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Urinary Tract Infection among Pregnant Women Attending Antenatal Care Service Visit on Selected Hospital of Kathmandu, Nepal

Shikha Thakur[1*], Ramanand Pandit[2], Ashok Pandey[3] and Komal Lata Nagpal[1]

[1]OPJS University, Churu, Rajasthan, India.
[2]GSEF Research and Training Centre, Maitidevi, Kathmandu, Nepal.
[3]Public Health Research Society Nepal, Kathmandu, Nepal.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Urinary Tract Infection during pregnancy may cause serious complications including pyelonephritis and delivery of premature or low-birth-weight infants.
Aim: The main objective of the study was to identify the Urinary tract infection among pregnant women attending the antenatal care service visit in a selected hospital in Kathmandu, Nepal.
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. The most frequent isolates were determined in 510 first urine samples from clinically suspected pregnant women by urine dipstick analysis, microscopic and by culture method. The identification of isolates was performed by the standard

Email: pandeyg7@gmail.com;

microbiological testing and the standard methods of descriptive statistics as well.
Results: Out of 510 clinically suspected urinary tract infection cases, 320 (62.6%) were culture negative. According to the microscopic examination of urine samples among gram-negative pathogens, the majority 177 (35%) Escherichia coli was the most common pathogens followed by Enterobacter cloacae 114 (22.4%) whereas among gram-positive pathogens; majority 93 (18 Staphylococcus negative coagulase was the most common pathogens.
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 to reduce its complications. Urinary Tract Infection screening is essential in pregnant women.

Keywords: Antenatal care; E. coli; pregnant women; urinary tract infection.

1. BACKGROUND

Urinary tract infections (UTI) are 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 may be 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 anaemia, 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 pneumonia, S. aureus, Proteus sp., Pseudomonas aeruginosa* and *Enterococcus* spp. [8,13,14-17]. 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 uro-pathogens 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, as it is the capital city of Nepal. The study population comprised of n=510 pregnant women attending the antenatal clinic in the hospital. The demographic data including age and pregnancy gestational age 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 16.0. Descriptive summaries were presented, and a Chi-square test (χ^2) was used to assess the association between sociodemographic variables and pathogens present in the urine. A P-value of less than 0.05 was considered as statistically significant. The study was ethically approved by the institutional review board of the 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 AND DISCUSSION

Majority 198 (39%) of the participants were in the age group of 30 to 39 years. More than one third 173 (34%) of the participants had and educational level up to 12 class. Ten out of nine 458 (90%) of the participants were Hindu. One third 172 (34%) of the participants were upper-caste group (Table 1).

Majority 195 (38%) of the participants have the milky urinal colour followed by 107 (21%) colourless and so on. While doing the microscopic examination of urine samples, majority 302 (59%) of the participants had *Trichomonas vaginalis, Schistosoma haematobium* pathogens in urine sample followed by 253 (50%) Red blood cells, 216 (42%) Calcium oxalate crystals, 171 (34%) Yeast cell and 154 (30%) pus cell respectively (Table 2).

Table 1. Sociodemographic information (n=510)

Variables	Number	Per cent
Age in years		
Less than 20	36	7.1
20-29	194	38.0
30-39	198	38.8
Above 40	82	16.1
Education in grade		
Primary (Up to 5)	37	7.3
Lower Secondary (Up to 8)	120	23.5
SLC/SEE	94	18.4
+2 level (Up to 12)	173	33.9
Bachelor	58	11.4
Master and above	28	5.5
Religion		
Hindu	458	89.8
Buddhist	35	6.9
Muslim	9	1.8
Kirat	8	1.6
Caste/ethnic Grouping		
Dalit	24	4.7
Disadvantaged Janajatis	87	17.1
Disadvantaged non-Dalit Terai caste groups:	73	14.3
Religious Minorities	29	5.7
Relatively advantaged Janajatis	125	24.5
Upper caste groups	172	33.7

Table 2. Urinal characteristics (n=510)

	Number	Per cent
Urine colour		
Pale yellow	42	8.2
Colourless	107	21.0
Milky	195	38.2
Amber	95	18.6
Red	44	8.6
Orange	27	5.3
Various pathogens in urine samples (Microscopic examination of urine samples)		
Yeast cells	171	33.5
Trachomonasvaginalis Schistosomahaematobium	302	59.2
Calcium oxalate crystals	216	42.4
Red blood cells	253	49.6
Pus cells	154	30.2

Table 3. Association between age and urine colour of pregnant women (n=510)

Age	Urine colour						χ^2 value	p-value
	Pale yellow	Colourless	Milky	Amber	Red	Orange		
Less than 20	3(7.1)	4(3.7)	19(9.7)	7(7.4)	3(6.8)	4(12.0)		
20-29	19(45.2)	37(34.6)	68(34.9)	34(35.8)	27(61.4)	9(33.3)	16.075[a]	0.377
30-39	11(5.6)	53(49.5)	74(37.9)	36(37.9)	11(25.0)	13(48.1)		
Above 40	9(21.4)	13(12.1)	34(17.4)	18(18.9)	3(6.8)	5(18.5)		

Table 4. Various pathogens in urine samples (quarantined colonies) (n=510)

Quarantined colonies (N=380)	Frequency	Percent
Germ to Gram negative		
Enterobactercloacae	114	22.4
Escherichia coli	177	34.7
Klebsiella pneumoniae	18	3.5
Enterococcus faecalis	11	2.0
Cocci to Gram positive (N=189)		
Staphylcoccus aureus	90	17.6
Coagulase-negative *Staphylococcus* (CoNS)	94	18.4
Streptococcus agalactiae	6	1.2

Table 5. Association between age group and quarantined colonies

Age group	*Streptococcus agalactiae*	*Coagulase-negative Staphylococcus*	*Staphylcoccus aureus*	*Enterococcus feacalis*	*Klebsiella pneumoniae*	*Escherichia coli*	*Enterobacter cloacae*
Less than 20	1(0.2)	5(1)	5(1)	23(4.5)	28(5.5)	10(2)	8(1.6)
20-29	2(0.4)	32(6.3)	32(6.3)	21(4.1)	5(1)	82(16.2)	57(11.2)
30-39	2(0.4)	40(7.8)	40(7.8)	21(4.1)	15(2.9)	65(12.7)	37(7.3)
Above 40	6(1.2)	18(3.5)	18(3.5)	7(1.4)	10(2)	28(5.5)	12(2.4)
χ2 value	12.812[a]	2.037[a]	2.037[a]	79.407[a]	175.276[a]	5.317[a]	9.870[a]
p-value	0.005	0.565	0.565	0.000	0.000	0.150	0.020

Table 6. Association between educational status and quarantined colonies

Education	*Streptococcus agalactiae*	*Coagulase-negative Staphylococcus*	*Staphylcoccus aureus*	*Enterococcus feacalis*	*Klebsiella pneumoniae*	*Escherichia coli*	*Enterobacter cloacae*
5 class	6(1.2)	17(3.3)	17(3.3)	2(0.4)	3(0.6)	18(3.5)	18(3.5)
8 class	1(0.2)	19(3.7)	19(3.7)	13(2.5)	13(2.5)	30(5.9)	5(1.0)
SLC/SEE	4(0.8)	4(0.8)	4(0.8)	9(1.8)	11(2.2)	38(7.5)	0(0.0)
+2	2(0)	35(6.9)	35(6.9)	45(8.8)	29(5.7)	97(19)	91(17.8)
Bachelor	0(0)	20(3.9)	20(3.9)	3(0.6)	2(0.4)	2(0.4)	0(0.0)
χ2 value	43.323a	33.154a	33.154a	33.183a	12.407a	81.953a	180.624a
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000

There is no significant association between age group and urine colour of pregnant women i.e. p-value <0.05 (Table 3).

Out of 510 clinically suspected UTI cases, 320 (62.6%) were culture negative. According to the microscopic examination of urine samples among gram-negative pathogens, the majority 177 (35%) *Escherichia coli* was the most common pathogens followed by *Enterobacter cloacae* 114 (22.4%) whereas among gram-positive pathogens; majority 93 (18 Coagulase-negative *Staphylococcus* was the most common pathogens (Table 4).

There is a significant association between the age group of participants and various pathogens in urine samples (quarantined colonies) like *Streptococcus agalactiae, Enterococcus feacalis, Klebsiella pneumonia* and *Enterobacter cloacae.* i.e. p-value <0.05 (Table 5).

There is a significant association between the educational status of participants and various pathogens in urine samples (quarantined colonies) i.e. p-value <0.05 (Table 6).

4. CONCLUSION

UTIs are very common during pregnancy and *Escherichia coli* is 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 sociodemographic characteristics play an important role in UTIs. Therefore, screening for early diagnosis and treatment of bacteriuria in women during pregnancy is necessary to prevent its complications.

CONSENT

As per international standard written patient consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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