1% (20/35) [Table 3]. Applying Univariate logistic regression the significant risk factors found were girls from rural background had 2.24 odds, water intake >1 L a day had 12.73 odds, holding urine usually/sometimes had 2.24 odds, using public toilet had 2.87 odds, using western toilet had 4.76 odds and washing the toilet seat before use had 2.30 higher odds of having UTI [Table 3].

Discussion

Nurses being the part of health team hence, the risk factors in this specific group were being studied as they come in contact with the general population more often than clinicians and hence are in a position to help the vulnerable population. The current study reported a bit higher prevalence (20%) of UTI as compared to findings from NFHS-3, Singh *et al*. and Ahmed and Avasarala where the prevalence was reported as 16.6%, 4.2% and 12.7%.[9-11] The present study shows that UTI was more prevalent in younger nursing girls, i.e., 17–20 years of age though the association was not found to be significant whereas in a study on medical students by Zalina *et al*. majority of UTI was found in the age group of 21–23 years (66%) followed by

Table 1: Clinical profile of symptomatic nursing students

Variables	Frequency	Percentage
Symptomatology		
At present	8	22.9
<1 month	5	14.3
1-3 months	22	62.9
Frequency of episodes*		
Once	16	45.7
Twice/thrice	12	34.3
>Three times	7	20.0
Clinical presentation**		
Frequency	20	57.1
Flank pain/pain in the renal angle	7	20.0
Fever	2	5.7
Only Dysuria	6	17.1

*In the past 3 months, **Dysuria was present in all (according to the operational definition), #Subjects can have more than one symptom

Table 2: Univariate analysis of sociodemographic factors associated with UTI

Variables	UTI						Crude OR (CI)	χ^2 test	*P*
	Present		Absent		Total				
	Number	Percentage	Number	Percentage	Number	Percentage			
Age									
17-20	21	60.0	83	58.5	104	58.8	1.77 (0.21-15)	0.280	0.87
21-25	13	37.1	52	36.6	65	36.7	1.75 (0.19-15)		
26-30	1	2.9	7	4.9	8	4.5	1		
Religion									
Hindu	27	77.1	110	77.5	137	77.4	1.33 (0.15-11.8)	0.35	0.99
Muslim	5	14.3	19	13.4	24	13.6	0.8 (0.07-9.9)		
Sikh	2	5.7	9	6.3	11	6.2	1.42 (0.09-20.4)		
Christian	1	2.9	4	2.8	5	2.8	1		
Background									
Urban	15	42.9	89	62.7	105	59.3	1	4.55*	0.03
Rural	20	57.1	53	37.3	72	40.7	2.24 (1.06-4.74)		

*Significant. UTI: Urinary tract infection, OR: Odds ratio, CI: Confidence interval

Table 3: OR for UTI and associated 95% CI of potential risk factors

Variables	UTI						OR (CI)	χ^2 test	*P*
	Present		Absent		Total				
	Number	Percentage	Number	Percentage	Number	Percentage			
Water intake/day (in glasses)									
<1 L	28	80.0	22	15.5	50	28.3	12.73 (3.43-47.2)	57.73*	<0.001
1-2 L	4	11.4	89	62.7	93	52.5	0.44 (0.09-2.12)		
>2 L	3	8.6	30	21.8	34	19.2	1		
Use of toilet/day									
1-3 times	22	62.8	62	43.7	84	47.4	1.77 (0.47-6.72)	4.15*	0.12
4-8	10	28.6	65	45.8	75	42.4	0.77 (0.19-3.14)		
>8	3	8.6	15	10.5	18	10.2	1		
Holding urine									
Occasionally/never	14	40.0	85	59.9	99	55.9	1	4.49*	0.03
Usually/sometimes	21	60.0	57	40.1	78	44.1	2.24 (1.05-4.76)		
Use public toilet									
Occasionally/never	15	42.9	97	68.3	112	63.3	1	7.83*	<0.01
Usually/sometimes	20	57.1	45	31.7	65	36.7	2.87 (1.34-6.13)		
Type of toilet used									
Usually indian	14	40.0	108	76.1	170	96.1	1	17.04*	<0.001
Usually western	21	60.0	34	23.9	7	3.9	4.76 (2.19-10.38)		
Wash toilet seat before use									
Always/usually	9	25.7	63	44.4	72	40.7	1	4.05*	0.04
Sometimes/occasionally	26	74.3	79	55.6	105	59.3	2.30 (1.01-5.27)		

*Significant, *Usually - 2-3 times in a week, Sometimes-at least once in 1-2 weeks, Occasionally-once in a 3-4 weeks or more. UTI: Urinary tract infection, OR: Odds ratio, CI: Confidence interval

18–20 years.[12] Majority of girls were taking 4–6 glasses of water in a day (1–1.5 L) whereas UTI was prevalent in those girls whose water intake was limited to 1–3 glasses in a day. The association was also found to be highly significant. In another study on teachers, half of the responders drank less while working to avoid the need of going to toilet, and those who drank less had a 2.21-fold higher risk of UTI.[13] The reason cited could be that drinking less or infrequently is a common practice to avoid the need of urinating during work shift/classroom or hospital based training sessions and may increase the risk of developing UTI. A higher no of girls were using the toilet only 1–3 times in a day (47.46%) in whom the prevalence of UTI was also found to be the maximum. In addition to it, 44% of girls were in the habit of holding urine of which majority (60%) had symptomatic UTI in the previous 3 months. The negative perceptions of public and staff toilets is well-spread among students and staff alike, i.e., girls are fearful of "catching germs from the toilet seat," leading to a total blockage of the ability to use them. Educated girls are often wary of using toilets, specially of the western styles, which are quite common in the public places and which they see as "dirty" because their usage involves sitting upon a seat previously used by strangers. Public toilets which are available are, usually, unhygienic hence in response to the lack of hygienic toilet provision, girls are likely to "hold on" resulting in urine (and pathogen) retention, leading in UTI. Waiting

for too long time to urinate can cause the bladder muscle to stretch too much that not all the urine is pushed out, which increase the risk for UTIs. In the current study, some of the nursing students adapted their behavior by limiting their water intake and tried not to go to the lavaratories thus, these girls were more likely to acquire UTI. According to a study done on school girls, most of the school girls do not drink water adequately or pass urine frequently at school contributing towards UTI.[14] In a previous study on female workers in the Tainan Science-Based Industrial Park, in 2001, it was found they had a higher prevalence of UTIs (6.2% vs. 2.5%,) and less water intake and voiding frequency during work in comparison with other workers.[15] This is because hydrodynamic factors by flushing out the contaminated urine has been associated with a reduction in the incidence of UTI.[16] Therefore, both frequent water intake and frequent urine voiding were reported to be protecting factors against UTI. However, Krienger in his data did not support this classic teachings involving increased water intake.[17] In the current study, almost 37% of nursing students were using a public toilet usually/sometimes of which majority (57%) had symptomatic UTI. The association was found to be highly significant. Public toilets act as epicenters of germ transmission and hence unusable most of the times. Lack of regulation or compulsory standards results in poor toilet design, inadequate maintenance and management, and unhygienic condition, resulting in the spread of urogenital infection. Desylpere (2004) had demonstrated that the chances of pathogen transmission are very high even in toilets that may appear to look clean, as every door handle, tap, lever, flush, lock, bar of soap, toilet roll holder, turnstile, are all potential germ carriers. Even ostensibly hygienic equipment, such as electric hand-driers (often imagined to be safer than towels) may be blowing germs back into the atmosphere (unless the filters are regularly changed).[18] In the current study, almost all girls (96%) were using Indian Toilet, whereas UTI was found to be more common in girls using western toilet. Another factor which may have contributed towards UTI is that women need to sit down to use the toilet (at least in the public places where western toilets are abundant) but have difficulty doing so as they are fearful of "catching germs from the toilet seat." Women are also wary of sitting down on a wet seat, sprayed by the last users. Studies have long shown that around 80% of women "hover" over the seat to urinate when in public toilets, whereas they prefer to sit while using the toilet at home. Hovering contributes to residual urine retention, as the bladder cannot empty properly and thus to the conditions conducive to the development of Infections.[19]

Limitations

Several problems had occurred in this study which could affect the results. First, the study was done on a specific segment of the population, and hence, the results cannot be extrapolated on the general population. Second, the sample size was quite small, also, some of the students refused to participate in this study. The reasons were, doubtful of the confidentiality of the study, some reasoned that the questionnaire was too personal, and few did not answer the question completely. There could be some dishonesty in answering personal questions. One of the major limitation was we did not carry out the lab testing/lab results were not taken into account as UTI was treated in the ambulatory setting (medication was taken on the first-second day of symptomatology) without diagnostic testing to verify the diagnosis.

Conclusion

It was concluded that nurses though part of the health team are not really spared from this inevitable morbidity, reason being they are themselves not aware of certain preventive aspects and hence not practicing the same. Other reasons may be though aware, they are not much bothered regarding the same either due to their hectic schedule or tedious work shifts. To conclude, nurses are in direct touch of the patient and community and hence are in a better position to help the vulnerable population. Hence, there is an urgent need to sensitize them regarding the issue so that they themselves become aware and can equally raise the awareness of other high-risk groups. Educational session which address UTI and its risk factors should be regularly held among the paramedics and nursing students. More health promotion programs are needed to be implemented to increase the awareness and improve their healthy behavior. Emphasis should be put upon women's needs as they are the ones who encounter problems finding a usable toilet, and who suffer from a wide range of toilet-related medical conditions Unless compulsory legislation, increased funding, and improved management, maintenance, and cleaning regimes are instigated, public toilet provision will continue to be a source of disease.

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