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Original Article

PREVALENCE OF ASYMPTOMATIC BACTERIURIA AND ITS MICROBIOLOGICAL PROFILE IN PREGNANCY AT TERTIARY CARE HOSPITAL, JABALPUR

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ABSTRACT

Objective: To determine the prevalence of asymptomatic bacteriuria (ASB), microbiological profile, and pregnancy outcome in asymptomatic pregnant women.

Methods: Pregnant women attending outpatient clinic were selected randomly. Urine sample by clean catch method collected and battery of tests were performed. Prevalence of ASB and pregnancy outcome studied.

Results: Total 114 pregnant women were studied, out of which 6 cases were positive for urine culture. Prevalence rate in our study found to be 5.3%. Study depicted that 33.4% women with asymptomatic bacteriuria had premature rupture of membranes, 16.7 % women had pre-eclampsia and 16.7% had severe anemia. 50 % babies were premature, 33.4% had fetal growth restriction and 16.7% developed acute respiratory distress syndrome.

Conclusion: Urinary tract infections are common during pregnancy. Asymptomatic bacteriuria can progress to pyelonephritis and may result in adverse pregnancy outcome. Prevalence rate found to be 5.3%. Premature rupture of membranes and premature births were major adverse pregnancy outcome. E. coli was most common bacterial isolate found in the study and was highly sensitive to cefuroxime sodium. Pregnancy complications may be avoided by using regular screening with urine cultures.

Keywords: Antimicrobial susceptibility profile, Asymptomatic bacteriuria, Fetal outcome, Maternal outcome, Pregnancy, Urinary tract, Urinary tract infections

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INTRODUCTION

Urinary tract infections (UTIs), which are caused by bacteria growing in the urinary system, are the most frequent kind of bacterial infection across all age ranges and are most prevalent in pregnant women [1]. Urinary tract infections are caused by bacteria that colonise the urinary system. Once a year, almost one-third of reproductive-age women report having a UTI [2].

Infections of the urinary system may affect either the lower urinary tract, which includes the bladder and urethra, or the upper urinary tract, which includes the kidneys, pelvis, and ureter [3].

UTI in pregnancy is classified as

Asypmtomatic: Most commonly, it occurs during pregnancy and involves lower urinary tract, leading to asymptomatic bacteriuria. UTIs may show in a variety of ways, and one of them is asymptomatic bacteriuria. It is described as a considerable population of persistent, actively proliferating bacteria without any overt symptoms. An asymptomatic pregnant woman with a urine count of at least 1 00 000 organisms per ml is considered to have this condition [4].

Symptomatic: Acute pyelonephritis is a hallmark of symptomatic bacteriuria, which affects the upper urinary system [1]. In a symptomatic patient, it is characterised as the presence of more than 100 organisms per ml of urine with pyuria, which is more than 5 white blood cells (WBCs) per ml.

The prevalence of UTIs varies widely within and between the countries. In India, 6.2% of people get asymptomatic UTIs. In addition to anaemia, UTIs pose a significant threat to the health of both mother and child if left untreated during pregnancy. Without treatment, between 20% and 35% of pregnant women with asymptomatic bacteriuria may develop a UTI [1].

In the general obstetric population, the most frequently reported organisms discovered in culture media include [5]: E. Coli (70%), Klebsiella (23.4%), Staphylococcus saprophyticus (5-15%), Group B Streptococcus strains, especially Streptococcus agalactiae (10%), Proteus (2%), Pseudomonas, Citrobacter.

Premature membrane rupture, intrauterine growth restriction, anaemia, bactraemia, abortion, hypertensive disorders of pregnancy, chorioamnionitis, and respiratory insufficiency are only few of the obstetric issues that might arise. The decreased synthesis of erythropoietin seen in pregnant women with renal failure and pyelonephritis seems to enhance their vulnerability to anaemia [6]. Pyelonephritis, a leading cause of septic shock during pregnancy, leads to maternal death [7]. Low birth weight, early delivery, respiratory distress, infection, and foetal or neonatal mortality are the most prevalent perinatal issues. We, therefore, undertook this study to determine the prevalence of asymptomatic bacteriuria in pregnancy, its microbiological profile and pregnancy outcome in asymptomatic pregnant women.

MATERIALS AND METHODS

Study design: Prospective study

Study period: 1st March 2021-31st August 2022

Study Area: Department of Obstetrics and Gynecology, NSCB Medical College and Hospital, Jabalpur (M. P.)

Sample size: The sample size was determined based on the probability of asymptomatic bacteriuria during pregnancy by using the following formula of simple random sampling for the infinite population. n = z2 x p(1-p)/l2 where

n is required sample size

z = 1.96 at 95% Confidence limit, 5% alpha and 80% power (1-beta)

p = 0.371 (assumed probability)

1 = Precision (marginal error), which was considered 25% relative to the assumed probability (0.9275)

This accumulated 104 number of pregnant women with the clinical presentation of asymptomatic bacteriuria. Further, 10% more

samples were added to adjust the probable sample losses due to any non-response error.

Finally, we planned for 114 subjects in the study.

Inclusion criteria

All asymptomatic pregnant women in all the trimesters of pregnancy.

Exclusion criteria

1) All non-pregnant women.

2) All pregnant women with symptoms of UTIs.

3) Pregnant women with sexually transmitted infections and/or on antibiotic therapy.

4) Non consenting.

Methodology

After explaining the study procedure informed consent was taken with approval from ethical committee taken. Using a questionnaire, we recorded information on the respondent's demographics, pregnancy status, history of UTIs, abortions, diabetes, hypertension, sickle cell anaemia, and hygiene practises.

Urine was collected from the patient's midstream using the clean catch technique, then examined under the microscope and tested for culture sensitivity. All samples were analysed immediately after collection, and if there was a delay, they were kept in the refrigerator for four to 6 h.

Sample collection was random. Pus cells, erythrocytes, epithelial cells, cysts, crystals, and yeast-like cells were all inspected under the microscope. The material was injected into standard culture medium after collection. Nutrient agar, CLED agar, MacConkey's agar, and blood agar were used as standard culture media, and the obtained material was put onto each and cultured at 37 ℃ for 24 h. Presence of an uropathogen, with a colony count of more than or equal to 10^5 organisms per ml on culture is considered as positive for UTI. Identification of pure isolates was accomplished via careful examination of their morphological, cultural, and biochemical characteristics.

Gram's staining, colony morphology, motility tests, sugar fermentation tests, and biochemical tests like the oxidase test, urease and phenyl puruvic acid test, and the IMViC (indole, methyl red, Voges-Proskauer, and citrate) tests were performed to identify and characterise the various isolated organisms.

The Kirby Bauer disc diffusion technique was used to determine the bacteria's susceptibility to the antibiotics. Women with bacteriuria was treated with a course of antimicrobial drugs as per the sensitivity of organisms.

Patients with positive urine cultures were followed up with two w after therapy ended. Women not responding to initial therapy or relapse, a second antibiotic course was given as per sensitivity. They were followed up carefully with the urine cultures every 4 weekly till delivery. Evidence of maternal complications was noted and treated accordingly. Newborns were assessed for maturity, birth weight, APGAR score and complications. A predesigned proforma was used to capture data, which was then imported into Microsoft Excel and analysed using SPSS Version 21.

RESULTS

There were 6 asymptomatic bacteriuria-positive pregnancies out of 114. Fig. 1 shows the overall prevalence rate was 5.3%.

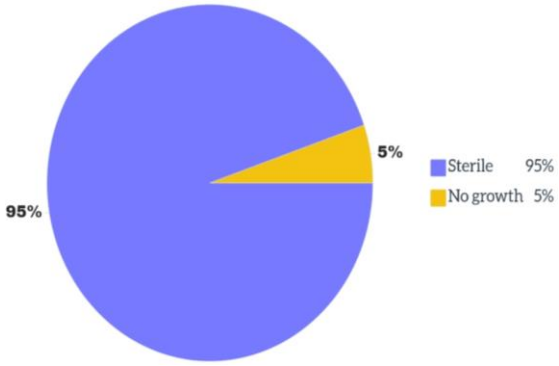

Fig. 1: Prevalence of asymptomatic bacteriuria

Table 1 shows that 66.7% (4) women had positive urine culture in the age group 21-25 y while 50% (3) were primigravida.

Table 1: Demographic details

Variables	Urine culture and sensitivity				Total	
	No Growth		Growth			
	Number	Percentage	Number	Percentage	Number	Percentage
Age groups						
<21 y	6	5.6	0	0	6	5.3
21-25 y	64	59.3	4	66.7	68	59.6
26-30 y	32	29.6	2	33.3	34	29.8
>30 y	6	5.6	0	0	6	5.3
Gravida						
Primigravida	43	39.8	3	50	46	40.4
Second gravida	44	40.7	2	33.3	46	40.4
Third Gravida	15	13.9	1	16.7	16	14
Fourth Gravida	6	5.6	0	0	6	5.3

Fig. 2 shows bacterial isolates found in urine culture were E. coli (66.7%) followed by Klebsiella (16.7%) and Staphylococcus (16.7%).

E coli was maximally sensitive (100%) to Cefuroxime sodium, followed by Amikacin, gentamycin and tobramycin (75%) equally. Klebsiella was highest sensitive (100%) to ciprofloxacin, levofloxacin, piperacillin-tazobactum and imipenem. Staphylococcus found to be highest sensitive (100%) to cotrimoxazole, clarithromycin, clindamycin, doxycycline, levofloxacin and vancomycin.

In terms of resistance, E. coli found to be highly resistant with Ampicillin (75%) and ciprofloxacin (75%) followed by norfloxacin (50%), nalidixic acid (50%).

Klebsiella found to have 100% sensitivity with ciprofloxacin, levofloxacin, piperacillin-tazobactum and imipenem. 100% resistance was observed with ampicillin, ceftriaxone, cefuroxime sodium, cefotaxime, cefazoline, cloxacillin and doxycycline.

Staphylococcus had highest sensitivity (100%) with cotrimoxazole, clarithromycin, clindamycin, doxycycline, levofloxacin and vancomycin. Strains were resistance to cefuroxime sodium and gentamicin (fig. 3)

Table 2 shows maternal complications occurred as 4 (66.7%) cases of premature rupture of membranes and 1(16.7%) case each of pre-eclampsia and severe anemia, respectively. 3(50%) babies were premature, 2(33.4%) had growth restriction and 1(16.7%) developed acute respiratory distress syndrome.

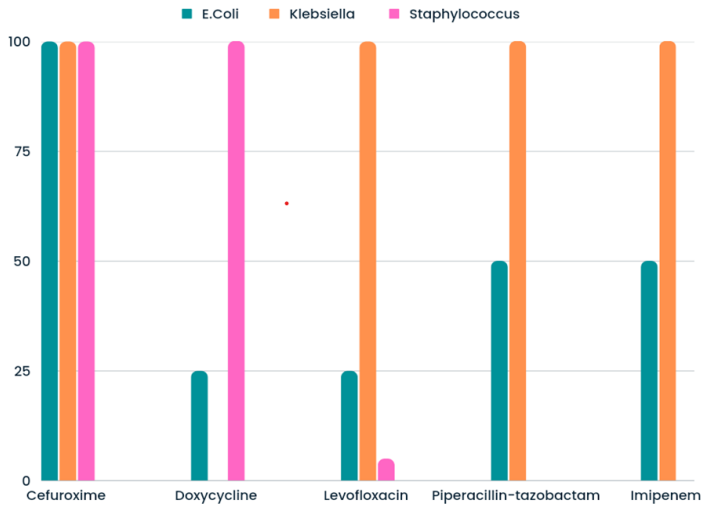

Fig. 2: Bacterial pathogens isolated from urine culture

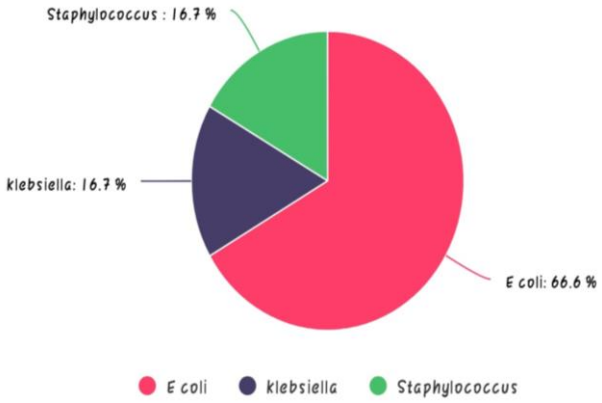

Fig. 3: Antibiotic susceptibility profile

Table 2: Maternal and fetal outcome

Variables	Urine culture and sensitivity			
	No Growth		Growth	
	Number	Percentage	Number	Percentage
Maternal Outcome				
No Complications	94	87	0	0
Severe Anemia	4	3.7	1	16.7
Pre-Eclampsia	5	4.6	1	16.7
Premature rupture of membranes	5	4.6	4	66.7
Fetal Outcome				
No Complications	93	86.1	0	0
Foetal growth restriction	2	1.8	2	33.4
Acute respiratory distress syndrome	5	4.6	1	16.7
Prematurity	8	7.4	3	50

DISCUSSION

The lack of symptoms and potentially dangerous outcomes in pregnancy makes asymptomatic bacteriuria a condition that need special attention [8].

During the study period, total 114 pregnant women were studied, out of which 6 were positive for urine culture. The prevalence rate thus found to be 5.3%, which is statistically significant. Asymptomatic bacteriuria is common during pregnancy, with estimates placing its worldwide frequency at between 1.9 and 9.1%. Multiple studies observed a prevalence of 6.8% [9], 7.4% [10] and 7.3% [11]. Recent cross-sectional study reported a prevalence of 9.6% in their study [8].

In our study we found positive urine culture majorly in the age group 21-25 y, primigravida. However we could not find any statistical significance in these categories. The studies conducted by Dash *et al.* [12], Sujata *et al.* [11] and Patel P *et al.* [13] all concluded that the greatest frequency was seen in those aged 21 to 25. In India, there is a established custom of early marriage. So this age group is considered as reproductive age group and most of the primigravida are in this age group. Anatomical and hormonal changes of urinary tract during pregnancy and immunological changes makes women more prone to acquire infection.

In our study, we found a statistically significant association of number of pus cells (3-4 cells and more than 5 pus cells) with

positive urine culture i. e. 33.3% each. These association is supported by Patel P *et al.* [13]. Presence of pus cells indicate infection. It could be due to multiple factors like anatomical, physiological hormonal changes and personal hygiene and sexual practices. Pus cells should certainly be evaluated further, particularly with regards to culture and sensitivity as their presence may affect pregnancy outcome.

We observed that E. coli (66.7%), Staphylococcus (16.7%), and Klebsiella (16.7%) were the most common bacterial isolates from urine cultures. This has a high probability of being true. The results of our investigation are consistent with those of Subramanian *et al.* [14] and Abdullahi *et al.* [15].

Gram-negative bacteria are the main miscreants. Bacteria of faecal origin colonise the periurethral region, causing asymptomatic bacteriuria. The E. coli bacteria that is ordinarily found in a human's intestines may cause a severe urinary tract infection if it makes its way there. Many studies have shown its role in causing a high prevalence of urinary tract infections [14].

All the bacterial isolates were tested for antibiotic sensitivity pattern. Our study results are statistically significant and are in agreement with studies conducted by Patel P *et al.* [13] and Abdullahi *et al.* [15]. Gentamicin is still very effective against bacterial isolates because it has many different ways of working. Our study shows that ciprofloxacin resistance continues to rise. Study is comparable to the results reported done by Subramanian *et al.* [14].

Nitrofurantoin is shown to be less efficient than other antibiotics in our investigation against E. coli, and this finding is corroborated by the work of Balachandranl *et al.* [16].

Strong selection pressures from the antibiotics in the population were shown by the fact that all the isolates were resistant to at least five different antibiotics. Antibiotic susceptibility and resistance is critical to form the basis for treatment.

All positive women were treated as per antibiotic sensitivity. After 2 w of therapy, a second urine culture was taken. The culture was found sterile; hence we can conclude that in our study group, there was no recurrence of urinary tract infection. All women were followed up till delivery and up to 6 w postpartum. We did not find any loss to follow up in our study.

Our study faced certain limitations. As study is conducted at tertiary hospital, we could not screen all the antenatal women attending OPD due to high influx of attendees per day. Since this study was conducted in the Covid period, number of pregnant women attending OPD were less in comparison to the pre Covid. Antenatal women presenting on government holidays and sundays could not be included in the study. All these factors tend to affect the prevalence rate in our study.

Urinary tract infections is the most common clinical finding during pregnancy and if it is asymptomatic bacteriuria it can progress to pyelonephritis and may result in adverse pregnancy outcome. We observed adverse maternal and fetal outcome therefore, screening and treating ASB during antenatal period can prevent pregnancy complications. Antibiotic sensitivity and resistance pattern through antibiogram can help us to decide treatment in pregnancy.

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Nil

AUTHORS CONTRIBUTIONS

All the authors have contributed equally

CONFLICTS OF INTERESTS

Declared none

REFERENCES

1. Ranjan A, Sridhar ST, Matta N, Chokkakula S, Ansari RK. Prevalence of UTI among pregnant women and its complications in newborns. Indian J Pharm Pract. 2017;10(1):45-9. doi: 10.5530/ijopp.10.1.10.
2. Rejali M, Ahmadi SS. Prevalence of urinary tract infection and associated effective factors during pregnancy in Shahrekord, Iran. Int J Epidemiol Res. 2018;5(2):55-9. doi: 10.15171/ijer.2018.12.
3. Im RB, Deepthi M, Mn D. Prevalence of urinary tract infection in antenatal period at tertiary care hospital in rural Bangalore. Int J Clin Obstet Gynaecol. *2018*;2(4):69-71. doi: 10.33545/gynae.2018.v2.i4b.108.
4. Patel R, Patel K. Next sizzling fashion trend of the technological wave. Glob J Res Anal. 2012;3(5):13-5. doi: 10.15373/22778160/MAY2014/6.
5. Hill JB, Sheffield JS, McIntire DD, Wendel GD. Acute pyelonephritis in pregnancy. Obstet Gynecol. 2005;105(1):18-23. doi: 10.1097/01.AOG.0000149154.96285.a0, PMID 15625136.
6. Herraiz MA, Gonzalez CC, Fumero SR. Urinary tract infection in pregnant women. Aber Sci. doi: 10.54517/urr.2021.v2i2.2091.
7. Snyder CC, Barton JR, Habli M, Sibai BM. Severe sepsis and septic shock in pregnancy: indications for delivery and maternal and perinatal outcomes. J Matern Fetal Neonatal Med. 2013;26(5):503-6. doi: 10.3109/14767058.2012.739221, PMID 23075279.
8. 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. 2021 Jul-Sep;46(3):469-73. doi: 10.4103/ijcm.IJCM_792_20, PMID 34759490.
9. Gayathree l, Shetty S, Deshpande SR, Venkatesha DT. Screening for asymptomatic bacteriuria in pregnancy: an evaluation of various screening tests at the Hassan District Hospital, India. J Clin Diagn Res. 2010;4(4):2702-6.
10. Jayalakshmi J, Jayaram VS. Evaluation of various screening tests to detect asymptomatic bacteriuria in pregnant women. Indian J Pathol Microbiol. 2008;51(3):379-81. doi: 10.4103/0377-4929.42516, PMID 18723963.
11. 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(4):DC01-3. doi: 10.7860/JCDR/2014/6599.4205, PMID 24959438.
12. Dash M, Sahu S, Mohanty I, Narasimham MV, Turuk J, Sahu R. Prevalence, risk factors and antimicrobial resistance of asymptomatic bacteriuria among antenatal women. J Basic Clin Reprod Sci. 2013;2(2):92-6. doi: 10.4103/2278-960X.118647.
13. Patel P, Patel M, Desai K. Prevalence of asymptomatic bacteriuria among pregnant women attending a tertiary care Hospital in Western India. Natl J Community Med. 2022;13(10):728-32. doi: 10.55489/njcm.131020222444.
14. Subramanian M, Ganesapandian S, Singh M, Kumaraguru A. Antimicrobial susceptibility pattern of urinary tract infection causing human pathogenic bacteria. Asian J Med Sci. 2011;3(2):56-60.
15. Abdullahi HI, Thairu Y. Asymptomatic bacteriuria among pregnant women attending antenatal: evaluation of screening test. IOSR J Pharm. 2015;5(8):41-7.
16. Balachandran L, Jacob L, Al Awadhi R, Yahya LO, Catroon KM, Soundararajan LP. Urinary tract infection in pregnancy and its effects on maternal and perinatal outcome: a retrospective study. Cureus. 2022;14(1):e21500. doi: 10.7759/cureus.21500, PMID 35223276.