

Original Research Article

<https://doi.org/10.20546/ijcmas.2018.703.206>

Hygiene and Wash Practices Associated with Urinary Tract Infection among Non-Pregnant Women at Capital Hospital, Bhubaneswar, Odisha, India

Jyoti Ranjan Mohanty¹, Alisha Pradhan², Sunita Jena², P.R. Misra²,
Bijaya Padhi² and Dhananjay Soren^{1*}

¹Department of Zoology, Ravenshaw University, Cuttack, Odisha, India

²Disease Surveillance Laboratory, Asian Institute of Public Health,
Bhubaneswar, Odisha, India

*Corresponding author

ABSTRACT

Worldwide, urinary tract infection (UTIs) is one of the most common bacterial infections in women and it's depending on the individual's wash practices and socioeconomic status. The objectives of this study were to assess hygiene and wash practices and the associated factors of urinary tract infections in non-pregnant women, Odisha, in order to find this a cross-sectional study was carried out at Bhubaneswar, Capital Hospital from March 2015 to March 2017 in non-pregnant women of age group between 20-65 years. Out of 766 midstream urine samples (MSU), 323(42.1%) samples were found to be UTI positive. From the defined age group, mainly 20-35 years age group women have showed the highest percentage (64.09%) of infection. After adjusting the confounders, clinical recurrent infection (OR- 3.65, 95% CI 2.24-5.95, $p \leq 0.001$), vaginal wash (OR-0.10, 95% CI 0.07- 0.14, $p \leq 0.001$) and full body bath (OR- 0.26, 95% CI 0.13- 0.54 $p \geq 0.001$). *E. coli* was the most predominant uropathogens among UTI infected non-pregnant women. Our findings indicate that there is an association between unhygienic practices and UTI and it is important that necessary hygiene practices should be used to prevent UTI.

Keywords

Urinary tract infections,
Socio-economic status,
Uropathogens, Hygiene
practices

Article Info

Accepted:
16 February 2018
Available Online:
10 March 2018

Introduction

Urinary tract infections (UTI) are common bacterial infections found in the different age group of women (Gales *et al.*, 1998). At least once in their lives, about half of the adult women reported urinary tract infections (Kunin, 1997). Globally, women have developed and followed their own personal stratagem to manage with their personal hygiene, which generally depends on financial condition, the individual's personal liking,

local cultural customs and beliefs and level of education (Baisley *et al.*, 2011; Aniebue *et al.*, 2009). Reoccurrence of UTI has been observed between 20-30% of women (Hooton, 2001). There are two main important factors responsible for UTI in females such as pregnancy and sexual activities which make them more prone to this disease (Arul *et al.*, 2012). A study conducted in Ethiopia in the year 2016 reported 63.3% of women are having UTI, which is very highly prevalent (Seifu *et al.*, 2018) even according to a

Bangladesh study, conducted on both men and women concluded that UTI is greater in women (48.29%) as compared to men (38.44%), which may be either due to anatomical structure of the women. (Haque *et al.*, 2015)

In community after respiratory tract infection, urinary tract infection (UTI) is most common type of infectious disease (Das *et al.*, 2015). A study conducted in South part of India revealed that Women (47.9%) had a significantly higher prevalence of UTI than men (Jennifer *et al.*, 2009). Low socio-economic status has also been found as risk factors for UTI (Peters *et al.*, 2000). Some of the other risk factors are poor menstrual and toilet hygiene, use of tampons or douching and lack of awareness (Ness *et al.*, 2005; Hillier *et al.*, 1996).

A study conducted to determine the prevalence of community acquired-UTI among women in rural Odisha showed that prevalence of UTI in females was 45.2% (Das *et al.*, 2013). Urinary tract infections are believed to be among the most common form of infection in girls and women of menstruating age and this is held to be due to unhygienic practices (Groen *et al.*, 2005). To the best of our knowledge, less data concerning hygiene practice which is associated with urinary tract infection among non-pregnant women from Odisha, India has been documented till date. We conducted the current study among non-pregnant women to assess the association between different hygiene practices and sociodemographic predictors with UTI.

Materials and Methods

Study design and settings

The cross-sectional study was conducted at Capital Hospital, Bhubaneswar, Odisha from

March 2015 to March 2017 Capital Hospital, a Government of Odisha hospital with 647 beds, has all major specialties including Obstetrics and Gynaecology (O&G) and Family welfare.

Study subjects

Non Pregnant women of age group between 20-65 years who attended outpatient department (OPD) of O & G with symptoms of UTI were recruited in the study. Women with symptoms such as itching and burning while urinating, frequent urge to urinate, cloudy or blood in the urine were included. Diabetes, HIV infection and pregnant women who were menstruating at the time of assessment, had taken a course of antibiotics within last three weeks, and those who refused consent to participate were excluded from the study.

Sample collection and processing of urine sample

Mid-stream, clean catch urine sample was collected from symptomatic woman Urinary tract infections were diagnosed by culturing midstream urine sample in HiChrome UTI Agar (Himedia) plate. The plates were incubated in the presence of oxygen conditions at 37°C and read after 48 hours. Colony count $\geq 10^5$ CFU/ml and Plates having pure growth is considered as a standard for the experiment (Sumpter, *et al.*, 2013). In case of less than 10^5 CFU/ml colony count, the whole process with complete history was again repeated.

Risk factor data collection

A standardized tool was used and after collecting the urine sample, data were collected by trained female interviewers. The socio-demographic section contains all the characteristics including age; marital status, religion, caste, educational attainment, living

arrangement, occupation, and wealth. Furthermore, wash practices such as only vaginal wash, a bath of full body and I don't wash types were also collected. Each woman was reassured that the all information's including biological samples will be kept confidential and used only for research purpose as well as the data-sheet were labeled with a unique identifier to ensure confidentiality of participants.

Statistical analysis

Pearson's chi-square test was used for comparison of the proportions and differences in values were considered significant if *P* values were less than 0.05. Multivariate analysis was used for socioeconomic, demographic and clinical factors to estimate the independent contribution of each variable.

The data were analyzed using the statistical program IBM Statistical package for social sciences (SPSS) 20

Ethical approval

The study was approved by the Institutional Review Board of Asian Institute of Public health (AIPH) (AIPH ethics ref: ERC/ No: 2015-09). Only those who provided written informed consent to participate in the study were included.

Results and Discussion

During the month of March 2015 to March 2017, a total number of 1067 non pregnant women between the age group of 20-65 years visited OG- OPD at the Capital Hospital, Bhubaneswar. Out of which, 179 were refused to give their consent and 122 were excluded from the study. Finally, 766 non Pregnant women were recruited and from this 323(42.16%) were found with urinary tract infection (Fig. 1).

UTI was found significantly higher in married women (1-15 years of marriage, 66.78%) and in the age group between 20-35 years (64.09%). Women belonging to OBC caste (53.40%), residing in urban slum area (42.72%), as well as from village (42.41%) and with lower monthly income of (INR5,000-10,000/-) 43.34% were more prone to UTI with Other variables we couldn't find any significant difference between uninfected and infected UTI non, pregnant women (Table 1).

The most reported symptom was found in women was itching and burning while urination (69.97 %), followed by vaginal discharge (45.20%) and Genital sores (9.60%).

However, recurrent infection was found to be more common among UTI infected women (57.59%). No significant difference found in other variables such as Urinate frequently, Urine frequency, Cloudy blood in urine, Lower back pain, Stomach pain, Breast pain (Table 2).

Primary water source from the piped tap with (64.09 %) was found to be another variable for urinary tract infection followed by Wash practice (71.52%). Other significant findings were Latrine/Bathroom Privacy (54.80%) and Latrine Bathroom door (53.56%) (Table 3).

Unadjusted univariate analysis of each of these associated factors is presented in the Univariate analysis showed women between the age group of 36-50 years with OR- (5.89), 95% CI 3.12-11.11, $p \leq 0.001$ and in the age group between 20-35 years with OR-(4.11), 95% CI 2.26-7.48 $p \leq 0.001$ were associated with UTI (Table 4).

Other risk factor such as Years of marriage between (16-30) with OR-(2.44), 95% CI 1.15-5.20 $p \leq 0.020$ and (1-15) with OR-(2.83), 95% CI 1.37-5.87, $p \leq 0.005$ were considerably higher to urinary tract infection.

Table.1 Socio-demographic characteristics of non pregnant women at capital hospital, Odisha (N=766)

Variables	Urinary Tract Infection (UTI)		P-Value
	Without Urinary tract infection (%) (N= 476)	With Urinary tract infection (%) (N=323)	
Age			
1(20-35)	273(61.63)	207(64.09)	0.001
2(36-50)	94(21.22)	102(31.58)	
3(51-65)	76(17.16)	14(4.33)	
Marital status			
1(Single, never married)	41(9.26)	28(8.67)	0.906
2(Married)	394(88.94)	288(89.16)	
3(Widow)	8(1.81)	7(2.17)	
Years of marriage			
1(1-15)	238(60.10)	193(66.78)	0.013
2(16-30)	123(31.06)	86(29.76)	
3(31 & above)	35(8.84)	10(3.46)	
Caste/Tribe			
1(SC)	108(25.71)	69(22.33)	0.043
2(ST)	8(1.90)	15(4.85)	
3(OBC)	204(48.57)	165(53.40)	
4(Other caste)	100(23.81)	60(19.42)	
Education			
1(No formal education)	132(29.80)	116(35.91)	0.083
2(Completed primary (5th year))	172(38.83)	131(40.56)	
3(Completed secondary (6-10th year))	92(20.77)	53(16.41)	
4(Completed +2 & above (university, etc))	47(10.61)	23(7.12)	
BPL card			
0 (No)	260(58.69)	182(56.35)	0.517
1 (Yes)	183(41.31)	141(43.65)	
Monthly Income			
1(Bellow 5,000)	62(14.00)	78(24.15)	0.001
2(5,000-10,000)	139(31.38)	140(43.34)	
3(10,000-20,000)	125(28.22)	78(24.15)	
4(20,000-30,000)	42(9.48)	16(4.95)	
5(30,000 and above)	8(1.81)	2(0.62)	
6(Don't Know)	67(15.12)	9(2.79)	
Occupation			
1(Employed or self-employed)	89(20.09)	66(20.43)	0.891
2(Housewife)	333(75.17)	244(75.54)	
3(Student)	21(4.74)	13(4.02)	
Where live			
1(Housing colony)	105(23.70)	32(9.91)	0.001
2(Urban slum)	155(34.99)	138(42.72)	
3(Rural/village)	175(39.50)	137(42.41)	
4(Hostel)	8(1.81)	16(4.95)	
People live in house			
1(1&2)	44(9.93)	13(4.02)	0.008
2(3-5)	280(63.21)	212(65.63)	
3(5& above)	119(26.86)	98(30.34)	

Table.2 Clinical Illustrations among Non Pregnant Women at Capital Hospital, Odisha (N=766)			
	Urinary Tract Infection (UTI)		
Variables	Without Urinary tract infection (%) (N= 476)	With Urinary tract infection (%) (N=323)	P-Value
Urinate frequently 0 (No) 1 (Yes)	318(71.78) 125(28.22)	235(72.76) 88(27.24)	0.767
Urine frequency 1(Once) 2(Two times a day) 3(Three or more times)	23(18.40) 58(46.40) 44(35.20)	8(9.09) 46(52.27) 34(38.64)	0.165
Itching/burning when urinating 0 (No) 1 (Yes)	270(60.95) 173(39.05)	97(30.03) 226(69.97)	0.001
Cloudy/blood in urine 1 (Cloudy) 2 (Blood) 3 (Both Cloudy & Blood) 4 (No cloudy and Blood)	125(28.22) 26(5.87) 45(10.16) 247(55.76)	79(24.46) 16(4.95) 20(6.19) 208(64.40)	0.069
Vaginal discharge 0 (No) 1 (Yes)	202(45.60) 241(54.40)	177(54.80) 146(45.20)	0.012
Genital sores 0 (No) 1 (Yes)	371(83.75) 72(16.25)	292(90.40) 31(9.60)	0.008
Lower back pain 0 (No) 1 (Yes)	292(65.91) 151(34.09)	220(68.11) 103(31.89)	0.524
Stomach pain 0 (No) 1 (Yes)	317(71.56) 126(28.44)	222(68.73) 101(31.27)	0.397
Breast pain 0 (No) 1 (Yes)	299(67.49) 144(32.51)	210(65.02) 113(34.98)	0.473
Clinic recurrent 0 (No) 1 (Yes)	251(56.66) 192(43.34)	137(42.41) 186(57.59)	0.001

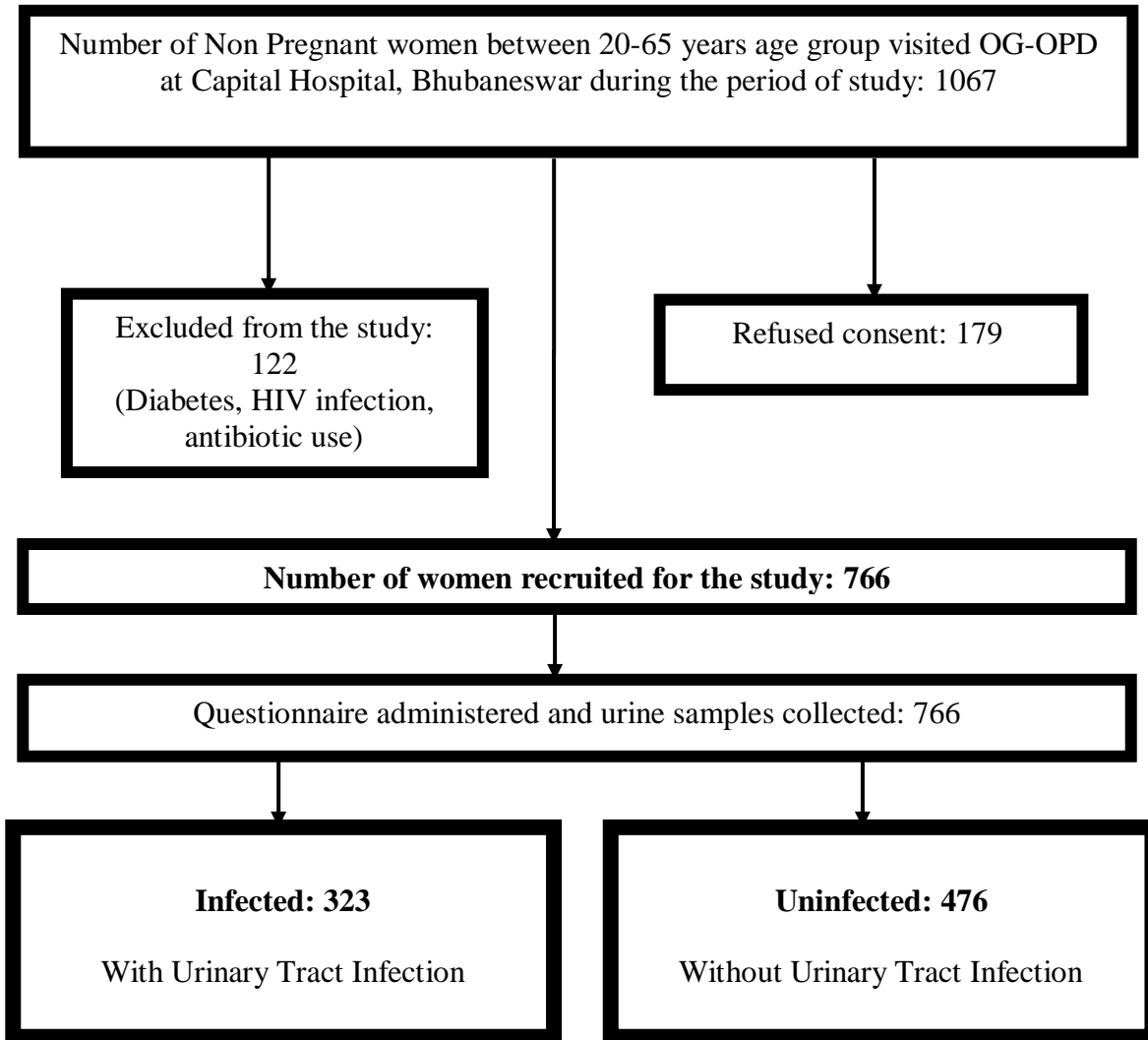
Table.3 WASH practices among non pregnant women at capital hospital, Odisha (N=766)

Variables	Urinary Tract Infection (UTI)		P-Value
	Without Urinary tract infection (%) (N= 476)	With Urinary tract infection (%) (N=323)	
Primary water source location			
1(In the house)	277(62.53)	187(57.89)	0.598
2(In the yard)	57(12.87)	50(15.48)	
3(At a relative's/ neighbor's house or yard)	13(2.93)	10(3.10)	
4(At a public location)	96(21.67)	76(23.53)	
Primary water source			
1(Piped tap)	310(69.98)	207(64.09)	0.002
2(Tube well or borehole or protected well)	85(19.19)	54(16.72)	
3(Unprotected well)			
4(Tanker truck or cart with a small tank)	7(1.58)	9(2.79)	
5(Surface water (river, dam, lake, pond or stream, canal, irrigation channel))	41(9.26) 0	45(13.93) 8(2.48)	
Household latrine/bathroom			
0 (No)	200(45.15)	126(39.01)	0.090
1 (Yes)	243(54.85)	197(60.99)	
Water for latrine			
1(Tap inside latrine)	250(56.43)	186(57.59)	0.648
2(Bring it from my private tube well)	106(23.93)	72(22.29)	
3(Neighbour tube well 1 min from home)	22(4.97)	12(3.72)	
4(Public source within 1 min from home)	56(12.64)	49(15.17)	
5(Far source more than 5 min walk)	9(2.03)	4(1.24)	
Where urinate			
1(Facility in-house or yard)	349(78.78)	241(74.61)	0.461
2(Facility in relative or Neighbors house or yard)	17(3.84)	11(3.41)	
3(Facility in the community)	21(4.74)	20(6.19)	
4(Open space(bush/field/Pond))	56(12.64)	51(15.79)	
Wash practice			
1(Only vaginal wash)	323(72.91)	78(24.15)	0.001
2(Bath of full body)	22(4.97)	14(4.33)	
3(I don't wash)	98(22.12)	231(71.52)	
Latrine/bathroom privacy			
0 (No)	152(34.31)	146(45.20)	0.002
1 (Yes)	291(65.69)	177(54.80)	
Latrine/bathroom roof			
0 (No)	130(29.35)	99(30.65)	0.697
1 (Yes)	313(70.65)	224(69.35)	
Latrine/bathroom door			
0 (No)	153(34.54)	150(46.44)	0.001
1 (Yes)	290(65.46)	173(53.56)	
Latrine/bathroom lock			
0 (No)	127(28.67)	106(32.82)	0.218
1 (Yes)	316(71.33)	217(67.18)	
Hand wash facility			
0 (No)	86(19.41)	73(22.60)	0.283
1 (Yes)	357(80.59)	250(77.40)	

Table.4 Univariate and multivariate analysis with unadjusted & adjusted or in different socio-demographic, clinical and wash practices (N=766)

Risk Factor	Unadjusted OR* (95% CI*)	P value	Adjusted OR* (95% CI*)	P value
Age				
3(51-65)	1.0	0.001	1.0	0.001
2(36-50)	5.89(3.12-11.11)	0.001	26.47(5.77-121.37)	0.001
1(20-35)	4.11(2.26-7.48)		18.90(3.48-102.53)	
Years of marriage				
3(31 & above)	1.0		1.0	
2(16-30)	2.44(1.15-5.20)	0.020	0.13(0.02-0.75)	0.022
1(1-15)	2.83(1.37-5.87)	0.005	0.21(0.03-1.40)	0.108
Caste/Tribe	0.99(0.86-1.14)	0.943	0.89(0.71-1.11)	0.314
Monthly Income				
5(30,000 and above)	1.0		1.0	
4(20,000-30,000)	1.52(0.29-7.95)	0.617	8.89(0.96-82.35)	0.054
3(10,000-20,000)	2.49(0.51-12.05)	0.255	5.12(0.58-45.23)	0.141
2(5,000-10,000)	4.02(0.84-19.30)	0.081	3.52(0.40-30.93)	0.255
1(Bellow 5,000)	5.03(1.03-24.55)	0.046	4.21(0.43-40.63)	0.213
6(Don't Know)	0.53(0.09-2.93)	0.474	1.15(0.11-11.89)	0.905
Where live				
1(Housing colony)	1.0		1.0	
2(Urban slum)	2.92(1.84-4.61)	0.001	1.82(0.86-3.82)	0.113
3(Rural/village)	2.56(1.63-4.04)	0.001	1.54(0.73-3.22)	0.252
4(Hostel)	6.56(2.57-16.74)	0.001	2.84(0.61-13.13)	0.181
People live in house				
1(1&2)	1.0		1.0	
2(3-5)	2.56(1.34-4.87)	0.004	1.42(0.54-3.71)	0.474
3(5& above)	2.78(1.42-5.46)	0.003	1.48(0.53-4.08)	0.448
Itching/burning when urinating				
0	1.0		1.0	
1	3.63(2.68-4.93)	0.001	5.66(3.47-9.23)	0.001
Vaginal discharge				
0	1.0		1.0	
1	0.69(0.51-0.92)	0.012	0.33(0.20-0.54)	0.001
Genital sores				
0	1.0		1.0	
1	0.54(0.34-0.85)	0.008	0.34(0.16-0.72)	0.005
Clinic recurrent				
0	1.0		1.0	
1	1.77(1.32-2.37)	0.001	3.65(2.24-5.95)	0.001
Primary water source				
1(Piped tap)	1.0		1.0	
2(Tube well or borehole or protected well)	0.95(0.64-1.39)	0.799	1.13(0.61-2.08)	0.681
3(Unprotected well)	1.92(0.70-5.25)	0.201	2.27(0.55-9.40)	0.254
4(Tanker truck or cart with a small tank)	1.64(1.03-2.59)	0.034	1.64(0.83-3.24)	0.148
Wash practice				
3(I don't wash)	1.0		1.0	
1(Only vaginal wash)	0.10(0.07-0.14)	0.001	0.05(0.03-0.93)	0.001
2(Bath of full body)	0.26(0.13-0.54)	0.001	0.22(0.08-0.61)	0.004
Latrine/bathroom privacy				
0	1.0		1.0	
1	0.63(0.47-0.84)	0.002	0.93(0.57-1.51)	0.772
Latrine/bathroom door				
0	1.0		1.0	
1	0.60(0.45-0.81)	0.001	0.40(0.24-0.68)	0.001

Fig.1 Schematic diagram of patient recruitment



Risk of UTI (OR-2.92, 95% CI 1.84-4.61, $p \leq 0.001$), (OR-2.56, 95% CI 1.63-4.04, $p \leq 0.001$), (OR-6.56, 95% CI 2.57- 16.74, $p \leq 0.001$) was also associated with the women who lived in Urban slum, Rural/Village & Hostel respectively followed by people live in house between 3-5 with (OR-2.56, 95% CI 1.34- 4.87, $p \leq 0.004$) and 5 & above (OR-2.78, 95% CI 1.42- 5.46, $p \leq 0.003$). While Clinically Itching/ burning when urinating varies significantly (OR-3.63, 95% CI 2.68- 4.93, $p \leq 0.001$) followed by Vaginal discharge (OR-0.69, 95% CI 0.51- 0.92, $p \leq 0.012$), Genital sores (OR-0.54, 95% CI (0.34- 0.85),

$p \leq 0.008$) and clinically recurrent (OR-1.77, 95% CI 1.32- 2.37, $p \leq 0.001$) were found to be associated with UTI in non-pregnant women.

Women assessed with Primary water source from tanker truck or cart with small tank showed significantly higher odds of UTI (OR-1.64, 95% CI 1.03- 2.59, $p \leq 0.034$). Other risk factors associated with wash practice such as vaginal wash (OR-0.10, 95% CI 0.07- 0.14, $p \leq 0.001$) and Bath of full body (OR-0.26, 95% CI 0.13- 0.54, $p \leq 0.001$) was likely to have more UTI. Whereas, lack of bathroom privacy (OR-0.63, 95% CI 0.47- 0.84,

$p \leq 0.002$) and no door in latrine (OR-0.60, 95% CI 0.45- 0.81, $p \leq 0.001$) showed strong association with UTI.

After multivariate analysis for each outcome women associated with UTI were found to be higher in age group (36-50) with (AdjOR-26.47, 95% CI 5.77- 121.37, $p \leq 0.001$) and age group between 20-35 years (AdjOR-18.90, 95% CI 3.48- 102.53, $p \leq 0.001$) followed by Years of marriage (16-30) with (AdjOR- 0.13, 95% CI 0.02-0.75, $p \leq 0.022$), Clinically Itching/burning when urinating (AdjOR-5.66, 95% CI 3.47- 9.23, $p \leq 0.001$), Vaginal discharge (OR-0.33, 95% CI 0.20-0.54, $p \leq 0.001$), Genital sores (AdjOR-0.34, 95% CI 0.16-0.72, $p \leq 0.001$), Clinic recurrent (AdjOR-3.65, 95% CI 2.24-5.95, $p \leq 0.001$), Wash Practice which includes Vaginal wash (AdjOR-18.90, 95% CI 3.48- 102.53, $p \leq 0.001$) and Bath of full body (AdjOR-0.22, 95% CI 0.08- 0.61, $p \leq 0.001$). Similarly, in case of privacy with respect to latrine/ bathroom door (OR-18.90, 95% CI 3.48-102.53, $p \leq 0.001$) showed significantly higher odds of UTI (Table 4).

Urinary tract infections (UTI) are major health curse that affects the majority of women in every year. This study provides support for the hypothesis that hygiene and wash practices can increase and lead to the risk of urogenital problems. UTI's among non-pregnant women is associated with poor hygienic conditions. However, other factors may also contribute to the problem as there are several causes of UTI infections. Bacteria are found to be the main cause of this infection and it affects a different part of the urinary tract which includes kidneys, ureters, bladder, and urethra. Particularly, bladder and urethra infections are mostly found in women (Manal *et al.*, 2012). Our study sites also allowed us to represent diversified samples which include individuals from a different age, castes, class and socio-economic status

with a range of wash practices and cleanliness. The main finding of this study are age group of non-pregnant women between 20-65years showed the highest percentage (64.09%) and live in a (42.72%), $p \leq 0.001$. This has been observed in another cross-sectional study that prevalence of bacteriuria in healthy women increases with age, in school among girls it was found to be 1% and in healthy community-dwelling women older than 80 years it was greater than 20% (Nicolle, 2003). Similarly, 43.34% of women found to be more prone to UTI, those are having a lower monthly income of (Rs 5,000-10,000/-). In our study, the statistically significant higher percentage was observed in Itching/ burning (69.97 %) when urinating followed by vaginal discharge and Genital sores. However, in health outcomes, self-reported symptoms have been used in several cross-sectional studies, with the most common symptoms reported so far was abnormal vaginal discharge and itching in the genitalia (Sumpter *et al.*, 2013). Our study revealed that about half of women (57.59%) had recurrent episodes of UTI and this result agree with Hamdan *et al.*, and Masinde *et al.*, who mentioned that a history of previous UTI is an important risk factor for asymptomatic UTI. In case of hygiene and wash practices, our study showed that about 71.52% of women do not wash their genital organs properly and this leads to urinary tract infection. Whereas, this result agrees with Tchoudomirova *et al.*, who mentioned that several hygiene practices such as washing genitals pre-coitus, washing genitals postcoitus, taking baths, frequent replacing of underwear and washing genitals from front to back were associated with a reduced frequency of UTIs (Tchoudomirova *et al.*, 2002). Across these studies, these practices were found to be particularly sensitive in women and girls belonging to lower socio-economic groups of rural areas (Das *et al.*, 2015).

The limitation is this is an observational study and so it's difficult to determine causality of the observed associations. Another limitation is that we only measured the association of hygiene practices related to urogenital diseases, but other infections could be associated, which is not included in this study.

Strengths of our work include a good sample size, use of a sophisticated microbiological laboratory to diagnose UTI and the fact that all of the interviewers involved were females, which assured a stress-free environment to discuss a stigmatized and sensitive topic.

It can be concluded that there is a strong association between hygiene practices and urinary tract infection. They were significantly exposed to recurrent infection and followed improper wash and sanitation practices.

It is important that women need to be educated about genital hygienic practices to avoid harmful uropathogens and reducing rate of vaginal infection. Training programs should be conducted which helps in counseling women about the genital hygienic practices. Further studies and more interventions were required and it must be explored to improve the health of women and avoid urinary tract infection. This study indicates that, in the context of women's health research, sanitation or hygiene is an important dimension.

Declaration of Interests

We have no conflict of interests.

Acknowledgement

We would like to express our sincere gratitude for the support from study participants, female interviewers and hospital nurses for assisting in this project.

References

- Aniebue, U.U., *et al.*, The impact of pre-menarcheal training on menstrual practices and hygiene of Nigerian school girls., *Pan Afr Med J*, Vol. 2, 2009, pp.9-12.
- Baisley, K., *et al.*, Bacterial vaginosis in female facility workers in north-western Tanzania: prevalence and risk factors. *Sex Transm Infect*, Vol.85, 2009, pp.370–375.
- Dasgupta, A., *et al.*, Menstrual Hygiene: How Hygienic is the Adolescent Girl? *Indian J Community Med*, Vol. 33, 2008, pp.77–80.
- Das, P., *et al.*, Menstrual Hygiene Practices, WASH Access and the Risk of Urogenital Infection in Women from Odisha, India. *PLoS ONE*, Vol. 10, 2015, pp 1-16.
- Gales, A.C., *et al.*, Activity and spectrum of 22 antimicrobial agents tested against urinary tract infection pathogens in hospitalized patients in Latin America: report from the second year of the SENTRY antimicrobial surveillance program (1998). *J Antimicrob Chemother*, Vol. 45, 2000, pp.295–303.
- Groen, S., *et al.*, The Course of Recurrent Urinary Tract Infections in Non-Pregnant Women of Childbearing Age, the Consequences for Daily Life and the Ideas of the Patient. *Nederlands Tijdschrift Voor Geneeskunde*, Vol. 149, 2015, pp.1048-51.
- Hillier, S.L., *et al.*, Role of bacterial vaginosis—associated microorganisms in endometritis. *American journal of obstetrics and gynecology*, Vol. 175, 1996, pp.435–441.
- Hinmann, F., The meaning of significant bacteriuria. *JAMA*, Vol. 184, 1963, pp. 727-28.

- Hooton, T.M., Recurrent urinary tract infections in women, *Int J Antimicrob Agents*, Vol.17, 2001, pp. 259–68.
- Arul, K. C., *et al.*, A cross sectional study on distribution of urinary tract infection and their antibiotic utilization pattern in Kerala, *International Journal of Research in Pharmaceutical and Biomedical Sciences*, vol. 3, 2012, pp. 1125–1130.
- Kunin, C.M.1997. MD Urinary Tract Infections. In: Williams and Wilkins Baltimore, fifth ed.
- Manal, F., *et al.*, Moustafa and Entesar, M.M. Association between the Hygiene Practices for Genital Organs and Sexual Activity on Urinary Tract infection in Pregnant Women at women’s health center, at Assiut University Hospital. *Journal of American Science*, Vol.8, 2012, pp. 515-522.
- Ness, R.B., *et al.*, Cluster analysis of bacterial vaginosis—associated microflora and pelvic inflammatory disease. *American journal of epidemiology*, Vol.162, 2005, pp. 585–590.
- Nicolle, L.E., Asymptomatic bacteriuria; when to screen and when to treat. *Infect Dis Clin North AM*. Vol. 17, 2003, pp. 367-94.
- Peters, S.E., *et al.*, Behaviors Associated with *Neisseria gonorrhoeae* and Chlamydia trachomatis: Cervical Infection among Young Women Attending Adolescent Clinics. *Clinical pediatrics*, Vol. 39, 2000, pp. 173–177.
- Seifu, Wubalem Desta and Alemayehu Desalegn Gebissa. 2018. “Prevalence and Antibiotic Susceptibility of Uropathogens from Cases of Urinary Tract Infections (UTI) in Shashemene Referral Hospital, Ethiopia.” *BMC Infectious Diseases* 18(1):30. Retrieved (<https://bmcinfectedis.biomedcentral.com/articles/10.1186/s12879-017-2911-x>).
- Sumpter, C., *et al.*, Systematic review of the health and social effects of menstrual hygiene management. *PLoS One*, Vol. 8, 2013.
- Tchoudomirova, K., *et al.*, History, clinical findings, sexual behavior and hygiene habits in women with and without recurrent episodes of urinary symptoms. *Actaobstetricia et gynecologica Scandinavica*, Vol. 77, 2002, pp 654-656.
- Seifu, W., *et al.*, Prevalence and Antibiotic Susceptibility of Uropathogens from Cases of Urinary Tract Infections (UTI) in Shashemene Referral Hospital, Ethiopia. *BMC Infectious Diseases*, Vol. 18, 2018, pp. 30: 34.

How to cite this article:

Jyoti Ranjan Mohanty, Alisha Pradhan, Sunita Jena, P.R. Misra, Bijaya Padhi and Dhananjay Soren. 2018. Hygiene and Wash Practices Associated with Urinary Tract Infection among Non-Pregnant Women at Capital Hospital, Bhubaneswar, Odisha, India. *Int.J.Curr.Microbiol.App.Sci*. 7(03): 1743-1753. doi: <https://doi.org/10.20546/ijcmas.2018.703.206>