ORIGINAL RESEARCH ARTICLE
pISSN09763325 | eISSN22296816
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www.njcmindia.com
DOI: 10.55489/njcm.131020222444

Prevalence of Asymptomatic Bacteriuria Among Pregnant Women Attending a Tertiary Care Hospital in Western India

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ABSTRACT

Introduction: Asymptomatic bacteriuria refers to the presence of bacteria in urine having overall incidence during pregnancy ranges between 2%-10%. The study was conducted to assess prevalence of asymptomatic bacteriuria in pregnant women. The study also aimed to find out the most common Pathogenic organism isolates from urine sample.

Methodology: Pregnant women with varying gestational periods attending the tertiary care hospital without any symptoms of UTI were included in the study. Their urine was tested for routine microscopy, culture, and certain biochemical testing.

Results: Prevalence rate of asymptomatic bacteriuria was seen 13.8% in pregnant women. Proportion of asymptomatic bacteriuria is highest 14.70% in age group 26-30 year, 23.33% in first trimester. Both gram negative and gram-positive bacteria were isolated, but gram-positive cocci isolates were higher comparatively gram-negative bacilli. Organisms recovered in order of frequency were E. coli, Coagulase Negative Staphylococci (CONS), S. aureus, Klebsiella spp, Acinetobacter spp, Citrobacter spp and Enterobacter spp.

Conclusion: High prevalence of asymptomatic bacteriuria demands routine bacteriological screening of pregnant women. This will help in early treatment of asymptomatic bacteriuria which will help in prevention of acute and chronic pyelonephritis.

Keywords: Bacteriuria, Pregnant women, Asymptomatic, Culture, Microscopy

INTRODUCTION

Asymptomatic bacteriuria refers to the presence of bacteria in urine, but without the patient showing symptoms of urinary tract infection. The overall incidence during pregnancy ranges between 2%-10%[1].

Cross-sectional prevalence studies identify 1% to 8% of women with asymptomatic bacteriuria. In longitudinal studies, 30% to 50% of non- pregnant women with bacteriuria have symptomatic lower tract infections during 3 to 5 years of following-up[2].

Asymptomatic bacteriuria led to pyelonephritis in pregnant women. Untreated pyelonephritis is associated with a high rate of premature delivery and infant mortality. Studies have shown that pregnant women found to have bacteriuria during screening have a 13.5 to 65% incidence of pyelonephritis. Furthermore, treatment of bacteriuria found on screening during pregnancy reduce the incidence of acute pyelonephritis from 13.5-65% down to 0-5.3%[3].

Urine culture obtained at the first prenatal visit and again at week 16 reveals most women at risk for asymptomatic bacteriuria during pregnancy. When bacteria are detected on screening, it should be

How to cite this article: 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):728-732. DOI: 10.55489/njcm.131020222444

Financial Support: None declared | **Conflict of Interest:** None declared | **Date of Submission**: 12-03-2022 | **Date of Acceptance**: 02-09-2022 | **Date of Publication**: 31-10-2022

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treated. In general, only the Penicillin and Cephalosporin can be regarded as safe throughout the gestation. A 3-day course of an oral agent in either class should be employed for screening bacteriuria[3].

The isolation of organism other than gram-negative rods depends on preparation, collection methods and selective medium. Although *E. coli* and other gram-negative rods are associated with pyelonephritis during pregnancy, other organisms may be important in other adverse pregnancy outcomes. A Large study that uses modern, comprehensive microbiologic techniques is needed to relate specific urinary tract pathogens to pregnancy[2].

However, in many hospitals in developing countries including India, routine urine culture test is not carried out for antenatal patients probably due to cost implication and time factor for culture result (usually 48 hours period) instead many clinicians opt for the strip urinalysis method for assessing urine in pregnant women. The true picture of such urine specimen cannot be fully assessed as the strip cannot quantify the extent of infection in such a patient as well as provide antimicrobial therapy which is usually seen in the case of culture test. In many health centres in developing countries, the attention of clinicians and health care providers is usually on the presence of glucose and protein in urine specimens with less attention on possible asymptomatic infection[4].

With this background, this work's aim was to determine asymptomatic bacteriuria among pregnant women attending tertiary care hospital- SMIMER, India.

OBJECTIVES

The study was conducted to assess prevalence of asymptomatic bacteriuria in pregnant women. The study also aimed to find out the most common Pathogenic organism isolates from urine sample.

MATERIALS AND METHODS

This study was conducted amongst the pregnant women attending the tertiary care hospital Surat Municipal Institute of Medical Education and Research (SMIMER), Surat; situated in South Gujarat region. There were 500 pregnant women enrolled for the study during the period from March 2019 to May 2019. Subjects enrolled for the study were of varying ages from 18-35 years.

Total 500 urine samples were collected from each of the subjects enrolled for the study.

Pregnant women with varying gestational periods attending the tertiary care hospital without any symptoms of UTI were included in the study. Pregnant women with known congenital anomalies of urinary tract, signs and symptoms of UTI, pyrexia, history of antibiotics during the previous two weeks or catheterization during past two weeks was excluded from the study.

Collection of Urine: Urine was collected sterile disposable, wide mouth urine container. Each subject was instructed to clean her vulva and perineum with soap and water, dry it completely with provided gauze piece and then collect mid-stream sample of urine after separating the labia. Information regarding age, trimester, date of last menstruation period, expected delivery date was documented. Urine specimens were transported to the laboratory within two hours of collection. Further work was carried out in the department of Microbiology[5].

Urine samples must be tested immediately after collection, but if urine cannot be tested and cultured within 2 hours of collection, the sample should be refrigerated or preserved with boric acid. Urine can be stored in the refrigerator for up to 24 hours. Urine transports in urine transport tube contain boric acid, glycerol and sodium format have been shown to preserve bacteria without refrigeration for as long as 24 hours[5].

Urine routine microscopy: Urine was observed by naked eye for altered colour, presence of turbidity, deposit and finding were recorded[6]. For the microscopic examination 10 ml of urine was transferred into test tube. The urine was then centrifuged at 5000 rpm for 5 minutes. The supernatant was then decanted, to leave sediment suspended in 1 ml volume of urine. This preparation was examined under low and high power. Several fields were searched to identify and count the number of pus cells, epithelial cell, Bacteria, Yeast cell, red cell, Crystals and casts. More than 5 pus cells per high power field were considered as significant[6].

Gram Staining[7]: A loopful of the urine sample were applied to a glass microscopic slide, allowed to air dry, stain with gram stain. The slide was observed under microscope in oil immersion lance.

Plating/Primary Inoculation: Plating of urine was done by standard loop technique on CLED agar[8].

The number of CFU's is multiplied by 1000 (a 0.001 ml loop was used) to determine the number of microorganisms per millilitre in the original specimen. Urinary tract infection causing pathogenic organism ranging prepared between 10^4-10^5 cells/ml of the mid-stream urine[5,9].

Colony Characteristics were noted on base of following Criteria: size, shape, edge, appearance, colour, consistency, surface, margin, pigmentation.

Biochemical Test[7]: For gram positive bacteria Catalase test, slide coagulase test, tube coagulase test and bile aesculin hydrolysis Test were performed. For gram negative bacteria Indole test, methyl red Test, Voges Proskauer test, citrate utilization test, phenylalanine deaminase test, urease test, triple sugar iron agar slant and motility test were performed.

RESULTS

A total 500 urine samples were collected in the tertiary care hospital-SMIMER from pregnant women. Routine urine analysis including microscopic examination was done. Culture and antimicrobial sensitivity were done on all the samples.

Out of 500, only 66 pregnant women (13.2%) had asymptomatic bacteriuria (10,000 or more bacteria/ml of urine). Bacterial count between 10^4/ml and 10^5/ml of urine was considered equivocal.

It is seen from the above table that the incidence of bacteriuria is highest in age group 21-25 year among pregnant women. However, there is no association between age and cases with asymptomatic bacteriuria. The highest prevalence of asymptomatic bacteriuria is in first trimester. There is no association between trimester and cases with asymptomatic bacteriuria.

Urine showing 3 or more pus cells per high power field (hpf) was considered as significant. Table 2 shows that significant pyuria was present in 57.57% in bacteriuric cases and 3.22% in non-bacteriuric cases of pregnant women

Table 2 reveals that Gram positive organisms detected in 29 (5.8%) out of 500 case and Gram-Negative organisms detected in 37 (7.4%) out of 500.

E. coli were the major isolate constituting 33.33% and *Enterobacter spp* were the lowest isolate constituting 3.03%. The Gram-Positive cocci were responsible for total 29 cases and Gram-negative bacilli were responsible for total 37 cases.

Table 2 shows the organisms isolated in asymptomatic bacteriuric cases*. E. coli* were the major isolates constituting 22 cases. *Coagulase negative Staphylococci* was the next major isolates constituting 17 cases. *S. aureus* accounted for 10 cases, *Klebsiella spp* accounted for 8 cases, *Acinetobacter spp* accounted for 4 cases, *Citrobacter spp* accounted for 3 cases and *Enterococci spp* accounted for 2 cases. Thus, the gram-positive cocci were responsible for 29 cases and gram-negative bacilli were responsible for 37 cases.

Table 1: Distribution of pregnant women with asymptomatic bacteriuria

Variables	Screened (n=500)	Asymptomatic bacteriuria (n=66) (%)	P value*
Age in year			
18-20	98	11 (11.22%)	0.926
21-25	240	33 (13.75%)	
26-30	102	15 (14.70%)	
31-35	57	7 (12.28%)	
Above 35	3	0 (0%)	
Trimester			
First	30	7 (23.33%)	0.205
Second	144	14 (9.72%)	
Third	326	45 (13.80%)	
No of Pus cell/hpf			
Absent	200	0 (0.0%)	<0.01
0-3	248	28 (42.42%)	
> 3	52	38 (57.57%)	

*Chisquare test used to calculate p value; hpf= High power field

Table 2: Urine routine microscopic and culture Examination among participants

Variables	Trimester			
	First	Second	Third	Total
Total patients screened	30	144	326	500
Urine Microscopy				
Epithelial cell	18 (60.0%)	76 (52.8%)	195 (59.8%)	289 (57.8%)
Pus cell				
Absent	13 (43.3%)	68 (47.2%)	134 (41.1%)	215 (43.0%)
0-3	13 (43.3%)	66 (45.8%)	168 (51.5%)	247 (49.4%)
>0-3	4 (13.3%)	10 (6.9%)	24 (7.4%)	37 (7.4%)
RBC	3 (10.0%)	1 (0.7%)	0 (0.0%)	4 (0.8%)
Culture Results				
Gram positive	2 (6.7%)	5 (3.5%)	22 (6.7%)	**29 (**5.8%)
Gram negative	5 (16.7%)	9 (6.3%)	23 (7.1%)	**37 (**7.4%)
Organism detected				
E. Coli	3 (10.0%)	8 (5.6%)	11 (3.4%)	22 (4.4%)
CONS	1 (3.3%)	2 (1.4%)	14 (4.3%)	17 (3.4%)
S. Aureus	1 (3.3%)	3 (2.1%)	6 (1.8%)	10 (2.0%)
Klebsiella	2 (6.7%)	0 (0.0%)	6 (1.8%)	8 (1.6%)
Acinetobacter	0 (0.0%)	0 (0.0%)	4 (1.2%)	4 (0.8%)
Citrobacter	0 (0.0%)	1 (0.7%)	2 (0.6%)	3 (0.6%)
Enterococci	0 (0.0%)	0 (0.0%)	2 (0.6%)	2 (0.4%)

DISCUSSION

In this study cases showing asymptomatic bacteriuria was 13.20%. This is almost similar to the figures reported in previous studies conducted by Abbas N et al[10], Mukherjee K et al[11], Verma A et al[12] and R sandhiya et al[13].

The proportion of cases of asymptomatic bacteriuria was found to increase with increase of age[14]. In the

present study showed that proportion of asymptomatic bacteriuria highest 14.70% in 26-30 years age group. R sandhiya et al[13] and Abbas N et al[10] found respectively 50% and 12.67% in 26–30-year group which correlates with our finding.

In this study, the frequency of asymptomatic bacteriuria was lowest in the first trimester (10.6%) compared to the second and third trimester. Abbas N et al[10], Mukherjee K et al[11], Verma A et al[12] and R Sandhiya et al[13] founds lowest asymptomatic bacteriuria respectively 23.81%, 18.51, 25% and 22.73% in first trimester, which correlates with our findings.

In present study highest incidence of bacteriuria is 68.18% in third trimester. Abbas N et al[10] found highest asymptomatic bacteriuria is 50% in third trimester, which correlates with our study. In present study significant pus cell was present 57.57% in bacteriuric cases and 3.22% in non-bacteriuric cases. It is felt that routine screening for bacteriuria during pregnancy is appropriate.

More isolation of microorganisms from the urine does not always mean infection, organism has to be 100,000 or more/ml or urine. When quantitative estimation is carried out indicating growth and multiplication of organism in the urinary bladder[15], Gram-positive cocci multiply slowly in the urine as compared to Gram negative bacilli. It has been suggested by Pead et al[16] that 10^4 organisms/ml of centrifuged urine in case of Gram-positive cocci should be considered consistent with urinary infection instead of 10^5 bacteria/ml which is appropriate for Gram negative bacilli. However, those showing 10^4 bacteria/ml were repeated.

Types of micro-organism isolated from the urine have never been constant, but the fact remains that *E. coli* has always been responsible for large number of urinary tract infection in all the series reported. In this study *E. coli* was isolated in 33.33% of the bacteriuric women. Out of the other members of the coliform group *Klebsiella spp* isolated in 12.12%, *Acinetobacter spp* 6.06% and *Citrobacter spp* 4.54%. Thus, the total coliform isolates constitute 43.9%. This finding is like other report which indicated that *E. coli* is the most implicating pathogen isolated in patient with UTIs. [10, 11, 12, 13]

Gram positive cocci accounted for 56.1% of total isolates. Earlier workers did not give any significance to Coagulase negative Staphylococci isolated from the urine sample and considered them as contaminants. But in recent years, Coagulase Negative Staphylococci in significant number has been viewed as causative agent for urinary tract infection (Joseph F john et al[17], Gillespie et al[18], Shrestha and Darrel et al[19]). In this study a significant proportion of Coagulase Negative Staphylococci (CONS) infection was noted in 17 cases (25.75%).

Significant asymptomatic bacteriuria during pregnancy has not yet been accorded the status of disease despite the isolation of almost similar type of bacterial flora as in the symptomatic cases.

Controlled trials and large-scale studies are required to establish pathogenic potential of the isolates. Many workers have shown that complications during pregnancy are more common in bacteriuric women. This study recommend screening for bacteriuria during pregnancy.

CONCLUSION

Prevalence rate of asymptomatic bacteriuria was seen 13.80% in pregnant women. Both gram negative and gram-positive bacteria were isolated, but gram-positive cocci isolates were higher comparatively gram-negative bacilli. Organisms recovered in order of frequency were E. coli, Coagulase Negative *Staphylococci (CONS), S. aureus, Klebsiella spp, Acinetobacter spp, Citrobacter spp* and *Enterobacter spp*. Proportion of asymptomatic bacteriuria is highest 14.70% in age group 26-30 year, 23.33% in first trimester. This will help in early treatment of asymptomatic bacteriuria which will help in prevention of acute and chronic pyelonephritis.

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