RESEARCH ARTICLE

Urinary Tract Infection in Pregnant Women at Kathmandu, Nepal

Shikha Thakur[1*] | Dr. Komal Lata Nagpal[2]

[1]Research Scholar (Department of Microbiology), OPJS University Churu, Rajasthan, India

[2]Associate Professor, OPJS University, Churu, Rajasthan, India

Abstract

Background: Urinary tract infections "UTIs" are one of the frequently encountered problems during pregnancy. Untreated UTI can be associ-ated with serious obstetric complications. Hence the management and prevention of UTI in pregnancy is the crucial factor for the sustained pregnant period. Hence the present study was designed to identify the pathogenic agents of UTI and its associated risk factors in antenatal mothers in two private hospitals at Kathmandu city.
Aim: The main objective of the study was to identify the etiologi-cal agent and associated risk factor in Urinary tract infection among pregnant women attending the antenatal care service visit in a selected hospital.
Study Design: Cross-sectional descriptive study.
Place and Time of Study: The study was carried out under the supervision of University and field study was carried out in Kathmandu, Nepal from March 2019 to October 2019.
Methods: The cross-sectional study was performed at the Norvic Hospital and Baidya and Banskota hospital from March 2019 to October 2019. In this cross-sectional study, a total of 510, clean catch midstream urine (MSU) samples were collected aseptically and analyzed using standard microbiology methods. Data for the factors associated with UTI were obtained by use of questionnaires and standard laboratory tests for selected underlying conditions concerning associated risk factors were collected using structured questionnaires and the sample was also processed for antimicrobial drug susceptibility testing.
Results: The study revealed 193/510(37.84%) UTI prevalence among patients attending two hospitals in Kathmandu valley. *Escherichia coli* was the most prevalent bacterial uropathogen with 119/193(61.6%) followed by *Klebsiella pneumoniae* 35/193(18.13%), *Staphylococcus aureus* 22/193 (11.39%), *Proteus mirabilis* 7/193 (3.6%), *Enterococcus faecalis* 2/193 (1.0%), *Enterobacter aerogenes* 2/193(1.0%) *Serratia odorifera* 3/193(1.5%), *Streptococcus species* 3/193(1.5%).
Conclusions: The high prevalence of urinary tract infection in pregnant women warrant the need to screen all pregnant women and treat those infected with appropriate antimicrobial regimens in order to reduce its complications. Urinary Tract Infection screening is essential in pregnant women.

1 | BACKGROUND:

Urinary tract infection (UTI) is one of the most common infections seen in clinical practice particularly in Nepal with a high rate of morbidity and financial cost[1]. Most of the key factors predisposing to UTI have been attributed to poor personal hygiene and urinary tract abnormalities[2−5]. The causative agents for urinary tract infection vary from place to place and they also vary in their susceptibility and resistance patterns[6,7]. UTIs are caused by different microbial pathogens[8].

In pregnant women, physiological and anatomical changes in the urinary tract, as well as immune system changes during pregnancy increase the prevalence of UTI and in some cases lead to the symptomatic infection, resulting in serious risks for both mother and fetus[6,7,9]. Increasing age, parity[8], diabetes, sickle cell anemia, history of UTI, urinary tract disorders and immune deficiency may increase the risk of UTI in pregnant women[9−12].The most common pathogenic organisms of UTI are *Staphylococcus saprophyticus*, *Escherichia coli,Klebsiella pneumoniae*, *S. aureus*, *Proteus spp*, *Pseudomonas aeruginosa*, and *enterococci*[8,13,14].To date,no data regarding the UTIs from Norvic and Baidya and Banskota (B&B) hospital has not been documented. This study is designed to determine the bacterial uropathogens and their association with sociodemographic variables.

2 | MATERIALS AND METHODS:

A cross-sectional study was conducted at Norvic Hospital and B&B Hospital, Kathmandu, Nepal from March to October 2019. The hospitals are located at Kathmandu valley, the capital city of Nepal. The study population comprised of 510 pregnant women attending the antenatal clinic in the hospital. The demographic data was collected using questionnaires. Clean catch mid-stream urine samples were collected from all participants using the wide-mouthed sterile capped container. The data entry was done in MS excel and analysis was performed using SPSS V-16. Descriptive summaries were presented, and a Chi-square test ($\chi 2$) was used to assess the association between sociodemographic variables and pathogens present in the urine. P-value less than 0.05 were considered as statistically significant. The study was ethically approved by the institutional review board of College of OPJS University. Participation was fully voluntary, and consent was obtained from all participants. Any information obtained during the study was kept confidential, and Doctors manage those women with UTI.

3|RESULTS:

Out of 510 urine samples among pregnant women, 193(37.84%) of urine samples revealed with significant bacteriuria.

TABLE 1: Incidence of significant bacteriuria of total 510 pregnant women

Significant bacteriuria (Pregnant women)	Total sample	Percentage%
	510	193(37.84)

Out of total 510 samples, 193 were positive for bacterial growth. On bacterial identification and isolation,most of the bacteria isolated were gram negative. Among them, E. coli was the most predominant isolate with highest incidence (61.6%). Table 2

On physical examination of urine, it was found that urine color was light yellow in 82% of cases while 11.17% have deep yellow and remaining 2.7% have colorless (Table4) Out of 510 samples, 85.09% had acidic PH, 14.5% had alkaline PH and only 0.3% had the neutral PH (Table 5). The biochemical reactions showed clear transparency in 64.4% of urine samples out of total 510 urine samples (Table 4). While 29.8% had slight turbidity and 3.7% had turbidity on biochemical reaction (Table 6). The presence of significant number of pus cells was predominant in

Corresponding Author: *Shikha Thakur* *Department of microbiology. (PhD Scholar) Email: shikhathakur2085@gmail.com*

TABLE 2: Percentage of Isolation of various significant pathogens in urine of pregnant women.

Pathogens	Number of isolates	Percentage (%)
Escherichia coli	119	61.6
Klebsiella pneumoniae	35	18.13
Staphylococcus aureus	22	11.39
Proteus mirabilis	7	3.6
Enterococcus faecalis,	2	1.0
Enterobacter aerogenes	2	1.0
Serratia odorifera	3	1.5
streptococcus species	3	1.5

TABLE 3: Microscopic examination and chemical deposits noted of the 510 urine samples from pregnant ladies.

Deposits	Percentage (number)
Pus cells	214(41.9)
RBC	74(14.5)
Ca oxalate	15(2.9)
Ammonium phosphate	11(2.1)
Ammonium ureates	9(1.7)
Mucus threads	17(3.3)
Glucose	20(3.9)

urine samples. It was in 41.9% of urine samples Table 3 .

TABLE 4: Urine colors presentation of the 510 urine samples from pregnant ladies.

Urine color	Percentage (number)
Light yellow	422(82.74%)
Deep Yellow	57(11.17%)
Colorless	14(2.7%)
Others	0 (0.0%)

The data included demographic variables (age, education, religion, blood group, and BMI). All sta-

TABLE 5: PH recording of the 510 urine samples from the pregnant ladies.

PH	Percentage (number)
Acidic	(85.09)434
Alkaline	(14.5)74
Neutral	(0.39)2

TABLE 6: Transparency revealed from the 510 urine samples of pregnant ladies.

Transparency	Percentage (number)
Turbid	19(3.7)
Slight turbid	152 (29.8)
Clear	322(64.4)

tistical analyses were performed in spss, Chi-square test was used to compare qualitative data. P value < 0.05 was considered statistically significant. There were no significant relationships between UTIs and the variables of age, BMI, religion. There were significant differences in blood group and maternal educational level Table 7 .

4 | DISCUSSION:

The prevalence of significant in this study was 37.84%. It agrees with the previous reports to 54/139 (38.8%) registered by Kabugo et al. [15] in Mulago hospital. The prevalence of UTIs in this current study was found to be higher than the ones previously recorded in the following studies in Uganda: 67/300 (22.33%) by Tibyangye et al. [16] in Bushenyi District, 82/339 (24.2%) by Odongo et al. [17] in Gulu, 40/399 (10%) by Mwaka et al. [18] in Mulago, but in contrast to this, Our prevalence is also lower than that obtained by some other authors [18,19,20], .They also explained the reason for this could probably due to poor housing, ventilation, sanitation and drainage systems. Moreover, they also added that it could be pronounced due to lack of proper personal and environmental hygiene, population susceptibility and other factors like low socio-economic status and sexual intercourse among pregnant women. During gestation, there is more possibility of bacterial colonization in urethra by the bacteria originated from the gastro-intestinal and perineal flora. The other

TABLE 7: The Demographic Characteristics of Pregnant Women in Kathmandu City Regarding Urinary Tract Infections

Characteristics	Culture results		Total No	(%)	P value
	Significant bacteriuria	No significant bacteriuria			
Age in years					
Less than 20	22(61.1)	14(38.8)	36	7.1	0.86
20-29	76(39.17)	118(60.8)	194	38.0	0.95
30-39	70(35.35)	136(68.68)	198	38.8	0.29
Above 40	25(30.48)	57(69.51)	82	16.1	0.81
Religion					
Hindu	185(40.39)	273(59.60)	458	89.8	0.57
Buddhist	5(14.28)	30(85.71)	35	6.9	0.7
Muslim	3(17.64)	14(82.35)	17	3.3	0.6
Education in grade					
Illiterate	41(71.9)	16(28.07)	57	11.1	0.003
Primary	44(46.80)	50(53.19)	94	18.4	0.002
secondary	63(36.41)	110(63.58)	173	33.9	0.03
University	45(28.48)	113(71.51)	158	30.9	0.036
Blood group					
A	63(50.8)	61(49.19)	124	0.24	0.002
B	95(62.5)	57(37.5)	152	0.49	0.006
AB	11(9.4)	105(90.5)	116	0.22	0.003
O	24(20.3)	94(79.3)	118	0.23	0.004
BMI					
Thin	41(34.16)	79(65.83)	120	0.23	0.42
Normal	79(31.6)	171(68.4)	250	0.49	0.29
Overweight	54(0.6)	36(0.4)	90	0.17	0.35
Obese	19(0.38)	31(0.62)	50	0.09	0.97

established fact that the urethra in females is shorter, wider and close to the anus contribute to the higher prevalence of the UTI in women and so in pregnancy in this study. Although biochemical analysis of urine revealed mostly clear transparency (64.4%), the remarkable cases had slight turbidity (29.8%) and turbidity (3.7%), which could be due to presence of bacteria, pus cells, RBCs, proteins and other deposits (Table 6) found in this study. However, most of the pregnant women (82.74%) revealed with normal urine color and transparency, the overall incidence of bacteriuria was 37.84% signifying a negative correlation between urine color and bacteriuria. High educational level was protective. Educational level attained may be an indicator of the socioeconomic status of the women. Lower levels of education and low socioeconomic status have been related to higher

prevalence of bacteriuria in others studies [18,20]. In addition, no significant correlation was observed between the age of pregnant women and acquisition of UTI. Similar finding also reported by Hamdan et al [23] on UTI in Sudan and Kovavisarach et al [21] Variation in studies may be due to differences in geographical location, socioeconomic status, setting of study (primary care, general hospital and community), sample size and variation in screening tests

5 | CONCLUSION:

UTIs are very common during pregnancy and Escherichia coli are still the dominant organism responsible for UTI among pregnant women. Our research has shown that there is an association between

the educational status of participants and various pathogens in urine samples (quarantined colonies). The study reveals that a sociodemographic characteristic plays an important role in UTIs. Therefore, screening for early diagnosis and treatment of bacteriuria in women during pregnancy is necessary to prevent its complications. Periodic health examination 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 condition

6 | REFERENCES:

1. Ezeigbo OR, Nnadozie RIA, Asuoha-Chuks N, Ojiako VU, Awurum IN, Ugochukwu MG. Incidence of Urinary Tract Infection (UTI) Among Pregnant Women Attending Antenatal Clinics at Some Selected Hospitals in Aba, Southeastern Nigeria. International Journal of Current Microbiology and Applied Sciences. 2016;5(1):193–9.

2. Turay A., S.O E, P.O O, M.C O. The prevalance of Urinary Tract Infections AMong Pregnant Women Attending Antenatal Clinic at Unjoelen Primary Health Care Centre, Ekpoma, Edo State, Nigeria. The prevalence of urinary tract infections among pregnant women attending antenatal clinic at Ujoelen primary Health Care Centre, Ekpoma, Edo State, Nigeria. 2014;3(1):86–94.

3. Kaduma J, Seni J, Chuma C, Kirita R, Mujuni F, Mushi MF, et al. Urinary tract infections and preeclampsia among pregnant women attending two hospitals in Mwanza City, Tanzania: A 1:2 Matched case-control study. BioMed Research International. 2019;2019.

4. Lawani EU, Alade T, Oyelaran D. Urinary tract infection amongst pregnant women in Amassoma, Southern Nigeria. African Journal of Microbiology Research. 2015;9(6):355–9.

5. Mohamed NR, Omar HHH, Abd-Allah IM. Prevalence and Risk Factors of Urinary Tract In-

fection among Pregnant Women in Ismailia City, Egypt. IOSR Journal of Nursing and Health Science. 2017;06(03):62–72.

6. Amiri M, Lavasani Z, Norouzirad R, Najibpour R, Mohamadpour M, Nikpoor AR, et al. Prevalence of urinary tract infection among pregnant women and its complications in their newborns during the birth in the hospitals of Dezful city, Iran, 2012 - 2013. Iranian Red Crescent Medical Journal. 2015;17(8).

7. Primack W, Bukowski T, Sutherland R, Gravens-Mueller L, Carpenter M. What Urinary Colony Count Indicates a Urinary Tract Infection in Children? Journal of Pediatrics. 2017;191:259–261.e1.

8. Parajuli S, Thapa B. Microbiology of Urinary Tract Infection and the Status of Urinary Isolates in Pregnant Women. MJSBH. 1397;13(2).

9. Íñigo M, Coello A, Fernández-Rivas G, Rivaya B, Hidalgo J, Quesada MD, et al. Direct identification of urinary tract pathogens from urine samples, combining urine screening methods and matrix-assisted laser desorption ionization-time of flight mass spectrometry. Journal of Clinical Microbiology. 2016;54(4):988–93.

10. Kant S, Lohiya A, Kapil A, Gupta SK. Urinary Tract Infection among Pregnant Women at a Secondary Level Hospital in Northern India. Indian J of Public Health. 2017;61:199–204.

11. Rohini UV, Reddy GS, Kandati J, Ponugoti M. Prevalence and associate risk factors of asymptomatic bacteriuria in pregnancy with bacterial pathogens and their antimicrobial susceptibility in a tertiary care hospital. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2017;6(2):558.

12. Li W, Sun E, Wang Y, Pan H, Zhang Y, Li Y, et al. Rapid identification and antimicrobial susceptibility testing for urinary tract pathogens by direct analysis of urine samples using a MALDI-TOF MS-based combined protocol. Frontiers in Microbiology. 2019;10(JUN).

13. Garnizov TM. Asymptomatic bacteriuria in pregnancy from the perspective of public health and maternal health care: review and case report. Biotechnology and Biotechnological Equipment. 2016;30(3):443–7.

14. Marahatta R, Dhungel BA, Pradhan P, Rai SK, Choudhury DR. Asymptomatic bacteriurea among pregnant women visiting Nepal Medical College Teaching Hospital, Kathmandu, Nepal. Nepal Medical College journal : NMCJ. 2011;13(2):107–10.

15. Wing DA, Fasset MJ, Getahun D. Acute pyelonephritis in pregnancy: an 18-year retrospective analysis. Am J Obstet Gynecol. Elsevier. 2014;210(3):219.e1–6.

16. Marzieh J, Mohsen S, Nasrin R, Koroosh K. Prevalence of urinary tract infection and somes factors affected in pregnant women in Iran, Karaj. Middle-East J Sci Res. 2014;20(7):782–5

17. D. Kabugo, S. Kizito, D. D. Ashok et al., "Factors associated with community-acquired urinary tract infections among adults attending assessment centre, Mulago Hospital Uganda," African Health Sciences, vol. 16, no. 4, 2016. [27]

18. J.Tibyangye, M. Okech, J. Nyabayo, and J. Nakavuma, "In vitro antibacterial activity of Ocimum suave essential oils against uropathogens isolated from patients in selected hospitals in Bushenyi district, Uganda," British Microbiology Research Journal, vol. 8, no. 3, pp. 489–498, 2015.

19 C. O. Odongo, D. A. Anywar, K. Luryamamoi, and P. Odongo, "Antibiograms from community-acquired uropathogens in Gulu, northern Uganda—a cross-sectional study," BMC Infectious Diseases, vol. 13, p. 193, 2013.

20. A. D. Mwaka, H. Mayanja-Kizza, E. Kigonya, and D. KadduMulindwa, "Bacteriuria among adult non-pregnant women attending Mulago hospital assessment centre in Uganda," African Health Sciences, vol. 11, no. 2, pp. 182–189, 2011

21. Assefa A, Asrat D, Woldeamanuel Y, G/Hiwot Y, Abdelle A, Melesse T. Bacterial profile and drug susceptibility pattern of urinary tract infection in pregnant women at Tikur Anbessa specialized hospital Addis Ababa, Ethiopia. Ethiop Med J. 2008; 46(3):227–35

22. Marzieh J, Mohsen S, Nasrin R, Koroosh K. Prevalence of urinary tract infection and somes factors affected in pregnant women in Iran, Karaj. Middle-East J Sci Res. 2014;20(7):782–5.

23. AL-Haddad AM. Urinary tract infection among pregnant women in AlMukalla district, Yemen. East Mediterr Health J. 2005;11(3):505–10 14. Colgan R, Nicolle LE, McGlone A, Hooton TM. Asymptomatic bacteriuria in adults. Am Fam Physician. 2006; 74(6):985–90. 23.