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Prevalence of Urinary Tract Infection among Pregnant Women attending Tertiary Care Center in the first trimester: A Cross-Sectional Study

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ABSTRACT

Introduction: Urinary tract infection (UTI) is one of the most prevailing clinical infection in pregnant women, due to the physiological and anatomical changes occurring during pregnancy. Considering the increased risk, this study focuses on prevalence of UTI in pregnant women in the first trimester, its early detection and timely, adequate treatment to prevent any complications.

Objective: To assess the prevalence of UTI in pregnant women during first trimester of pregnancy.

Methodology: A descriptive cross-sectional study was conducted among first-trimester pregnant women visiting the Obstetrics and Gynecology out-patient department of a tertiary care center in Nepal. After informed consent, urine routine and culture tests were done as part of antenatal screening. Clean-catch midstream urine was collected in two sterile containers following verbal instructions and sent for microscopy and culture sensitivity. UTI was diagnosed based on significant bacteriuria ($\geq 10^5$ cfu/mL), positive culture, or both.

Results: The prevalence of UTI in total of 316 pregnant women in the first trimester was 15.18%. Among all positive cases, 89.58% were asymptomatic and only 10.41% were symptomatic. Primiparous women (58.33%) were more affected compared to multiparous women (41.66%). More than half of the pregnant women aged 15 – 20 years had UTI. The most common bacteria causing UTI was Escherichia coli (72.72%) and the most common sensitive antibiotic detected was Amoxicillin- Clavulanic acid, (54.54%).

Conclusion: Pregnant women have higher likelihood of having asymptomatic UTI. Without visible symptoms the only option is screening test for UTI during pregnancy, so it is important to provide appropriate management to prevent adverse outcome.

Keywords: First trimester; Pregnant women; Urinary Tract Infection.

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INTRODUCTION

Urinary tract infection (UTI) encompasses infections affecting the kidneys, ureters, bladder, and urethra.[1] It may present with symptoms such as fever, dysuria, urinary urgency, lower abdominal pain, or remain asymptomatic.[2] Asymptomatic bacteriuria (ASB), defined as bacterial presence in urine without symptoms, affects 2-15% of pregnant women in developing countries and 2-7% in developed ones.[3,4] If untreated, 30% progress to cystitis, while 40-50% develop acute pyelonephritis.[5,6] Pregnancy increases UTI risk due to anatomical and hormonal changes leading to urinary stasis particularly from the 6th week onwards.[7,8]

Urinary Tract Infection in the first trimester poses risks such as miscarriage, preterm birth, and low birth weight, requiring prompt diagnosis and treatment of all cases, including ASB.[9,10] However, limited studies have focused UTI in 1st trimester in Nepal. This study aimed to determine the prevalence of UTI among pregnant women in 1st trimester admitted to a tertiary care center in Nepal, contributing to improved maternal and fetal outcomes.

METHODOLOGY

A descriptive cross-sectional study was conducted among the pregnant women in their first trimester during the visit to Department of Obstetrics and Gynecology of a Tertiary care centre in Nepal. The study period was from 15 November 2023 to 15 May 2024. The study population included all the pregnant women who presented to the OPD of Department of Obstetrics and Gynaecology in their 1st trimester.

Ethical approval was obtained from Institutional Review Committee of Kathmandu Medical College with Reference number 29092023/02.

Each woman or her kin was informed about the study and verbal/written informed consent was obtained. With proper instructions clean catch midstream urine samples were collected from each women in two sterile containers then the samples were sent for urine microscopy and culture sensitivity as part of routine antenatal investigations. Urinary Tract Infection was diagnosed either by significant bacteriuria (≥10^5 colony-forming units [cfu] per mL) or by positive urine culture or both**.**

The inclusion criteria for the study were pregnant women who presented to the Obstetrics and Gynecology Department for an antenatal care visit in the first trimester. The exclusion criteria were pregnant women who did not want to continue their pregnancy and women with renal disease, those who had been on antibiotic therapy within the last 72 hours and women who did not give consent to participate in the study. The dependent variable is UTI, while the independent variables are age, education status, gravida, and parity

As this study was being done in a dynamic population, convenience sampling was done to reach the required sample size. The sample size for the study was calculated using the following formula for continuous data in an infinite population for descriptive studies:

$n = z^2pq/e^2$

Where z= 1.96 at 95% of Confidence interval

Prevalence of UTI taken from a previous study (p) =25%[4]

q=1-p =75%

e (margin of error) = 5%

Thus, minimum required sample size (n) = $1.96^2*25*75/5^2$

n=288

10% nonresponse rate = 10 % of n

= 28

Final sample size = 288+ 28

= 316

Data was collected using a pretested proforma. The women's identifying details was not included except the hospital ID number for future references. The principal author kept the folder with women details confidential and secure. The Urine Routine Examination (RME) & Culture(C/S) were collected from urine test reports from the medical laboratory . The urine tests were standard technique and reliable and did not require validation. All data with the hospital number was entered using Microsoft Excel, with secured password. The complete document was assessed only by the Principal Investigator (PI). All other co-authors received the version of the coded file which did not have patient's identifying information. Once entered, the data was processed and refined. Missing, incomplete and invalid data were discarded. The final data set was coded for analysis. Data analysis was done using IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, N.Y., USA)

RESULTS

The prevalence of UTI among 316 pregnant women in first trimester was 15.18% (with CI of 95%). Out of 316 pregnant women in their first trimester, 48 (15.18%) were diagnosed with UTI and among total diagnosed cases, 37 (77.08%) had urine RME Positive(>5/CFU), six (12.5%) had Urine RME negative but culture positive, five (10.41%) had both urine RME and Urine culture positive . Similarly, 283 (89.58%) were found to be asymptomatic and only 33 (10.41%) were symptomatic. Focusing solely on Urine culture results, 11 (3.48%) pregnant women tested positive, while 305 (96.52%) women tested negative (Table 1). On evaluating the UTI cases according to age, it was found that pregnant women from age group 15-20 years (54.54%) were most affected.

On further evaluation, of the total 48 diagnosed cases, 25 women were of less than 8 weeks of gestation and 23 were between 8-13 weeks of their gestation (Table 2). While 58.33% were primigravida and 41.66% were multigravida (Table 3).

Among 11 urine positive cases, E. coli was isolated in eight (72.72%) cases while Citrobacter freundi, Klebsiella pneumoniae, Acinetobacter baumanii were isolated in remaining three (9.09%) cases as shown in (Figure 1). Antibiotic susceptibility was also done and six samples were found sensitive to Amoxicillin-Clavulanic acid, five samples were sensitive to Amikacin, two were sensitive for Nitrofurantoin and one each for Ampicillin and Meropenem (Figure 2). Hence, culture positive cases were sensitive to more than one drug.

Table 1: Prevalence of Urinary tract infection among pregnant women n=316

Result	n (%)
positive for UTI	48(15.2)
Negative for UTI	268 (84.8)
Presence of UTI symptoms (n=48)	
Asymptomatic	43(89.58%)
Symptomatic	5(10.41%)
Culture Positive	11 (3.48%)

Table 2: Distribution of UTI among pregnant women in relation to obstetric variables (n=48)

Obstetric variables	Presence of UTI n (%)
Week of gestation	
<8	25(52.08%)
8-13	23(47.91%)
Parity	
Primigravida	28 (58.33%)
Multigravida	20 (41.66%)

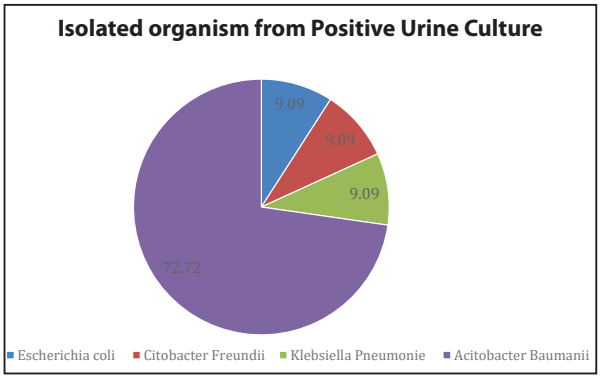

Figure 1: Microorganism isolated in culture positive UTI.

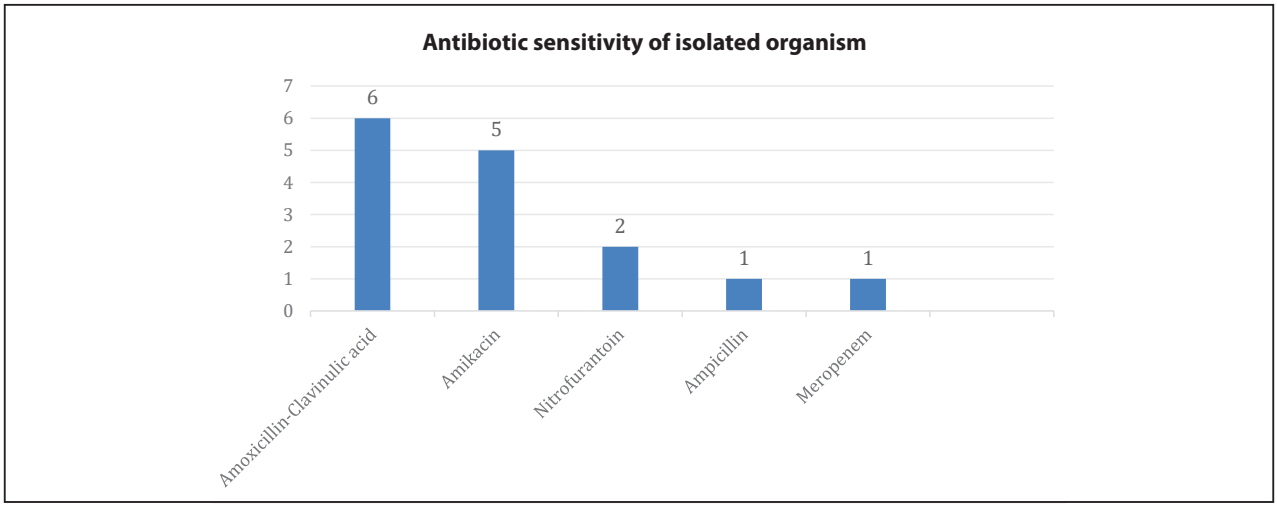

Figure 2: Antibiotic sensitivity in culture positive UTI.

DISCUSSION

Pregnant women are more likely to contract UTIs than non-pregnant women, possibly as a result of weakened immunity and a variety of physiological effects of elevated progesterone.[1, 5] The prevalence was 15.18% with 89.58% were asymptomatic and rest 10.41% were symptomatic. The prevalence was lower than that found in a study done by Kayastha et al. conducted in Dhulikhel Hospital Nepal, with the prevalence of UTI 25.9%, symptomatic being 10.5% and asymptomatic 15.5%.[4] Likewise, the prevalence was higher than the study done in Bangladesh (8.9%) and B.P. Koirala Institute of Health and Science (8.7%).[11,12] On the other hand a study done by Gilbert NM et al which was reviewed globally about the prevalence of asymptomatic bacteriuria showed the prevalence of 86.6% which was lower than our study.[13] The variation in the prevalence rate of UTIs may result from variations in sample sizes, research methodologies

that were tailored for the study or the kind of sample that was chosen for the evaluation.

In this study, UTI was prevalent in women between 15-20 years of age with the percentage of 54.54%. In contrast was most prevalent in the age group 21-25(52.22%) in a study done in Janakpur and age group 20-30 in a study done in Kathmandu (65%).[14, 15]

It has been corroborated that primiparous women had a higher incidence of UTI (58.33%). This is because there is a lack of knowledge about keeping good hygiene. Similar to our study, a study conducted in Nepal revealed that primiparity, low levels of paternal education, and undernutrition in mothers are the main causes of the rise in pregnancy-related UTI occurrences.[11] A contradicting result was present in the study done by Yadav K et al in Nepal (Province 2), where UTI in primigravida was 29.93% and in multigravida it was 51.59%.[14]

Pregnant women's UTIs are caused by many bacterial strains. In our study, out of 11 culture positive UTIs E.coli was isolated in eight of them being 72.72% and the rest three cases were positive for Citrobacter freundii, Klebsiella pneumonia and Acinetobacter baumani (9.09%). The results are consistent with other studies, where E. coli was the most frequently isolated bacteria.[16-18] But in another study done by Johnson B et al in Uganda, klebsiella was the most isolated organism.[19]

On doing antibiotic sensitivity test, the most sensitive antibiotic found was Amoxicillin/Clavulanic acid(54.54%), and others antibiotic that were found sensitive were Amikacin (45.45%), Nitrofurantoin (18.18%), Ampicillin (9.09%) and Meropenem (9.09%). Whereas a systemic review done by Belete MA et al in developing countries of Asia and Africa ciprofloxacin, nitrofurantoin and ceftriaxone shows the highest efficacy against isolates of E. coli.[20]

This study is limited in a single tertiary care center. Geographic and demographic constraints in this study limits applicability to diverse populations. Antibiotic sensitivity testing was restricted to a narrow range of drugs, and there was no follow-up to assess maternal or fetal outcomes. Additionally, comparing findings with studies using different methods complicates interpretation. Future research should address these limitations for broader applicability.

CONCLUSIONS

Among, pregnant women in first trimester, younger and primiparous women are more susceptible to UTIs. Taking these women into consideration, health education and sanitation among these women becomes a primary modality to prevent UTI. The prevalence of asymptomatic bacturia is more common than symptomatic UTI in early first trimester (<8 weeks). Therefore, screening regular urine examinations is essential in all pregnant women. Diagnosing and treating UTI in first trimester itself prevents different maternal and fetal complication in later stages of pregnancy.

In our study, *E. coli* was the most commonly isolated organism. Antibiotic prescriptions should prioritize drugs based on culture and antibiotic susceptibility to ensure effective treatment.

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REFERENCES

1. Wei Tan C, Chlebicki MP. Urinary tract infections in adults. Singapore Med J. 2016 Sep;57(9):485–90. [PubMed | Full text | DOI]
2. Werter DE, Kazemier BM, van Leeuwen E, de Rotte MCFJ, Kuil SD, Pajkrt E, et al. Diagnostic work-up of urinary tract infections in pregnancy: study protocol of a prospective cohort study. BMJ Open. 2022 Sep 14;12(9):e063813. [PubMed | Full text | DOI]
3. Agarwal A, Pandey S, Maheshwari U, Singh MP, Srivastava J, Bose S. Prevalence of Asymptomatic Bacteriuria and Antimicrobial Resistance Profile among Pregnant Females in a Tertiary Care Hospital. Indian J Community Med Off Publ Indian Assoc Prev Soc Med. 2021;46(3):469–73. [PubMed | Full text | DOI]
4. Kayastha B, Tamrakar SR. Maternal and Perinatal Outcome of Urinary Tract Infection in Pregnancy at Dhulikhel Hospital, Kathmandu University Hospital. Kathmandu Univ Med J KUMJ. 2022;20(77):82–6. [PubMed | Full text | DOI]
5. The American College of Obstetricians and Gynecologists. Urinary Tract Infections in Pregnant Individuals. Obstetrics & Gynecology [Internet]. 2023

Aug 1;142(2):435. Available from:https://journals.lww.com/greenjournal/fulltext/2023/08000/urinary_tract_infections_in_pregnant_individuals.26.aspx [PubMed | Full text | DOI]

6. Kladenský J. [Urinary tract infections in pregnancy: when to treat, how to treat, and what to treat with]. Ceska Gynekol. 2012 Apr;77(2):167–71. [PubMed | Full text]
7. 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. Iran Red Crescent Med J. 2015 Aug 24;17(8):e26946. [PubMed | Full text | DOI]
8. Getaneh T, Negesse A, Dessie G, Desta M, Tigabu A. Prevalence of Urinary Tract Infection and Its Associated Factors among Pregnant Women in Ethiopia: A Systematic Review and Meta-Analysis. BioMed Res Int. 2021. [PubMed | Full text | DOI]
9. Gessese YA, Damessa DL, Amare MM, Bahta YH, Shifera AD, Tasew FS, et al. Urinary pathogenic bacterial profile, antibiogram of isolates and associated risk factors among pregnant women in Ambo town, Central Ethiopia: a cross-sectional study. Antimicrob Resist Infect Control. 2017 Dec 29;6:132. [PubMed | Full text | DOI]
10. Taghavi Zahedkalaei A, Kazemi M, Zolfaghari P, Rashidan M, Sohrabi MB. Association Between Urinary Tract Infection in the First Trimester and Risk of Preeclampsia: A Case-Control Study. Int J Womens Health. 2020;12:521–6. [PubMed | Full text | DOI]
11. Lee AC, Mullany LC, Koffi AK, Rafiqullah I, Khanam R, Folger LV, et al. Urinary tract infections in pregnancy in a rural population of Bangladesh: population-based prevalence, risk factors, etiology, and antibiotic resistance. BMC Pregnancy Childbirth. 2019 Dec 31;20(1):1. [PubMed | Full text | DOI]
12. Thakur A, Baral R, Basnet P, Rai R, Agrawal A, Regmi MC, et al. Asymptomatic bacteriuria in pregnant women. JNMA 2013;52(192):567–70. [PubMed | Full text | DOI]
13. Gilbert NM, O'Brien VP, Hultgren S, Macones G, Lewis WG, Lewis AL. Urinary Tract Infection as a Preventable Cause of Pregnancy Complications: Opportunities, Challenges, and a Global Call to Action. Glob Adv Health Med. 2013 Sep;2(5):59–69. [PubMed | Full text |DOI]
14. Yadav K, Prakash S. Prevalence of Asymptomatic Bacteriuria during Pregnancy at a Tertiary Care Hospital of Province No. 2, Nepal. Tribhuvan Univ J Microbiol. 2019 Dec 6;6:32–8. [PubMed | Full text | DOI]
15. Parajuli S, Thapa B. Microbiology of Urinary Tract Infection and the Status of Urinary Isolates in Pregnant Women. Med J Shree Birendra Hosp. 2014;13(2):20–4. [Full Text | DOI]
16. Haider G, Zehra N, Munir AA, Haider A. Risk factors of urinary tract infection in pregnancy. JPMA J Pak Med Assoc. 2010 Mar;60(3):213–6. [PubMed | Full text]
17. Usta TA, Dogan O, Ates U, Yucel B, Onar Z, Kaya E. Comparison of single-dose and multiple-dose antibiotics for lower urinary tract infection in pregnancy. Int J Gynaecol Obstet. 2011 Sep;114(3):229–33. [PubMed | Full text | DOI]
18. Laily F, Lutan D, Amelia S, Tala M, Aman T. Associated risk factors for urinary tract infection among pregnant women at Puskesmas Kenangan, Deli Serdang district. IOP Conf Ser Earth Environ Sci. 2018 Mar;125(1): 012035. [Full Text | DOI]
19. Johnson B, Stephen BM, Joseph N, Asiphas O, Musa K, Taseera K. Prevalence and bacteriology of culture-positive urinary tract infection among pregnant women with suspected urinary tract infection at Mbarara regional referral hospital, South-Western Uganda. BMC Pregnancy and Childbirth. 2021 Feb 23;21(1):159. [PubMed | Full text | DOI]
20. Belete MA, Saravanan M. A Systematic Review on Drug Resistant Urinary Tract Infection Among Pregnant Women in Developing Countries in Africa and Asia; 2005–2016. Infect Drug Resist. 2020 May 18;13:1465–77. [PubMed | Full text | DOI]