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Research Article

Incidence of asymptomatic bacteriuria and antibiotic sensitivity Pattern in pregnant women at tertiary care hospital, Nepal

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ABSTRACT

Background & Objectives: Asymptomatic bacteriuria (ASB) in pregnancy is often overlooked, yet it can lead to serious maternal and fetal complications. The emergence of antibiotic resistance adds to its clinical significance. The study aimed to determine the incidence, bacterial isolates, antibiotic susceptibility pattern, and associated sociodemographic factors of ASB in pregnant women attending antenatal care.

Materials and Methods: A cross-sectional study was conducted among 101 asymptomatic pregnant women at a tertiary care hospital. Midstream urine samples were collected and processed using the Kirby–Bauer disk diffusion method. Sociodemographic and risk factor data were obtained via questionnaire.

Results: ASB prevalence was 10.9%, predominantly in women aged 21–30 years, gravida ≤2, with cattle-rearing occupations, and consuming adulterated food. *Escherichia coli* was the sole isolate. High sensitivity was observed to Ofloxacin, Linezolid, Amikacin, Amoxicillin–Clavulanic acid, Cefepime, Clindamycin, and Nitrofurantoin, while resistance was noted to Amoxicillin and Azithromycin.

Conclusion: ASB remains a hidden but preventable cause of pregnancy-related complications. Age, parity, occupation, diet, and socioeconomic status are potential risk factors. Routine urine culture and sensitivity testing is recommended in antenatal care to guide targeted antibiotic therapy.

Keywords: Asymptomatic bacteriuria, antibiotic resistance, pregnancy, urine culture, Nepal

INTRODUCTION

Urinary tract infections (UTIs) are a common incidence in pregnant women, with vast physiological, immunological and anatomical changes increasing the risks. UTIs in pregnancy pose a risk of pyelonephritis, low birth weight and preterm baby [1].

Asymptomatic bacteriuria (ASB) is defined as persistently & actively multiplying bacteria in significant numbers i.e. more than 10^5 bacteria /ml within the urinary tract without any obvious symptoms [2]. Asymptomatic bacteriuria is common and needs urine culture and antibiotic sensitivity to all pregnant patients to prevent the dangerous complications like acute pyelonephritis associated with it [3].

Global studies have revealed variation in the prevalence of asymptomatic bacteriuria, ranging from 11.1% in Africa [4], 18.45% in Latin America [5] and 13.5% in India [6]. The prevalence of asymptomatic bacteriuria in Nepal is variable, ranging from 5% [7] to 8.9% [8]. The most common isolates are *E. coli* 35%, *Acinetobacter spp* 15%, *Enterococcus spp* 12% and Klebsiella *spp* 10% while the most sensitive antibiotics are Nitrofurantoin, Norfloxacin and Amikacin [3]. Most common isolates across studies are usually *Escherichia coli*, group B-*Streptococcus* and *Enterobacteriaceae* among many [1,9]. With the rise of resistance in antimicrobials across the world, pregnant women with asymptomatic bacteriuria are at higher risk of failed therapy and deteriorating consequences [9]. Although no accurate trimester for increased chances of UTI is evident, the ninth to 12th week is considered an ample time period of increased risk of UTIs in general pregnant women [10]. Pooled prevalence of ASB among pregnant women in India is 13.5% (CI 11.1- 15.8). The prevalence of ASB was found to be high in the third trimester, at 21.8% [6].

Contributing factors like age of the participants, trimester, pregnancy, Gravida, educational status, occupation and previous history of UTI did not show a significant relation with asymptomatic bacteriuria, but bacteriuric mothers had an increased risk of low birth weight 25% than those with asymptomatic bacteriuria, 14.92% [11]. The American College of Obstetrics and Gynecology suggests compulsory urine culture for pregnant women in their first trimester to prevent and diagnose asymptomatic bacteriuria [12].

This scenario possesses a public health burden with higher silent visceral involvement and other morbid baby situations. The aim of the study was to find out early isolation, identification and specific management with specific antibiotics.

MATERIALS AND METHODS

This prospective descriptive observational study was conducted from December 2024 to April 2025 at tertiary Hospital of Janaki Medical College, Ramdaiya, Dhanusha. The study was conducted after ethical approval from the Institutional Review Committee of Janaki Medical College was obtained under

reference number(027/IRC-JMC/2024/021). All asymptomatic pregnant patients irrespective of trimester visited to Obstetric OPD in Janaki Medical College and Teaching Hospital, Ramdaiya, Dhanusha. Any pregnant mother attending Obstetric OPD were included whereas Mother with gestational DM/HTN/any chronic illness, renal diseases, symptoms and signs of UTI, antibiotic treatment within 48 hours were excluded. Written informed consent, demographic data, complete general, systemic and obstetric history were taken. Socioeconomic classes were determined as upper, middle and lower using the modified Kuppuswamy's socioeconomic status scale for Nepal [13].

In the morning, mid-stream urine of 10ml from each patient was collected aseptically and immediately inoculated onto Blood Agar and MacConkey Agar Plates, which were read for bacterial growth. Mixed growth was discarded, and another sample was collected and again followed. Bacterial growth was observed and classified according to Gram Staining. Then the isolated colony was proceeded to inoculation in Biochemical Media of Urease media, TSIA media, Citrate media and SIM media for bacterial identification. Coagulase and Catalase tests were done for Staphylococcus and Streptococcus spp. respectively. Antibiotic susceptibility testing of bacterial isolates was done by Kirby-Bauer disc diffusion method. Data were collected and analyzed. Statistical analysis of the collected data was done by using SPSS version 25.

RESULTS

The mean age of participants was found to be 23.36± 4.161 with a minimum age being 17 years and the oldest at 40. Most of the participants were from Dhanusha (88.1%), belonged to middle-class family (73.3%), Terai Madhesh Origin Castes (52.5%) and Hindu (96%) by religion. 67.3% of participants had at least a primary level of education, and all except one were housewives. The Mean Family size was found to be 6, with a minimum being 2 and a maximum size being 15. 89.1% of the participants had consumed OTC drugs during their lifetime. 35.6% had visited traditional healers during their time of pregnancy, and 73.3% had basic information on how diseases occur. 92.1% had taken the vaccination associated with pregnancy (TD vaccination). 85.1% users had a pump as a drinking water source, with 95% depending on groundwater for washing purposes. 63.4% of participants buried their wastes, 44.6% experienced air pollution,96% used safe latrines, and 92.1% have proper domestic sanitation. 92.1% used gas as fuel for cooking. Additional demographics are in Table 1. Average BMI was found at 20.66+-1.42, and 93.1% of the population was within normal BMI.

10.9 % of the sample size tested positive for asymptomatic bacteriuria. All the cultures tested positive for *Escherichia Coli* only.For culture-positive patients, Antibiotic Susceptibility tests were done. Amoxycillin with Clavulanic acid, Levofloxacin, Amikacin, Ofloxacin and Nitrofurantoin were found sensitive as shown in Table 2.

All the culture positive cases were Hindus, were educated up to primary level, non-smokers, non-alcoholics, used ground water as washing water, used gas as energy source for cooking, BMI range within normal and had used OTC drugs. Remaining details on positive cases distribution are in Table 3.

Table 1: Socio-demographic Status of participants				
		Frequency	Percent (%)	Mean
Age Range	<20 years	29	28.7	23.36± 4.161
	21-30 years	69	68.3	
	31-40years	3	3	
	Total	101	100.0	
BMI range	<18.5	1	1.0	20.66± 1.42
	18.5-23	94	93.1	
	>23	6	5.9	
	Total	101	100.0	
Gravida	1	34	33.7	
	2	43	42.6	
	3	18	17.8	
	4	4	4.0	
	5	1	1.0	
	6	1	1.0	
	Total	101	100.0	
Parity	0	35	34.7	
	1	43	42.6	
	2	17	16.8	
	3	6	5.9	
	Total	101	100.0	
District	Dhanusha	89	88.1	
	Mahottari	10	9.9	
	Rautahat	1	1	
	Sarlahi	1	1	
	Total	101	100	
Socioeconomic Status	Middle class	74	73.3	
	Lower class	27	26.7	
	Total	101	100.0	
House	Pakka	88	87.1	
	Kachcha	13	12.9	
	Total	101	100.0	
caste group	TMOC	53	52.5	
	Janajati	33	32.7	
	Muslim	5	5.0	
	Dalit	5	5.0	
	Others	5	5.0	
	Total	101	100.0	
Religion	Hindu	97	96.0	
	Muslim	4	4.0	
	Total	101	100.0	
Education	Illitrate	19	18.8	
	Primary Level	68	67.3	
	Secondary level	14	13.9	
	Total	101	100.0	
Family size	<6	29	28.7	6
	6-8	65	64.4	

	>8	7	6.9	
	Total	101	100.0	
Comorbidity	No	96	95.0	
	Yes	5	5.0	
	Total	101	100.0	
Occupation	Housewife	100	99.0	
	Study	1	1.0	
	Total	101	100.0	
Alcohol consumer	Yes	5	5.0	
	None	96	95.0	
	Total	101	100.0	
Smoking	None	98	97.0	
	Yes	3	3.0	
	Total	101	100.0	
Economic source	Enough	73	72.3	
	Good	22	21.8	
	Poor	6	5.9	
	Total	101	100.0	
Vector/carrier	Mosquito/Fly	96	95.1	
	None	5	5.0	
	Total	101	100.0	
Traditional healer	Not visited	65	64.4	
	Visited	36	35.6	
	Total	101	100.0	
Concept of disease	No	27	26.7	
	Yes	74	73.3	
	Total	101	100.0	
Over The Counter drug use	Used	90	89.1	
	Not used	11	10.9	
	Total	101	100.0	
Vaccination status	None	8	7.9	
	Vaccinated	93	92.1	
	Total	101	100.0	
Drinking water	Ground water	15	14.9	
	Handpump	86	85.1	
	Total	101	100.0	
Washing water	Handpump	96	95.0	
	Pond	5	5.0	
	Total	101	100.0	
Waste disposal	Burial	64	63.4	
	Ditch	37	36.6	
	Total	101	100.0	
Air pollution	None	56	55.4	
	Yes	45	44.6	
	Total	101	100.0	
Veg/Non veg	Non veg	93	92.1	
	Veg	8	7.9	
	Total	101	100.0	
Milk/Meat	Both	83	82.2	
	Meat	10	9.9	
	Milk	8	7.9	
	Total	101	100.0	

Balance diet	None	7	6.9	
	Yes	94	93.1	
	Total	101	100.0	
Roasted food	No	16	15.8	
	Yes	85	84.2	
	Total	101	100.0	
Preservative food	None	16	15.8	
	Yes	85	84.2	
	Total	101	100.0	
Food adulteration	None	25	24.8	
	Yes	76	75.2	
	Total	101	100.0	
Domestic sanitation	None	8	7.9	
	Yes	93	92.1	
	Total	101	100.0	
Garbage disposal	Burial	67	66.3	
	Ditch	34	33.7	
	Total	101	100.0	
Sanitary Latrine	Yes	97	96.0	
	No	4	4.0	
	Total	101	100.0	
Safe kitchen	None	33	32.7	
	Yes	68	67.3	
	Total	101	100.0	
Cooking status	Gas	93	92.1	
	Wood	8	7.9	
	Total	101	100.0	

Table 2: Antibiotics Sensitivity pattern of *E.Coli*

Antibiotics	Sensitive	Resistance	Total	Sensitive %
Amikacin(AK)	10	1	11	90.9
Ofloxacin(OF)	9	2	11	81.8
Amoxicillin Clavulanic Acid(AMC)	10	1	11	90.9
Azithromycin(AZM)	3	8	11	27.3
Nitrofurantoin(NIT)	8	3	11	72.7
Ceftriaxone(CTR)	7	4	11	63.6
Levofloxacin(LE)	3	8	11	27.3
Amoxicillin(AMX)	3	8	11	27.3
Linezolid(LE)	10	1	11	90.9
Cefepime(CPM)	6	5	11	54.5
Clindamycin(CD)	6	5	11	54.5
Cefuroxime(CXM)	6	5	11	54.5

Table 3: Distribution of Positive Cases against various demographics

Demographics		Positive cases		Negative cases	
		Count	**%**	**Count**	**%**
Age Range	<20 years	2	6.9	27	93.1
	20-30 years	9	13.0	60	87.0
	>30	0	0.0	3	100.0
Religion	Hindu	11	11.3	86	88.7
	Muslim	0	0.0	4	100.0
Education	Illiterate	1	5.3	18	94.7

	Primary Level	10	14.7	58	85.3
	Secondary level	0	0.0	14	100.0
House	Pakka	9	10.2	79	89.8
	Kachcha	2	15.4	11	84.6
Socio-economic Status	Middle Class	7	9.5	67	90.5
	Lower Class	4	14.8	23	85.2
Alcohol consumer	Yes	0	0.0	5	100.0
	none	11	11.5	85	88.5
	Total	11	10.9	90	89.1
Smoker	none	11	11.2	87	88.8
	yes	0	0.0	3	100.0
Vector/carrier	mosquito/fly	9	9.4	87	90.6
	none	2	40.0	3	60.0
Economic source	Enough	7	9.6	66	90.4
	Good	2	9.1	20	90.9
	Poor	2	33.3	4	66.7
Drinking water	Ground water	0	0.0	15	100.0
	Handpump	11	12.8	75	87.2
Washing water	Ground water	11	11.5	85	88.5
	Pond	0	0.0	5	100.0
Sanitary barrier	None	3	20.0	12	80.0
	Yes	8	9.3	78	90.7
Waste disposal	Burial	5	7.8	59	92.2
	Ditch	6	16.2	31	83.8
Air pollution	none	7	12.5	49	87.5
	Yes	4	8.9	41	91.1
Veg/non veg	Non veg	9	9.7	84	90.3
	veg	2	25.0	6	75.0
Milk/meat	Both	8	9.6	75	90.4
	meat	1	10.0	9	90.0
	milk	2	25.0	6	75.0
Preservative food	none	0	0.0	16	100.0
	Yes	11	12.9	74	87.1
Roasted food	no	1	6.3	15	93.8
	Yes	10	11.8	75	88.2
Food adulteration	none	0	0.0	25	100.0
	Yes	11	14.5	65	85.5
Balanced diet	balance diet	0	0.0	2	100.0
	none	1	14.3	6	85.7
	yes	0	0.0	5	100.0
	Yes	10	11.5	77	88.5
Garbage disposal	burial	7	10.4	60	89.6
	Ditch	4	11.8	30	88.2
Safe kitchen	none	5	15.2	28	84.8
	yes	6	8.8	62	91.2
Personal hygiene	none	2	20.0	8	80.0
	Yes	9	9.9	82	90.1
Cattles	Yes	7	10.3	61	89.7
	no	4	12.1	29	87.9
Cooking status	gas	11	11.8	82	88.2
	wood	0	0.0	8	100.0
BMI range	<18.5	0	0.0	1	100.0

	18.5-22.9	11	11.7	83	88.3
	>23	0	0.0	6	100.0
Co-morbidity	None	10	10.4	86	89.6
	Yes	1	20.0	4	80.0
Gravida	1	4	11.8	30	88.2
	2	5	11.6	38	88.4
	3	2	11.1	16	88.9
	4	0	0.0	4	100.0
	5	0	0.0	1	100.0
	6	0	0.0	1	100.0
Parity	0	4	11.4	31	88.6
	1	5	11.6	38	88.4
	2	2	11.8	15	88.2
	3	0	0.0	6	100.0
family size	<6	2	6.9	27	93.1
	6-8	8	12.3	57	87.7
	>8	1	14.3	6	85.7
Traditional healer	Visited	7	10.8	58	89.2
	Not visited	4	11.1	32	88.9
concept of disease	No	2	7.4	25	92.6
	Yes	9	12.2	65	87.8
caste group	Dalit	0	0.0	5	100.0
	Janajati	4	12.1	29	87.9
	Muslim	0	0.0	5	100.0
	TMOC	5	9.4	48	90.6
	Others	2	40.0	3	60.0
Sanitary Latrine	Safe	10	10.3	87	89.7
	Not safe	1	25.0	3	75.0
Domestic sanitation	Bad	2	25.0	6	75.0
	Good	9	9.7	84	90.3
vaccination status	No	1	12.5	7	87.5
	Yes	10	10.8	83	89.2
balance diet	No	1	14.3	6	85.7
	Yes	10	10.6	84	89.4
OTC drug use	Used	10	11.1	80	88.9
	Not used	1	9.1	10	90.9
	Total	11	10.9	90	89.1

DISCUSSION

The prevalence rate identified by this study at 10.9% was slightly above the universal range of 2-10%. The rate is higher than studies conducted by Shrestha and Baral [14] with a prevalence at 7.1%, Marahatta et al [7] at 5% and by Raut et al. [8]at 8.9%.

Age, Socioeconomic Status, Type of Housing, gravida, education, religion, knowledge of disease, and sanitary habits were not significantly associated with positive cases, whereas negative relation with alcoholism and smoking was found. Similar to multiple studies conducted across the nation, no significant association with age and cases of asymptomatic bacteriuria was noted [15,16]. This can be explained by the similar distribution of asymptomatic bacteriuria among different age ranges. Relative to other age groups, the age group of 21-30 had the highest percentage of cases with asymptomatic bacteriuria at 13.0%. Similar findings were present in Raut et al. [8]and

Shrestha and Baral [14]. The reason could be that most women become pregnant during this age.

Although no significant association between caste group and positive cases were found, most of the positive cases belonged to the TMOC and Janajati group, raising concerns about their health, hygiene and environment. Most of the participants visited healers before reporting their pregnancy care in the hospital, which also identifies the health-seeking behaviour of the participants. This raises the concern associated with the late diagnosis of ASB in patients. As a high percentage of participants had the concept of disease, the distribution of disease was still higher in those with the required knowledge on disease (12.2%). This highlights the necessity of health education regarding disease and bacteriuria in general.

Unlike other studies, women with gravida two or less had a higher percentage of asymptomatic bacteriuria, 11.8% for primigravidae and 11.6% for those with a gravida of two. This was similar to Raut et al[8]. This was also reported by MuthuPrabha and Ramalakshmi in India, where 13.98% of primigravida had Asymptomatic Bacteriuria [17].

Although not significant, the relative presence of ASB was found in poor economic status. Similar conditions were explained by a study in Ethiopia [18]. Those who reported the presence of vectors of infection, like mosquitoes and flies, also reported a higher presence of ASB, which projects the transmission of disease is related to vectors.

Introduction of newer variables in the Nepalese Context, the association with asymptomatic bacteriuria. Personal Hygiene, cattle rearing, safer latrines, previous antibiotic use and OTC drug use have helped explore multiple gateways to causes of asymptomatic bacteriuria. Use of over-the-counter (OTC) drugs for associated pains could have led to an increased number of asymptomatic bacteriuria in OTC drug users, as seen in our study, with all the positive cases being users of OTC drugs.

Bad personal hygiene and sanitation were also associated with higher presence of ASB. Similar findings were reported by Singh et al. [19]. The housing status of participants did not have any effect on the presence of ASB, which points out the need for personal hygiene and sanitation as primary preventive measures of ASB. It should be noted that those who reared cattle were suffering from asymptomatic bacteriuria, possibly because they come in contact with a variety of organisms, and hygiene is also compromised. Relative cases of Asymptomatic Bacteriuria appear at 10 positive cases out of 97 (10.3%) users of safer latrines. Sanitary Barrier was found to have a positive effect on the prevention of ASB, as only 9.3% of cases with a sanitary barrier had ASB. Those who disposed of their waste in a ditch were more likely to suffer from ASB, likely because the sanitation barrier can be broken easily in those households.

Food adulteration and preserved food consumption were associated with a higher presence of ASB, which can be linked to potential nutrient deficiency and exposure to harmful microorganisms. Family size was a constant factor with the incidence of Asymptomatic Bacteriuria.

Bacteriuria is treated with broad-spectrum antibiotics until the true diagnosis of the causative pathogen is made. Diagnosis of Asymptomatic bacteriuria is impossible

without a urine culture. Thus, treatment is based on what the culture is and what the culture is sensitive to [12]. To identify the spectrum of antibiotics active against Escherichia Coli, a gram-negative bacterium which is the most common pathogen behind UTIs, either asymptomatic or symptomatic [1,9,20–22] was done.

The pathogen was found to be resistant to azithromycin and amoxicillin in 5 out of 7 cases. Several studies have also noted the increase in amoxicillin resistance in asymptomatic bacteriuria [23]. Amikacin [8,24], Ofloxacin, Nitrofurantoin [7,8,14,24], Levofloxacin was found to be the drug the pathogen was found to be most sensitive compared to other drugs. This condition raises the concern of antimicrobial resistance. The need for mandatory bacterial culture and treatment planned according to the diagnosis will help reduce the risk of resistance. The study was done irrespective of the gestation period. The incidence of asymptomatic bacteriuria was found to correlate with limited associated variables in this study. The participants were also limited to Dhanusha District, which limits the generalization of our research to Madhesh Province.

CONCLUSION

The prevalence of asymptomatic bacteriuria in our study was found at 6.9% with Amikacin, ofloxacin, levofloxacin and Nitrofurantoin are commonly found sensitive. Every pregnant woman should follow urine culture and sensitivity tests within the first trimester of pregnancy. Hospitals should make these tests mandatory and provide the necessary assistance to pregnant women with the disease.

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