

Original Research Article

Study of Bacterial Profile & Complications of Asymptomatic Bacteriuria in Pregnancy

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Abstract: Asymptomatic bacteriuria (ASB) is presence of bacteria in urine without causing any symptoms. As symptoms do not manifest, this entity goes undetected. But in case of pregnancy this condition poses a serious threat to the mother and fetus. Though screening for asymptomatic bacteriuria has been rising as a part of standard obstetric care in these days, still much more importance is not given for regular screening in each trimester. In this scenario, this project focuses on the importance of routine screening for ASB in pregnancy in each trimester. The objective of the study is to detect the prevalence of significant bacteriuria among pregnant patients without symptoms in each trimester and also to find out the common bacteria causing asymptomatic bacteriuria along with the sensitivity pattern of the isolated bacteria. About 100 samples were collected in sterile condition from pregnant woman attending antenatal OP in a tertiary care hospital. Samples were transported immediately to the laboratory and examined. The examination includes microscopical methods, Gram staining, culture and sensitivity testing. The prevalence of ASB in pregnant women was found to be about 28%. E.coli was the most common organism isolated (57%) in this study followed by Staphylococci. Most of the bacteria are sensitive to 3rd generation cephalosporins and less sensitive to ampicillin and amoxicillin. This study concludes by suggesting that Urine culture should be included in routine screening test during antenatal checkup.

Keywords: asymptomatic bacteriuria, pregnancy, routine screening

INTRODUCTION

Screening for asymptomatic bacteriuria (ASB) has been rising as a part of standard obstetric care in these days. But still much more importance is not given for regular screening in each trimester. As symptoms do not manifest, this entity goes undetected in early stages which poses a serious threat to the mother and fetus. This study focuses on the need for routine screening in all trimesters so that timely diagnosis is made and fatal complications can be avoided. Also the sensitivity pattern of isolated bacteria is determined to aid in treatment. Urine, inside the bladder is normally sterile. During urination it can pick up commensals and pathogens from distal urethra. High number of bacteria in the urine is an indicator of urinary tract infections. Risk factors of UTI include poor genital hygiene, history of recurrent UTI, anatomical abnormalities, diabetes mellitus and so on. Urinary tract infections may be symptomatic or asymptomatic. The common symptoms associated include fever, frequency and

urgency, lower abdominal pain, burning sensation during micturition & hematuria. Asymptomatic bacteriuria is bacteriuria without any symptom seen in elderly women, diabetes, pregnancy & patient with catheter [1]. It affects about 5 to 10 percent of pregnant women & 40% of pregnant women develop pyelonephritis (especially patients with retroverted uterus) [2]. 25 to 30 percent of this patient will progress to symptomatic infection, which has 3 to 4 times greater progression as in non-pregnant [3]. There are several anatomic and physiologic changes in urinary tract during pregnancy. The renal pelvis and the ureters dilate in 8th week of pregnancy. The displacement of bladder superiorly & anteriorly and the compression by enlarging uterus leads to hydronephrosis. Also the relaxation effect provided to the smooth muscles by progesterone cause bladder distension. Differences in urinary pH and osmolality are induced by glucosuria & apparent reduction in immunity is also present. All these changes facilitate enormous growth of bacteria in

the urinary bladder [2]. The relatively short female urethra and close approximation with rectum are the main reasons to be colonized with organisms from the G.I.T that leads to UTI. *E. coli* is responsible for 75 to 80 percent of asymptomatic bacteriuria. *This was* discovered in the human colon in 1885 by German bacteriologist Theodor Escherich. *E. coli* that has pilli p protein which adheres to the urinary epithelium and cause UTI. It is a Gram negative bacilli and lactose fermentor. It is a motile organism with peritrichous flagella. *Klebsiella pneumoniae*, *Proteus* species, *Pseudomonas* species, *Staphylococcal* species, *Enterococci*, and group B streptococci are other organisms responsible for urinary tract infections. Maternal complications include pyelonephritis, preeclampsia (PET), endometritis, preterm premature rupture of amniotic membrane (PPROM), preterm labour & septicemia [4]. Foetal complications are abortion, low birth weight (LBW), intra uterine growth retardation (IUGR) & foetal death. [5, 6] In this scenario, this project focuses on the importance of routine screening for ASB in pregnancy in each trimester.

AIMS AND OBJECTIVES

- To detect the prevalence of significant bacteriuria among pregnant patients without symptoms in each trimester.
- To find out the common bacteria causing asymptomatic bacteriuria among them and to see the sensitivity pattern of the isolated bacteria.
- To establish guidelines for the prevention of bacteriuria in pregnant patients thereby aiding in the prevention of further complications.

MATERIALS AND METHODS

This is a prospective study of duration 2 Months in outpatient antenatal clinic in Department of Obstetrics and Gynecology and Institute of Microbiology in a tertiary care hospital. About 100 urine samples are collected from pregnant women without any symptoms of bacteriuria after obtaining Ethical clearance for study protocol from the Ethical Committee. Informed consent was obtained from all patients

INCLUSION CRITERIA

Pregnant women of all three trimesters without any symptoms of bacteriuria.

EXCLUSION CRITERIA

Pregnant women having

- history of UTI (increased frequency of urination, burning micturition)
- patients on antibiotic treatment
- patients with other complications such as Diabetes, recurrent UTI, any structural abnormalities in urinary tract.

METHODOLOGY

Sample collection

A total of 100 mid stream urine samples collected from pregnant women of all three trimesters. Proper instructions given regarding thorough cleaning of genitalia with soap & water before collection. Instructions given include:

- Cleaning of external genitalia with soap and water.
- Labia separated with fingers and first portion of urine that flushes out commensal bacteria from anterior urethra is discarded.
- About 15 to 20 ml of midstream urine collected in a wide mouthed container with sterile aseptic precaution [7].

Transport

After proper labeling of each specimen, they are transported to the lab immediately.

Processing the sample

All the urine samples received are processed by following methods:

Microscopy

Wet mount preparations prepared from uncentrifuged urine and examined for the detection of pus cells, bacteria and red blood cells. Presence of more than 10 leucocytes/ mm³ of uncentrifuged urine are considered as pyuria.

Gram staining

Gram positive & Gram negative Bacteria are differentiated by this method.

Culture method

Semi quantitative cultures prepared using sterile bacteriological loop. One drop of uncentrifuged urine inoculated on blood agar and Cysteine Lactose electrolyte Deficient (CLED) medium. They were incubated at 37^o c for 24 hrs. Colony count was made from the number of colony forming units in the culture plates. Bacterial count > 10⁵ /ml of urine, considered as significant bacteriuria [8]. From the growth, the bacteria were identified by Gram staining & routine Biochemical reactions.

Sensitivity testing

Antibiotic susceptibility testing was performed by the Kirby-Bauer disc diffusion method using amoxicillin (30µg), ampicillin (10µg), cefixime (30µg), cephalexin (5µg), cefpodoxime (10µg) discs according to the CLSI (Clinical and Laboratory Standards Institute). From the zone of inhibition, sensitivity pattern for each antibiotic was derived.

RESULTS

Out of 100 samples collected 28 samples were culture positive. Among them the prevalence of ASB is highest in 1st trimester (43%) in which there is 12 culture positive cases. The trimester wise prevalence of asymptomatic bacteriuria is given in Table 1 and Chart 1.

Table-1: TRIMESTER WISE DISTRIBUTION OF ASYMPTOMATIC BACTERIURIA

TRIMESTER	1ST TRIMESTER		2ND TRIMESTER		3RD TRIMESTER	
	NUMBER(n)	%	NUMBER(n)	%	NUMBER(n)	%
STUDY POPULATION	33	33%	33	33%	34	34%
CULTURE POSITIVE CASES(TOTAL(n)=28)	12	43%	5	18%	11	39%

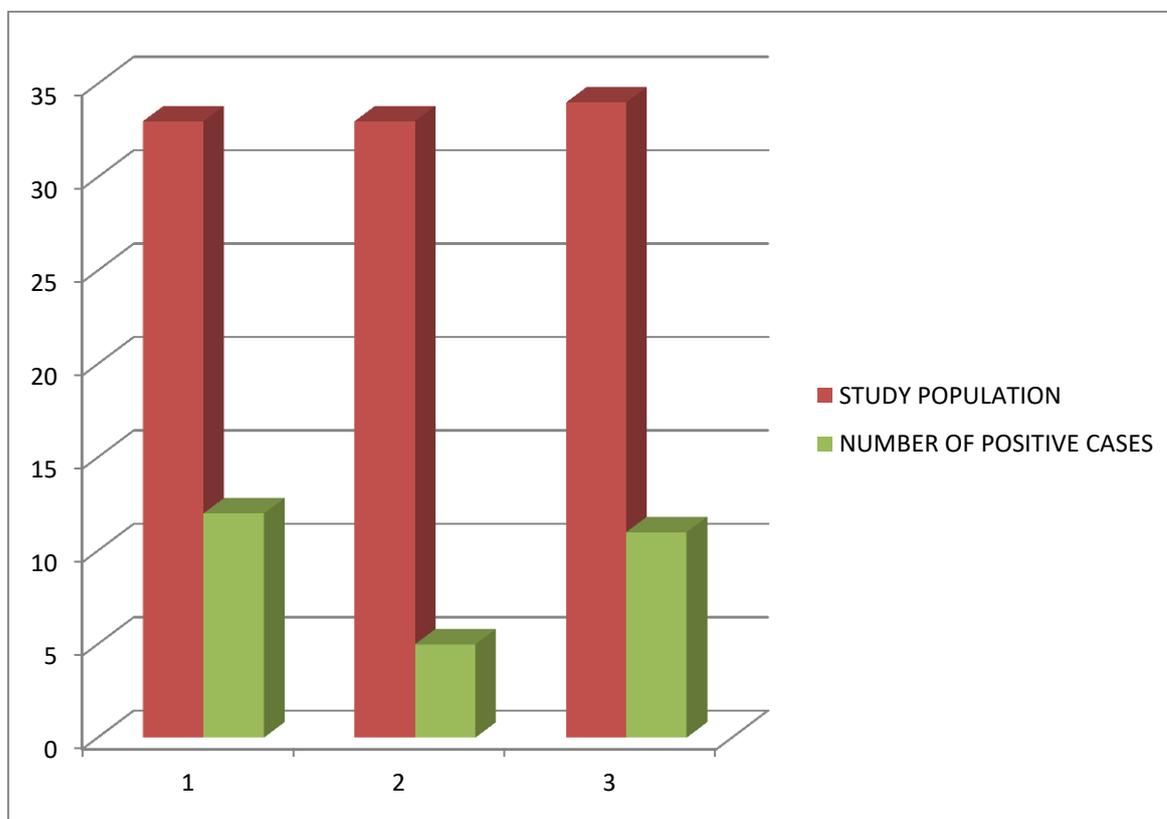


CHART-1: TRIMESTER WISE DISTRIBUTION OF ASYMPTOMATIC BACTERIURIA

ASB is highly prevalent in the age group of 21-25. The age wise distribution of asymptomatic bacteriuria is given in Chart 2.

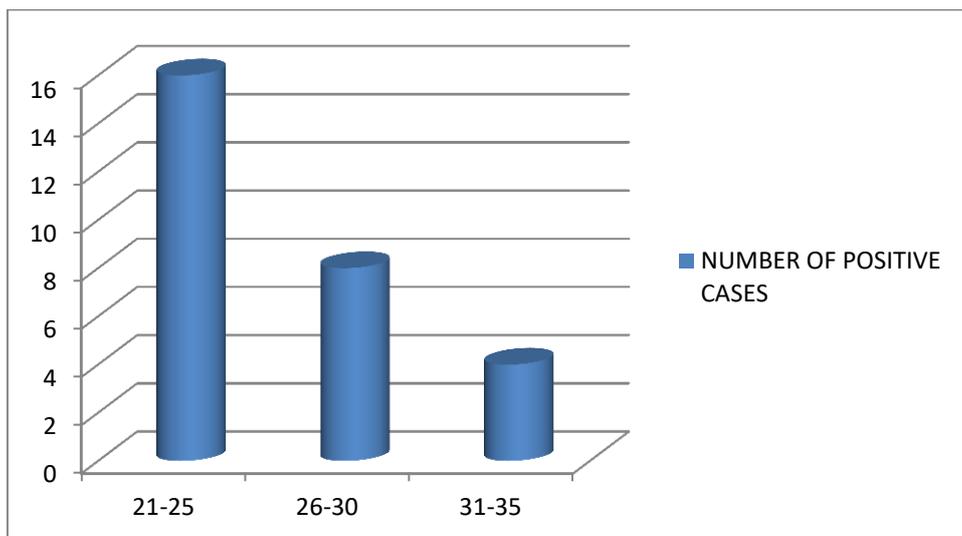


CHART-2: AGE WISE DISTRIBUTION OF ASYMPTOMATIC BACTERIURIA

ASB is highly prevalent in the primi gravida (57%). It is least prevalent in multi gravida. The distribution of

ASB with respect to gravid is given in Table 2& Chart3.

Table-2: Distribution of Asymptomatic Bacteriuria With Respect To Gravida

GRAVIDA	CULTURE POSITIVE CASES	PERCENTAGE
1	16	57%
2	11	39%
3	1	0.40%

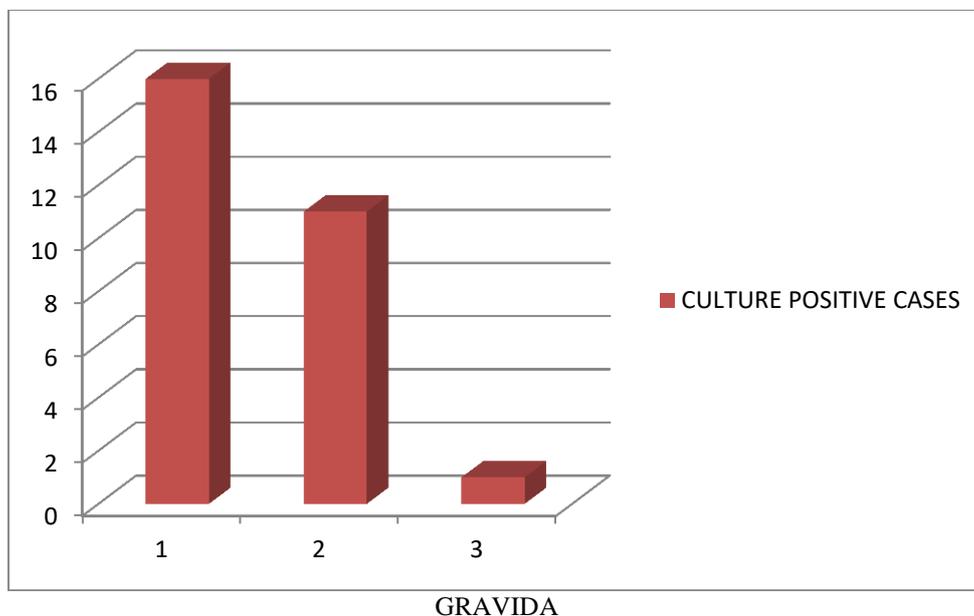


CHART-3: DISTRIBUTION OF ASYMPTOMATIC BACTERIURIA WITH RESPECT TO GRAVIDA

Among the total of 28 bacteria isolated, E.coli has the higher prevalence (57%).The next is Coagulase negative Staphylococci (CoNS) (18 %).The other

bacteria isolated includes Pseudomonas, Klebsiella species and Citrobacter species. The distribution of bacterial isolates is given in Table 3 & Chart 4

Table-3: Distribution of Bacterial Isolates

BACTERIA ISOLATED	CULTURE POSITIVE	PERCNTAGE
	CASES	
Escherichia coli	16	57%
Coagulase negative Staphylococci	5	18%
Pseudomonas species	4	14%
Klebsiella species	2	7.10%
Citrobacter species	1	0.40%
TOTAL	28	

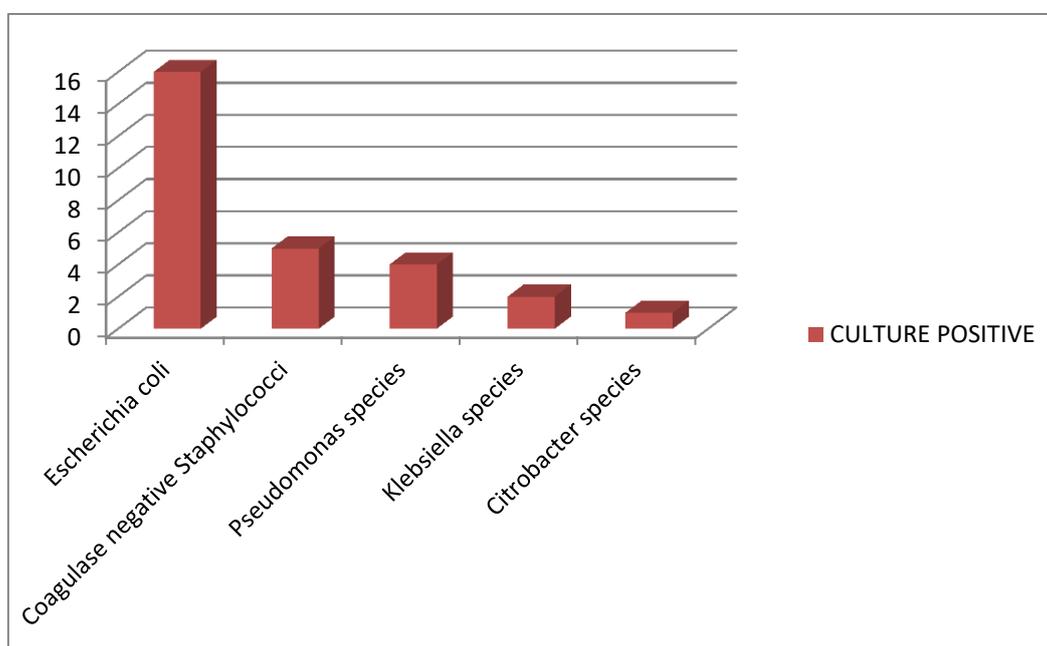


CHART-4: DISTRIBUTION OF BACTERIAL ISOLATES

E.coli is the most predominant organism isolated in all the trimesters. In this study, Klebsiella is isolated only in third trimester

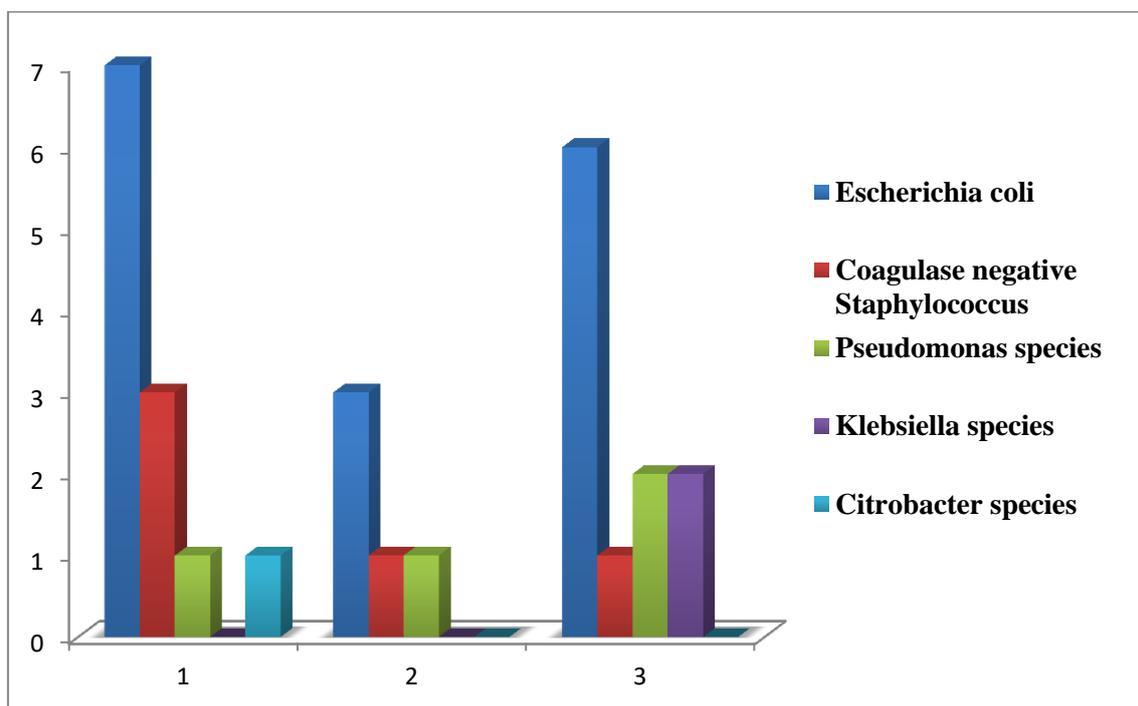


CHART-5: TRIMESTER WISE DISTRIBUTION OF BACTERIAL ISOLATES

In this study, E.coli is highly sensitive to cefixime and cefpodoxime (68.75%). Almost all the organisms are sensitive to 3rd generation cephalosporins. They are less

sensitive to ampicillin and amoxicillin. Citrobacter isolated is resistant to the all drugs used. The sensitivity pattern is given in Table 4.

Table-4: Sensitivity Pattern of Isolated Bacteria

BACTERIA ISOLATED	AMPICILIN (10µg)		AMOXCILLIN (30µg)		CEPHALEXIN (30µg)		CEFIXIME (5µg)		CEFPODOXIME (10µg)	
	sensitive	%	Sensitive	%	Sensitive	%	Sensitive	%	Sensitive	%
Escheichia coli(n=16)	3	18.8	3	18.8	5	31.2	11	68.7	11	68.75
Staphylococcus species (n=5)	1	20	1	20	2	40	4	80	4	80
Pseudomonas species(n=4)	2	50	2	50	1	25	3	75	3	75
Klebsiella species(n=2)	0	0	0	0	1	50	1	80	1	80
citrobacter species(n=1)	0	0	0	0	0	0	0	0	0	0

DISCUSSION

In the present study the prevalence of asymptomatic bacteriuria in pregnancy in the tertiary care hospital is 28%.This is comparable to the study undertaken by Neupane *et al.* (26%) [9]. This higher prevalence may be attributed to the difference in environment, social habits and standards of personal hygiene of the persons included in the study. The

prevalence is high among primigravida (57%). This correlates with the study done by Lavanya SV *et al.* (66%)[8]. According to age the prevalence is higher in age group 21-25(57%) and 26-30(29%) which matches with the study done by Nupane *et al.* [9] where the age group (21-30) had higher prevalence (72%). The prevalence is highest in 1st trimester(43%) followed by 3rd trimester(39%) which coincides with the study done

by Vaishali Jain *et al.* [4] in which the incidence was 17% in 1st trimester and 16% in third trimester. The higher prevalence in 3rd trimester is probably due to urinary stasis caused by dilated bladder and obstruction to urinary flow by the enlarging uterus. The most common organism that is isolated in this study is E.coli (57%). This correlates with the study of Girish Babu *et al.* [10] and also with many other studies [4, 8, 10]. The second organism with higher prevalence is coagulase negative Staphylococcus (5%). In all the trimesters, E.coli is the predominant organism isolated. In this study, Klebsiella was isolated in the 3rd trimester. E.coli is mostly sensitive to 3rd generation cephalosporins like cefixime, cefpodoxime. One of 2 Klebsiella isolated was sensitive to cephalixin. In this study 2 E.coli (12.5%), 1 staphylococcus (20%) and citrobacter were found to be resistant to all the drugs. All the organisms are less sensitive to amoxicillin and ampicillin [10].

CONCLUSION

- Prevalence of ASB among pregnant women is 28% which is a higher rate and thus routine screening for urinary infection in all trimesters must be done.
- E.coli (57%) is the predominant organism isolated in all three trimesters.
- It is more sensitive to cefixime or cefpodoxime. Thus in suspected or proven cases it is better to give cefixime or cefpodoxime
- Proper treatment must be provided taking into account the antibiotic sensitivity of the organism.
- The patient must also be advised to take full course of treatment to avoid resistance. This can reduce the various complications like pre-eclampsia, preterm delivery, PPRM and LBW and thus ensure the maternal and fetal safety.

SUGGESTIONS

- Urine culture should be included in routine screening test during antenatal checkup.
- Urinary tract infection in each trimester should be ruled out and this will reduce complications like preeclampsia, preterm labour, low birth weight, intra uterine growth retardation etc.,
- Proper selection of antibiotics in treating ASB should be made to prevent the development of resistance.
- Health education should be provided to the pregnant women while attending antenatal

checkup to improve genital hygiene, adequate water intake.

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