Prevalence of urinary tract infection and associated risk factors among women in Sindhupalchowk district, Nepal

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INTRODUCTION

Body waste and extra water are removed as ultra-filtrate of blood in the form of urine through the body’s drainage system known as urinary tract. The urinary tract consists of two kidneys, two ureters, a bladder and a urethra. Infection of the tract by microbes including bacteria, virus and fungi are the causative agents for urinary tract infection.1

It is the result of an invasion of bacteria or other microorganisms into the urinary tract. The infection is named after the part that gets infected and is referred to as cystitis (bladder infection) and pyelonephritis (kidney infection).2

Urinary tract infection is defined as a combination of clinical features or symptoms and the presence of bacteria in urine or presence of more than 100,000 CFU/ml after urine culture. Clinical symptoms of UTI include frequency of micturition, dysuria, abdominal pain, back

ABSTRACT

Background: Urinary tract infection (UTI) occurs in all age groups, more common in women due to short urethra and its close proximity to anus and vagina. UTI is defined as “microscopic finding of >10 pus cells/high power field (40x) in urine”. The purpose of the study is to find the prevalence of UTI and its association with various risk factors.

Methods: An analytical cross-sectional study on prevalence of UTI was done among 260 women aged 15 years and above. Convenient sampling technique was used. Semi-structured questionnaire was designed to collect the data and urine sample was collected for routine and microscopic examination at the time of interview. Collected urine was sent, within 3 hours of collection.

Results: The mean age of the respondents was 36.43±16.17 years. The prevalence of UTI among women aged 15 years and above was 36.9%. The most common symptom was frequency of micturition (35%) followed by lower abdominal pain (38.46%). There was significant association between frequency of micturition, burning micturition and lower abdominal pain with occurrence of urinary tract infection. On urinalysis, 96 samples were positive for pus cell; one sample showed blood, 16 samples showed ca-oxalate and 57 samples showed protein which determines the type of UTI. Smoking [COR-2.15, C.I-(1.12, 4.09)] and unavailability of toilet facility [COR-0.27, C.I-(0.08, 0.93)] were the significant risk factors for occurrence of UTI.

Conclusions: There was high prevalence of UTI among women aged 15 years and above and association between smoking and unavailability of toilet facility and UTI was significant.

Keywords: Urinary tract infection, Urinalysis, Sindhupalchowk district, Risk factors
pain, urgency and fever. Risk factors of urinary tract infections are pregnancy, use of contraceptive, lack of personal hygiene, genital prolapse, sexual activity, chronic disease like diabetes and renal stone.  

UTI is the most common bacterial infection accounting for 25% of all infections and occurs in all ages in both men and women. However; infection is more common in women, especially reproductive age women due to shorter length of urethra and its close proximity to anus and vagina, allowing bacteria quicker access to the bladder. The lifetime risk of having a urinary tract infection is almost 50% in women. UTIs in men are not as common as in women but can be serious when they occur. It is predicted that about 50% of women will experience a UTI in their lifetime, and one in three women will receive antimicrobial therapy for UTI.

The commonest micro-organism responsible for causing UTI is coliform bacteria. It accounts to 80% of the infection whereas S. saprophyticus constitutes to 5% to 10% followed by the other gram negative rods which causes sporadic infection.

In Nepal total reported cases of urinary tract infection in year 2015-16 were 2539 out of which 1637 were female and 902 male. Out of 1637 women, 491 were between 20-29 years of age. The total number of death due to urinary tract infection is 9 in one year 2015-16 in Nepal.

METHODS

An analytical cross-sectional study was conducted in Sindhupalchowk district from November to December 2016 to find the prevalence of UTI among women aged 15 years and above. Before conducting the study, ethical approval was taken from the Institutional Review Committee of Kathmandu Medical College. Convenient sampling technique was used to select the study population. Sample size was calculated as:

\[ n = \frac{Z^2 \cdot p \cdot (1-p)}{d^2} \]

\[ = \frac{(1.96)^2 \cdot 0.20 \cdot 0.80}{(0.05)^2} \]

\[ = 245.76 \]

Where, \( Z \) = degree of confidence level at 95% \( = 1.96 \)

\( p \) = prevalence \( = 20 \% \)

\( d \) = allowable error \( = 5 \% \)

Considering 5% non-response rate, the final sample size was 260.

Semi-Structured questionnaire was designed in order to collect the necessary information by interview method. Urinary tract infection was defined as “microscopic finding of >10 pus cells/high power field (40x) in urine.” For this purpose urine container and urine tag was used to collect the sample and labeling was done. All the respondents were asked to collect mid-stream sample of urine. Collected urine was sent for examination within 3 hours in the Indrawati Community Health Center, Sindhupalchowk and the results was filled in the questionnaire. All the collected data were entered and analyzed using SPSS 20.0 version. At the end of the study the participants who were found to have risk factor for UTI were counselled about preventive measures and those who had UTI full course of antibiotics along with health education was given.

RESULTS

The mean age of the respondents with standard deviation was 36.43±16.173 years (minimum 15 years and maximum 80 years). Most of them were Janajati (43.5%) by ethnicity followed by Dalit (30.4%). Majority of them were Hindu by religion (99.6%). Almost 42% of the respondents were illiterate. Out of 260 women 219 (84.2%) were married and rest were unmarried (Table 1).

Table 1: Demographic characteristics of the respondents (n=260).

| Variables              | Frequency | Percentage (%) |
|------------------------|-----------|----------------|
| Age (in years)         |           |                |
| 15-30                  | 114       | 43.8           |
| 30-45                  | 79        | 30.4           |
| 45-60                  | 40        | 15.4           |
| >60                    | 27        | 10.4           |
| Religion               |           |                |
| Hindu                  | 259       | 99.6           |
| Christian              | 1         | .4             |
| Ethnicity/caste        |           |                |
| Brahmin                | 49        | 18.8           |
| Chhetri                | 19        | 7.3            |
| Dalit                  | 79        | 30.4           |
| Janjati                | 113       | 43.5           |
| Level of education     |           |                |
| Illiterate             | 108       | 41.5           |
| Primary                | 88        | 33.8           |
| Secondary and above    | 64        | 24.6           |
| Marital status         |           |                |
| Never married          | 41        | 15.8           |
| Married                | 219       | 84.2           |

The prevalence of urinary tract infection among women aged 15 years and above was 36.9%.

The various symptoms of urinary tract infection experienced by the participants was lower abdominal pain (38.6%) followed by frequency of micturition (35%), incomplete emptying of urine (20%), dribbling of urine (16.9%) and urinary incontinence (7.3%). Haematuria (1.5%) was the least common symptoms (Figure 1).
There was significant association between frequency of micturition [COR-3.51, C.I-(2.05, 6.01)], burning micturition [COR-8.83, C.I-(4.87, 16.00)] and lower abdominal pain [COR-17.18, C.I-(7.80, 37.82)] with occurrence of urinary tract infection. Presence of blood in urine, sense of incomplete voiding of urine, unknowingly passes of urine and something coming out per vaginum was not significantly associated with occurrence of UTI (Table 2).

The routine tests on urine samples showed that 260 samples had normal pH (4.5-8.0). The multistrip dipped in urine showed the presence of protein and sugar in urine in the suspected cases of UTI (Figure 2).

Table 2: Urinary tract Infection according to various symptoms (n=260).

| Symptoms                              | UTI (+) | UTI (-) | *COR (95%CI) | P value |
|---------------------------------------|---------|---------|--------------|---------|
| Frequency of micturition              |         |         |              |         |
| Yes                                   | 51      | 40      | 3.51 (2.05-6.01) | 0.000   |
| No                                    | 45      | 124     |              |         |
| Burning micturition                    |         |         |              |         |
| Yes                                   | 65      | 28      | 8.83 (4.87-16.00) | 0.000   |
| No                                    | 31      | 118     |              |         |
| Presence of blood in urine            |         |         |              |         |
| Yes                                   | 0       | 4       |              |         |
| No                                    | 96      | 160     |              |         |
| Sense of incomplete voiding of urine  |         |         |              |         |
| Yes                                   | 30      | 22      | 0.63 (0.34-1.18) | 0.149   |
| No                                    | 142     | 66      |              |         |
| Unknowingly passes of urine           |         |         |              |         |
| Yes                                   | 11      | 8       | 2.52 (0.98-6.51) | 0.049   |
| No                                    | 85      | 156     |              |         |
| Something coming out per vaginum      |         |         |              |         |
| Yes                                   | 9       | 15      | 1.02 (0.43-2.44) | 0.95    |
| No                                    | 87      | 149     |              |         |
| Lower abdominal pain                   |         |         |              |         |
| Yes                                   | 88      | 64      | 17.18 (7.80-37.82) | 0.000   |
| No                                    | 8       | 100     |              |         |

*COR- Crude odds ratio, C.I- Confidence interval.

Table 3: Cell count in microscopy of urine.

| Frequency         | Number of cases |
|-------------------|-----------------|
| WBC count         |                 |
| <10               | 164             |
| ≥10               | 96              |
| RBC count         |                 |
| nil               | 259             |
| >2                | 1               |
| Epithelial cell count |             |
| ≤15               | 248             |
| ≥15               | 12              |

The microscopic study also found co-oxalate crystal in 16 samples. There was no presence of any other crystals and casts in any of the urine samples.

Smoking [COR-2.15, C.I-(1.12, 4.09)] and unavailability of toilet facility [COR-0.27, C.I-(0.08, 0.93)] were significantly associated with the development of urinary tract infection. There was no significant association with the other risk factors. There was higher chance of getting UTI among those who consumed less amount of water in a day but the association was not statistically significant. Similarly, smokers had 2 times higher chance of getting...
urinary tract infection as compared to non-smoker and the association was also statistically significant (Table 4).

Similarly those having toilet facility had less chance of getting urinary tract infection and the association was also statistically significant.

Age, education, marital status, time of urination, use of family planning methods, sexual activity, pregnancy, diabetes, recent gynecological examination were the common risk factors but there was no significant association with occurrence of urinary tract infection (Table 5).

Table 4: Association between various risk factors and UTI (n=260).

| Variables                  | UTI (+) | UTI (-) | *COR (95% CI) | P value |
|----------------------------|---------|---------|---------------|---------|
| Age in years               |         |         |               |         |
| 15-45                      | 71      | 122     | 0.98 (0.55,1.73) | 0.939   |
| >45                        | 25      | 42      |               |         |
| Education status           |         |         |               |         |
| Uneducated                 | 41      | 67      | 1.07 (0.64,1.79) | 0.769   |
| Educated                   | 55      | 97      |               |         |
| Marital status             |         |         |               |         |
| Married                    | 80      | 139     | 1.11 (0.56,2.20) | 0.761   |
| Unmarried                  | 16      | 25      |               |         |
| Smoking habits             |         |         |               |         |
| Yes                        | 24      | 22      | 2.15 (1.12,4.09) | 0.018   |
| No                         | 72      | 142     |               |         |
| Alcohol consumption        |         |         |               |         |
| Yes                        | 32      | 57      | 0.93 (0.55,1.59) | 0.815   |
| No                         | 64      | 107     |               |         |
| Amount of water            |         |         |               |         |
| <1 liter                   | 64      | 78      | 4.92 (0.57,41.95) | 0.108   |
| 2-3 liters                 | 31      | 80      | 2.32 (0.26,20.10) | 0.431   |
| >4 liters                  | 1       | 6       |               |         |

*COR- Crude odds ratio, C.I- Confidence interval.

Table 5: Association between various risk factors and development of UTI.

| Variables                      | UTI (+) | UTI (-) | *COR (95% CI) | P value |
|--------------------------------|---------|---------|---------------|---------|
| Toilet facility                |         |         |               |         |
| Yes                            | 88      | 160     | 0.27 (0.08,0.93) | 0.028   |
| No                             | 8       | 4       | 1             |         |
| Time of urination              |         |         |               |         |
| After urge arises              | 40      | 56      | 1.37 (0.82,2.31) | 0.225   |
| Immediately after sense of full bladder | 56 | 108 | 1 |
| Use any family planning method |         |         |               |         |
| Yes                            | 35      | 59      | 1.02 (0.60,1.72) | 0.937   |
| No                             | 61      | 105     | 1             |         |
| Risk factors for UTI           |         |         |               |         |
| Pregnancy                     | 4       | 3       | 2.61 (0.56,11.98) | 0.200   |
| Diabetes                      | 9       | 9       | 1.95 (0.74,5.14) | 0.165   |
| Recent gynaecological procedure | 8 | 7 | 2.23 (0.78,6.41) | 0.124   |
| None                          | 74      | 145     | 1             |         |
| Sexual activity                |         |         |               |         |
| Yes                            | 34      | 55      | 1.08 (0.64,1.84) | 0.757   |
| No                             | 62      | 109     | 1             |         |

*COR- Crude odds ratio, C.I- Confidence interval.

**DISCUSSION**

The prevalence of urinary tract infection in our study was 36.9%. Study done by Phidelis et al found the prevalence of 14.2% regardless of the women’s age, parity and the gestational age. It shows that the prevalence of UTI was comparatively higher in our study. The relatively high prevalence of UTI among the women in this study could be due to illiteracy (41.5%), unavailability of toilet facility which was found to be strongly associated with UTI, less consumption of water and higher age range (15-80 years).

The most common symptoms in our study was lower abdominal pain (38.46%) followed by frequency of micturition (35%) and the least common symptom was haematuria (1.5%). The study done by Phidelis showed the commonest urological symptoms to be urgency (43.1%) and least common symptoms hematuria (4.2%). Similar study done by Khatri et al showed burning sensation during micturition (62.40%) as the most common symptoms and nocturnal incontinence (4.1%) the least common symptoms. This variation in the presenting symptoms could be due to environmental and socio-economic condition, age group and other underlying health conditions.

This study showed significant association between frequency of micturition, burning micturition and lower abdominal pain and occurrence of urinary tract infection.
Increased age, gender, underlying pathological conditions, lack of personnel hygiene might be the common risk factors for the occurrence of various symptoms of UTI.

In this study smoking [COR-2.15, C.I-(1.12, 4.09)] and unavailability of toilet facility [COR-0.27, C.I-(0.08, 0.93)] were the significant risk factors for the occurrence of UTI. Age, education, marital status, time of urination, use of family planning methods, sexual activity, pregnancy, diabetes, recent gynaecological examination were the common risk factors but were not statistically significant. Emiru et al conducted a study among 367 pregnant women to investigate for the presence of risk factors associated with urinary tract infections which showed that the chance of UTI was higher among pregnant women with associated risk factors such as anaemia, low income level, past history of UTI and sexual activity. Multiparity, history of catherization, genitourinary abnormality, maternal age, gestational age and education status were not statistically significant.[10] Similar study done by Haider et al in 2010 found that illiteracy, history of sexual activity, low socio-economic group, past history of UTI and multiparty as a risk factors for UTI.[11] Krcmery et al also demonstrated that sexual activity was risk factor for UTI in women.[10] From above studies done in different countries, sexual activity was found to be a common risk factor for UTI. It may be due to the lack of knowledge regarding personal hygiene.

On urinalysis our study showed that 96 samples were positive for pus cell, 16 sample showed presence of calcium oxalate in urine. Similar cross-sectional study done by Gupta et al. on a group of 300 females in the age from 18 to 30 years suspected for UTI showed that 172 were positive for pus cell and 10 showed presence of calcium oxalate crystal.2 Pus cell and calcium oxalate in the urine can determine the pyuria and type of urinary tract infection.

Periodic health awareness and awareness programs can help to improve the health status as well as quality of life in women. This study highlights the need of toilet facility to each and every house which was one of the significant risk factors for urinary tract infection. Similarly, they should be aware of other risk factors. There is need to raise awareness of UTI and to expand services for prevention of UTI by maintaining hygienic conditions, changing behavior and regular health examination.

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