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ORIGINAL ARTICLE

Frequency of asymptomatic bacteriuria, causative pathogens and antibiotic sensitivity pattern in antenatal women.

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ABSTRACT… Objective: To determine the frequency of asymptomatic bacteriuria (ASB), causative pathogens and antibiotic sensitivity pattern in antenatal women. **Study Design:** Cross-sectional study. **Setting:** Department of Obstetrics and Gynaecology, Nishtar Hospital, Multan, Pakistan. **Period:** February 2022 to July 2023. **Methods:** A total of 110 women with singleton pregnancy with gestational age 13-42 weeks, and aged 18 to 40 years were included. Once the patients were enrolled, demographic characteristics (age, gestational age, parity (primiparous or multiparous), body mass index (BMI), place of living (rural or urban), gestational diabetes mellitus (yes or no), educational status (illiterate, primary, middle, matric, or graduate)) were noted. Presence or absence of asymptomatic bacteriuria was noted. **Results:** In a total of 110 pregnant females, the mean age and gestational age were 28.7±3.9 years and 29.4±4.0 weeks, respectively. The frequency of ASB among pregnant women was found in 19 (17.3%) patients. The frequency of causative pathogens showed that E. coli was the most frequent isolates noted among 7 (36.8%) women while staphylococcus aureus, Klebsiella, pseudomonas spp, and Proteus spp were identified in 5 (26.3%), 4 (21.0%), 2 (10.5%), and 1 (5.26%) respectively. Antibiotic susceptibility patterns revealed that Amikacin, Nitrofurantoin, cephalexin, and Ciprofloxacin were the most sensitive antibiotics noted in 18 (94.7%), 17 (89.5%), 15 (79.0%) and 14 (73.7%) samples respectively. **Conclusion:** The frequency of asymptomatic bacteriuria in pregnant women is high with E. coli as the most common causative organism. Antibiotic susceptibility patterns revealed that Amikacin, Nitrofurantoin, cephalexin, and Ciprofloxacin to have good sensitivities.

Key words: Amikacin, Asymptomatic Bacteriuria, E. coli, Klebsiella, Nitrofurantoin.

INTRODUCTION

The term "bacteriuria" is used when bacteria are present in urine.[1] A bacteriuria that is characterized by the absence of symptoms of urinary tract infections (UTIs) is known as "asymptomatic bacteriuria (ASB)". The further progression of ASB into symptomatic infections makes it an important issue to be concerned.[2] Among non-pregnant women, ASB might last for a shorter period of time, but during pregnancy, its spontaneous resolution is rare. Although there is no change in ASB prevalence during pregnancy, there is an evolution in pathogenesis, which maintains both the woman and the unborn child at risk of problems from bacteriuria.[3] Most of the time, the development of symptomatic UTIs is observed in the later stages of pregnancy. The risks that are established with ASB during pregnancy are symptomatic UTI, premature delivery, intrauterine growth retardation, endometritis, and even mortality among mother and baby.[4] Complications might occur even in the perinatal and postnatal periods as ABS may persist throughout pregnancy.[5]

ASB is common (3-8%) during pregnancy, while the most likely period of gestation for its occurrence is between 9-17 weeks.[3] Bacteriuria might cause adverse maternal and perinatal outcomes during pregnancy if it is left untreated. Preterm delivery, hypertensive conditions, recurrent abortions, intrauterine growth restriction (IUGR), polyhydramnios and oligohydramnios, early rupturing of membranes, and labour

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induction are all independently linked to ASB.[6,7] Moreover, during the puerperium period, women are at higher risk of developing pyelonephritis on account of ASB.[8] Therefore, all pregnant women who pay visits to have antenatal check-ups, are recommended to do routine screening even if they do not have symptoms, so that mother and baby could be protected from unexpected complications that may occur as a consequence of ASB.[9]

In a study, asymptomatic bacteriuria had an incidence of 11.3% among pregnant ladies and showed the dominance of Escherichia coli (E. coli) at 20.6%, while Staphylococcus aureus (11.8%), Klebsiella species (2.9%), and Proteus species (8.8%) were next to follow.[10] Abdel-Aziz Elzayat M et al[11] showed in their study that among pregnant females, ASB had a frequency of 10.0%, and the predominant microorganism was E. coli with Klebsiella next to it. These isolates had 100% susceptibility against nitrofurantoin, while against cephalexin, 88% of them showed resistance.[11] According to Jayachandran AK et al[12], 11.66% of the pregnant females had ASB, showing a higher prevalence of E. coli (35.7%) as compared to Staphylococcus aureus (28.5%) and Klebsiella species (14.28%). Amikacin and nitrofurantoin showed sensitivity of 90% and 80%, respectively, against all gram negative bacteria. Nitrofurantoin had 100% sensitivity against all Staphylococcus aureus isolates.[12]

Pyelonephritis incidence can be significantly reduced by early identification and treatment of ASB, which can result in preventing premature labour by up to 20%. That is why we planned this study to determine the frequency of ASB, causative pathogens, and antibiotic sensitivity patterns in antenatal women. Our study will not only provide the magnitude of the problem among the local population but will also emphasize the clinician's routine antenatal screening for bacteriuria and proper and timely treatment in order to decrease the complications as well as morbidity of both mother and fetus. Culture sensitivity can help generate local antibiograms and guide clinicians for empirical antibiotic therapy. The findings of this study may also help to reduce treatment failure as well as the cost of the treatment.

METHODS

This was a cross-sectional study performed at the department of obstetrics and gynecology, Nishtar Hospital, Multan, from February 2022 to July 2023. A sample size of 110 was calculated considering 11.66%12 as the frequency of E. coli among causative pathogens of ASB, with a 95% confidence level and a 6% margin of error. Inclusion criteria were pregnant ladies of 18-40 years of age with singleton pregnancy of cephalic presentation (assessed on USG) and gestational age of 13-42 weeks (assessed on LMP). Both primiparous and multiparous were included. Exclusion criteria were women with a history of genital tract trauma (assessed on clinical examination), antibiotic therapy taken within the last two weeks, renal stones, urinary tract anomalies (assessed on USG), or catheterization within the last one week due to any reason. Informed and written consents were taken from all woman. Approval from the "Institutional Ethical Committee" was also obtained.

Once the patients were enrolled, demographic characteristics (age, gestational age, parity (primiparous or multiparous), body mass index (BMI), place of living (rural or urban), gestational diabetes mellitus (yes or no), educational status (illiterate, primary, middle, matric, or graduate)) were noted. BMI above 27 was taken as obese. Gestational diabetes mellitus was labeled for those women who had no history of diabetes mellitus before pregnancy and were diagnosed in pregnancy. It was based on the "International Association of Diabetes and Pregnancy Study Groups (IADPSG)" and "Hyperglycemia and Adverse Pregnancy Outcome (HAPO)" study (2 hours, 75 g OGTT: fasting glucose≥92 mg/dl and a 2-hour result of ≥ 153 mg/dl).13 Then a sterile universal container was used to collect clean catch mid-stream urine sample and sent to the institutional laboratory within half an hour for bacteriuria screening. The presence or absence of asymptomatic bacteriuria was noted. All women with no urinary symptoms like dysuria (pain during urination), urgency (cannot control urine >15 minutes), or frequency (>5 times urine

in a day) but the presence of bacteria ≥105/ml on microscopic examination of urine and a pus cell count of ≥10 cells per microliter of urine were taken positive for ASB.11 Urine culture (the urine specimen was incubated for more than 72 hours, showing single significant pathogen) and drug sensitivity were performed. Drug sensitivity was measured as diameter (mm) by zone of inhibition by applied drugs (ciprofloxacin, nitrofurantoin, amikacin, and cephalexin) on Mueller Hinton agar plates incubated for 72 hours by the modified Kirby Bauer disc diffusion method. A special proforma was designed to record all the study information.

Statistical analysis was done using "Statistical Package for Social Sciences (SPSS)", version 26.0. Quantitative variables like age, gestational age, and BMI were shown as mean and standard deviation (SD). The representation of qualitative variables such as gestational diabetes mellitus (yes or no), place of living (rural or urban), educational status (illiterate, primary, middle, matric, graduate), ASB (present or absent), causative pathogens, and antibiotic susceptibility pattern were made through frequencies and percentages. Stratification was done for the effect modifiers like age, gestational age, parity, BMI, gestational diabetes mellitus, place of living, and educational status. A post-stratification chi-square test was applied and a p-value≤0.05 was considered significant.

RESULTS

In a total of 110 pregnant females, the mean age and gestational age were 28.7±3.9 years (ranging between 18 to 40 years) and 29.4±4.0 weeks respectively. There were 83 (75.4%) females who were multiparous.The mean Mean was 27.5±3.0 kg/m2 whereas 53 (48.2%) women were obese. Table-I is showing detailed description of characteristics of women studied.

The frequency of ASB among pregnant women was found in 19 (17.3%) patients. The frequency of causative pathogens showed that E. coli was the most frequent isolates noted among 7 (36.8%) women while staphylococcus aureus, Klebsiella, pseudomonas spp, and Proteus spp were identified in 5 (26.3%), 4 (21.0%), 2 (10.5%), and 1 (5.26%) respectively. Antibiotic susceptibility patterns revealed that Amikacin, Nitrofurantoin, cephalexin, and Ciprofloxacin were the most sensitive antibiotics noted in 18 (94.7%), 17 (89.5%), 15 (79.0%) and 14 (73.7%) samples respectively. Stratification of ASB with respect to study variables are shown in Table-II.

Characteristics		Frequency (%)
Age (years)	18-30	55 (50.0%)
	31-40	55 (50.0%)
Gestational age (weeks)	13-28	24 (21.8%)
	>28	86 (78.2%)
Parity	Primiparous	27 (24.6%)
	Multiparous	83 (75.4%)
Body mass index (kg/m2)	≤27	57 (51.8%)
	>27	53 (48.2%)
Place of living	Rural	40 (36.4%)
	Urban	70 (63.6%)
Educational status	Illiterate	13 (11.8%)
	Primary	11 (10.0%)
	Middle	22 (20.0%)
	Matric	30 (27.3%)
	Graduate	(34 (30.9%)
Gestational diabetes	Yes	27 (24.6%)
	No	83 (75.4%)

Table-I. Characteristics of women (n=110)

DISCUSSION

Our study showed that among pregnant females, 17.3% had ASB. Ullah et al 90 from Bangladesh described similar findings for ASB (12%) in their study. Various authors carried out a literature review that showed a variation in the occurrence of ASB ranging between 4-24%.[14] The occurrence rates of ASB vary due to the differences in the characteristics of the communities. Among Asian populations, researcher have shown that ASB affects between 6-16%[14-19] pregnant females. Data from some of the studies from Africa reported rates of occurrence of ASB at 10.6%, 13%, 37.5%, and 43.3%.[20-23] The same trend continues among the populations of developed countries. The USA and Canada have 2-7% and 4-7% occurrence rates of ASB, respectively, and it varies for the pregnant ladies of Spain at 16%.[24] There are multiple factors, like variation in the geography, culture, study settings, and screening tests, that contribute in bringing to the varying results.

Characteristics		Asymptomatic Bacteriuria		P-Value
		Present (n=19)	Absent (n=91)	
Age (years)	18-30	8 (14.5%)	47 (85.5%)	0.449
	31-40	11 (20.0%)	44 (80.0%)	
Gestational age (weeks)	13-28	6 (33.3%)	18 (66.7%)	0.257
	>28	13 (15.1%)	73 (84.9%)	
Parity	Primipa-rous	4 (14.8%)	23 (85.2%)	0.697
	Multipa-rous	15 (18.1%)	68 (81.9%)	
Body mass index (kg/m2)	≤27	8 (14%)	49 (86%)	0.352
	>27	11 (20.8%)	42 (79.2%)	
Place of living	Rural	5 (12.5%)	35 (87.5%)	0.317
	Urban	14 (20.0%)	56 (80.0%)	
Educational status	Illiterate	0 (0.0%)	13 (100%)	0.392
	Primary	1 (9.1%)	10 (90.9%)	
	Middle	5 (22.7%)	17 (77.3%)	
	Matric	6 (20.0%)	24 (80.0%)	
	Graduate	7 (20.6%)	27 (79.4%)	
Gestational diabetes	Yes	5 (18.5%)	22 (81.5%)	0.664

Table-II. Stratification of ASB with respect to study variables (N=110)

Our study revealed that among pregnant females of age between 31 and 40 years, the frequency of ASB was higher, whereas the subsequent age group was 18-30 years. According to Alghalibi et al[25], the most common age group of pregnant females for infection was 21-25 years, and it was 35-39 years found by Turpin et al.[26] Another study found that pregnant women of age above 35 were at higher risk of having ASB.[27] The trend of bacteriuria observed in our study and reported in other studies depicts that pregnant females aged between 31 and 40 years are at higher risk of developing UTIs. On the other hand, multigravida women in our study had a higher incidence of ASB, as mentioned by Roy et al[28] and Obirikorang et al29 in their findings.

E. coli and Klebsiella were the most common bacteria, with the majority of the patients in our study being infected by E. coli, which coincides with the previous studies.[30,31] The use of ampicillin and amoxicillin is more common in treating pregnant women presenting with UTIs. In this study, antibiotic susceptibility patterns revealed that Amikacin, Nitrofurantoin, cephalexin, and Ciprofloxacin were the most sensitive antibiotics noted in 94.7%, 89.5%, 79.0% and 73.7% samples respectively.

There were some limitations of this study. As this was single center study conducted on a relatively small sample size, our findings cannot be generalized. We were unable to record treatment outcomes among current set of females.

CONCLUSION

The frequency of asymptomatic bacteriuria in pregnant women was high with E. coli as the most common causative organism. Antibiotic susceptibility patterns revealed that Amikacin, Nitrofurantoin, cephalexin, and Ciprofloxacin were the most sensitive antibiotics. We recommend that early screening of asymptomatic bacteriuria in pregnant women should be done.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

1. Radha S, Nambisan B, Prabhakaran NK, Jamal S. **Prevalence and outcome of asymptomatic bacteriuria in early pregnancy.** Int J Reprod Contracept Obstet Gynecol. 2017; 6(1):223-7

2. Bose AM, Sreekumary PK, Pulikkottil SK. **Microbiological profile of asymptomatic bacteriuria in pregnancy.** Int J Reprod Contracept Obstet Gynecol. 2017; 6(4):1352-61.

3. Rao VM, Venkatesh BMS, Rao SR. **Asymptomatic bacteriuria in pregnant women - study at a tertiary maternity care hospital in Hyderabad, India.** Int J Curr Microbiol App Sci. 2018; 7(5):1133-42.

4. Izuchukwu KE, Oranu EO, Bassey G, Orazulike NC. **Maternofetal outcome of asymptomatic bacteriuria among pregnant women in a Nigerian Teaching Hospital.** Pan Afr Med J. 2017; 27:69.

5. Ghafari M, Baigi V, Cheraghi Z, Doosti-Irani A. **The prevalence of asymptomatic bacteriuria in iranian pregnant women: A systematic review and meta-analysis.** PLoS ONE. 2016; 11(6):e0158031.

6. Kasinathan A, Thirumal P. **Prevalence of asymptomatic bacteriuria in antenatal women attending a tertiary care hospital.** Int J Reprod Contracept Obstet Gynecol. 2014; 3(2):437-41.

7. Prasanna B, Naimisha M, Swathi K, Shaik MV. **Prevalence of asymptomatic bacteriuria in pregnant women, isolates and their culture sensitivity pattern.** Int J Curr Microbiol App Sci. 2015; 4(8):28-35.

8. Verma A, Baheti S, Sharma M. **Asymptomatic bacteriuria in pregnancy and its relation to perinatal outcome.** Int J Reprod Contracept Obstet Gynecol. 2016; 5(12):4390-6.

9. Akpan NG, Onwuezobe IA, Antia UE. **Asymptomatic bacteriuria among pregnant women at university hospital in Uyo, Nigeria: Prevalence, risk factors and characteristics.** Asian J Med Health. 2017; 3(3):1-9.

10. Prabhavathi V, Krishnamma B, Krishna Murthy G, Prasad DKV. **Prevalence of asymptomatic bacteriuria among antenatal women and its effects on maternal and perinatal outcome in northern Andhra Pradesh population.** Int J Adv Med. 2018; 5(1):179-85.

11. Abdel-Aziz Elzayat M, Barnett-Vanes A, Dabour MFE. **Prevalence of undiagnosed asymptomatic bacteriuria and associated risk factors during pregnancy: A cross-sectional study at two tertiary centres in Cairo, Egypt.** Br Med J Open. 2017; 7(2):e013198.

12. Jayachandran AL, Ukkiravel Gnanasambandam, Balan K, Sangeetha AV, Vijayalakshmi TS. **Asymptomatic bacteriuria among antenatal women attending a tertiary care hospital in Kanchipuram: Evaluation of screening tests and antibiotic susceptibility pattern.** Int J Res Med Sci. 2016; 4(2):540-4.

13. Waters TP, Dyer AR, Scholtens DM, Dooley SL, Herer E, Lowe LP, et al. **Maternal and neonatal morbidity for women who would be added to the diagnosis of GDM using IADPSG criteria: A secondary analysis of the hyperglycemia and adverse pregnancy outcome study.** Diabetes Care. 2016; 39(12):2204–10.

14. Ansari HQF, Rajkumari A. **Prevalence of asymptomatic bacteriuria and associated risk factors among antenatal women attending a tertiary care hospital.** J Med Allied Sci. 2011; 1(2):74-78.

15. Karya U, kausar K, Bhatnagar M. **Prevalence of asymptomatic bacteriuria among pregnant women and its association with pregnancy outcome.** Indian J Public Health Res Development. 2012; 3(1):168.

16. Chandel LR, Kanga A, Thakur K, Mokta KK, Sood A, Chauhan S. **Prevalence of pregnancy associated asymptomatic bacteriuria: A study done in a tertiary care hospital.** J Obstel Gynaecol India. 2012; 62(5):511-14.

17. Lavanya SV, Jogalakshmi D. **Asymptomatic bacteriuria in antenatal women.** Indian J Med Microbial 2002; 20(2):105-6.

18. Kasraeian M, Asadi N, Ghaffarpasand F. **Prevalence of asymptomatic bacteriuria among pregnant women in Shiraz, Iran.** Saudi Med J. 2009; 30(7):917-20.

19. Marahatta R, Dhungel BA, Pradhan P, Rai SK, Choudhury DR. **Asymptomatic bacteriuria among pregnant women visiting Nepal medical college teaching hospital, Kathmandu, Nepal.** Nepal Med Coll J. 2011; 13(2):107-10.

20. Assefa A, Asrat D, Woldeamanuel Y, G/Hiwot Y, Abdella 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.

21. Masinde A, Gumodoka B, Kilonzo A, Mshana SE. **Prevalence of urinary tract infection among pregnant women at Bugando medical centre.** Mwanza, Tanzania. Anzan J Health Res. 2009 Jul; 11(3):154-9.

22. Turpin CA, Minkah B, Danso KA, Frimpong EH. **Asymptomatic bacteriuria in pregnant women attending antenatal clinic at Komfo Anokye teaching hospital, Kumasi, Ghana.** Ghana Med J 2007.41(1):26-9.

23. Imade PE, Izekor PE, Eghafona NO, Enabulele OI, Ophori E. **Asymptomatic bacteriuria among pregnant women.** N Am J Med Sci. 2010; 2(6):263-66.

24. Faidah HS, Ashshi AM, Abou El-Ella GA, Al-Ghumdi AK, Mohamed AMRM. **Urinary tract infections among pregnant women in Makkah, Saudi Arabia.** Biomed Pharmacol J. 2013; 6(1):01-07.

25. Alghalibi SM, Al-Jaufy A, Al-Moayad E. **Bacterial urinary tract infection among pregnant women in Sana'a City-Yemen.** Arab Gulf Journal of Scientific Research. 2007; 25:23-31.

26. Turpin CA, Minkah B, Danso KA, Frimpong EH. **Asymptomatic bacteriuria in pregnant women attending antenatal clinic at komfo anokye teaching hospital, Kumasi.** Ghana Medical Journal. 2007; 41(1):26-9.

27. Akinloye O, Ogbolu DO, Akinloye OM, Terry Alli OA. **Asymptomatic bacteriuria of pregnancy in Ibadan, Nigeria: A reassessment.** Br J Biomed Sci. 2006; 63:109-12.

28. Roy SK, Sinha GR, Qudros MA. **A study of bacteriuria in pregnancy.** J Obstet Gynecol India. 1974; 24:244-51.

29. Obirikorang C, Quaye L. **Asymptomatic bacteriuria among pregnant women attending antenatal clinic at the University Hospital, Kumasi, Ghana.** Journal of Medical and Biomedical Sciences. 2012; 1(1):38-44.

30. Sujatha R, Nawani M. **Prevalence of asymptomatic bacteriuria and its antibacterial susceptibility pattern among pregnant women attending the antenatal clinic at Kanpur, India.** J Clin Diagn Res 2014; 8:2-4.

31. Jalali M, Shamsi M, Roozbehani N. **Prevalence of urinary tract infection and some factors affected in pregnant women in Iran Karaj City 2013.** Middle East J Sci Res. 2014; 20:781-5.

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3	Humaira Bashir	Proof reading, Literature review.	
4	Hina Iqbal	Data collection, Literature review.	
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