

Symptomatic and Asymptomatic Bacteriuria in Pregnancy with Special Reference to HIV Positive Antenatal Women

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Abstract

Bacteriuria is a condition where the significant presence of bacteria in the urine. Pregnancy women with Human Immunodeficiency Virus are likely to be more predisposed to urinary tract infections due to the suppression of their immunity and tend to encourage the growth of pathogens. The present study was aimed to evaluate the symptomatic and asymptomatic bacteriuria in pregnancy with special reference to HIV positive antenatal women.

Materials and Methods: The present study was conducted in the Department of Microbiology, Mamata Medical College and General Hospital, Khammam. Total number of antenatal women attending Mamata General Hospital (MGH) included 200, and 36 pregnant women were involved in the study who were admitted as inpatient in the antenatal ward for HIV positive women, at Government General Hospital (GGH) Khammam, T.S.

Results: In the present study, 128 out of total 236 (50%) pregnant asymptomatic women belong to the age group of 26 to 30 years. Out of 100 symptomatic pregnant women (35%) revealed significant bacteriuria. Whereas, 9.56% asymptomatic pregnant women revealed significant bacteriuria. Significant bacteriuria was observed in 48 pregnant women out of the total 236 cases and pyuria was observed only in 56 pregnant women out of total 236 cases. Five symptomatic and two asymptomatic HIV positive antenatal women urine samples revealed significant bacteriuria with bacterial counts of more than 10^5 CFU/ml and all their CD4⁺ counts varied between 260/mm³ to 350/mm³.

Conclusion: Screening for bacteriuria is important during pregnancy, as this could lead to pyelonephritis and adverse obstetric outcomes such as prematurity, low birth weight and higher foetal mortality rates.

Keywords: Bacteriuria; HIV; Antenatal Women; CD4⁺

Introduction

Bacteriuria is defined as the presence of 100,000 or more colony forming units (CFU) per ml of urine. Kass (1956) first introduced the concept of significant bacteriuria and demonstrated the presence of more than 10⁵ CFU of bacteria per ml of urine in a single specimen indicated bacteriuria. Though Kass's definition of significant bacteriuria retains its general usefulness, there are clinical situations where counts between 10³ - 10⁵ CFU per ml may be significant [1].

The infectious disease society of America gave a slightly more relaxed consensus definition requiring 10³ organisms per ml to diagnose cystitis and 10⁴ per ml for pyelonephritis [2]. The American academy of paediatrics and the American college of obstetricians and gynaecologists as well as US preventive task force recommended scanning for bacteriuria at the first prenatal visit. Urinary tract infections

are the most common bacterial infections encountered during pregnancy. Worldwide the prevalence of asymptomatic bacteriuria during pregnancy varies from 2 - 7% [3]. If asymptomatic bacteriuria is not treated during pregnancy 25% of infected women develop acute symptomatic infection [4]. The prevalence of asymptomatic bacteriuria in pregnancy ranges from 4 to 7%, although in certain groups of patients may vary from less than 2% to 14% [5].

Pregnant women with bacteriuria are either symptomatic or asymptomatic are likely to develop acute pyelonephritis in later pregnancy, post-partum urinary tract infection, hypertensive disease of pregnancy, anaemia, chronic renal failure, prematurity, low birth weight babies and prenatal death if untreated [6,7]. Significant changes in both structure and function take place in the urinary tract during normal pregnancy. Urinary tract dilatation is one of the most significant anatomical alterations induced by pregnancy.

People living with Human Immunodeficiency Virus (HIV) are likely to be more predisposed to urinary tract infections due to the suppression of their immunity and women in this category tend to get them more often due to the nature of their anatomy [8]. The incidence of UTI is higher in HIV-infected than HIV seronegative individuals [9], it is also higher amongst HIV-infected with low CD4 counts [10]. The present study was aimed to evaluate the symptomatic and asymptomatic bacteriuria in pregnancy with special reference to HIV positive antenatal women.

Materials and Methods

The study was conducted in the Department of Microbiology, Mamata Medical College and General Hospital, Khammam. Total number of antenatal women attending Mamata General Hospital (MGH) included 200, and 36 pregnant women were involved in the study who were admitted as inpatient in the antenatal ward for HIV positive women, at Government General Hospital (GGH) Khammam, T.S.

Sample collection and processing

About 20 ml of clean catch mid-stream urine samples were collected in sterile containers after educating the patients regarding collection of specimen. The samples were brought to the laboratory and were processed within one hour. The colour and turbidity of samples were observed.

The samples were subjected to

- **Microscopy:** Wet film examination was done for each sample and observed for leucocytes, red blood corpuscles, epithelial cells, casts and crystals.
- **Gram staining:** This was done on an air dried smear preparation of each uncentrifuged urine sample and the bacteria was identified by their morphology and staining reactions noted as Gram positive or Gram negative.
- **Urine culture:** A semi quantitative calibrated loop technique was adopted for the primary isolation of organism. A Nichrome wire of SWG 28 was used to make a circular loop of 3.26 mm internal diameter, which holds a drop of water or urine of 0.004 ml volume when withdrawn slowly and vertically from the liquid so as to produce a flat sided drop.

Volume of mixed uncentrifuged urine was taken and spread over a plate of agar culture medium. The plate was incubated at 37°C for 24hrs, the number of colonies counted and this number was used to calculate number of viable bacteria per ml of urine. Thus if 0.004 ml loop full of urine yields 400 colonies, the count per ml will be 10^5 or just indicative of significant bacteriuria. While Kass criteria was used for determining significant bacterial count i.e. more than 10^5 CFU/ml of urine, in cases where *Staphylococcus* Spp. Were isolated even counts of greater than or equal to 10^3 CFU/ml of urine were considered significant.

Total viable bacterial count per ml of sample = number of colonies x 250

Calculating the number of bacteria per mL of serially diluted bacteria:

To calculate the number of bacteria per mL of diluted sample one should use the following equation:

$$\frac{\text{Number of CFU}}{\text{Volume plated (mL)} \times \text{total dilution used}} \longrightarrow \frac{\text{Number of CFU}}{\text{mL}}$$

For example, if for the 1×10^{-8} dilution plate you plated 0.1 mL of the diluted cell suspension and counted 250 bacteria, then the calculation would be:

$250/0.1 \text{ mL} \times 10^{-8}$ or $250/10^{-9}$ or 2.5×10^{11} bacteria per mL.

Results

Total number of pregnant women included in the study was 236. Where 200 cases were from Mamata General Hospital (MGH) and 36 cases were from Government General Hospital (GGH). In the present study, the number of cases with symptoms (symptomatic) was observed in 100 cases and significant bacteriuria was seen in 35 cases. Whereas, 120 cases without symptoms (asymptomatic) was seen and 11 cases shown significant bacteriuria. All 200 pregnant women from MGH were HIV negative screened during antenatal check-up.

In the present study, 128 out of total 236 (50%) pregnant asymptomatic women belong to the age group of 26 to 30 years. 43 out of 100 (43%) symptomatic cases belong to 26 to 30 age group and 85 out of 136 (62.5%) asymptomatic cases also belong to 26 to 30 age group (Table 1).

Age of Pregnant women	Symptomatic			Asymptomatic		
	MGH	GGH	Total	MGH	GGH	Total
Less than 20 years	10	01	11	10	01	022
21-25 years	20	05	25	20	02	047
26-30 years	35	08	43	75	10	128
31-35 years	10	04	14	10	02	026
36-40 years	05	02	07	05	01	013
Total	80	20	28	120	16	236

Table 1: Age wise distribution of total pregnant women from MGH and GGH with and without symptoms.

Table 2 shows, 35 cases out of 100 symptomatic pregnant women (35%) revealed significant bacteriuria. 13 cases out of 136 asymptomatic pregnant women (9.56%) revealed significant bacteriuria. In cultures where *S. aureus* and *S. saprophyticus* were isolated bacteriuria of more than 10^3 CFU/ml was considered as significant. P value based on Chi-square test; less than 0.05 is taken as statistically significant and more than 0.05 as not significant

Bacterial count in Urine by culture	Symptomatic		Asymptomatic		Total	P value
	MGH	GGH	MGH	GGH		
More than 10^5 CFU/ml (400 CFU/loopful Single organism)	27	05	09	02	043	0.009*
10^3 to 10^4 CFU/ml (40 CFU /loopful)	03	-	02	-	005	
Less than 10^3 CFU/ml and mixed growth of organisms were considered as not significant	50	15	109	14	188	
Total	80	20	120	16	236	

Table 2: Bacterial counts in urine in relation to symptomatic and asymptomatic cases.

More than 8 leucocytes/HPF indicates pyuria. No Red blood corpuscles, casts and crystals were seen. Significant bacteriuria was observed in 48 pregnant women out of the total 236 cases and Pyuria was observed only in 56 pregnant women out of total 236 cases (Table 3).

Leucocyte count in Urine	Symptomatic cases from MGH	Symptomatic cases from GGH	Asymptomatic cases from MGH	Asymptomatic cases from GGH	Total	P value
Less than 8/HPF	47	13	108	12	108	0.01*
More than 8/HPF	33	07	012	04	56	
Total	80	20	120	16	236	

Table 3: Leucocyte counts in urine in relation to symptomatic and asymptomatic women.

*P value based on Chi-square test ; less than 0.05 is taken as statistically significant and more than 0.05 as not significant.

Bacterial count more than 10^3 CFU/ml were considered as significant bacteriuria in samples where *Staphylococcus aureus* and *Staphylococcus Saprophyticus* were isolated. 30 cases out of the 80 symptomatic cases (37.5%) and 11 out of 120 asymptomatic pregnant women (9.16%) from MGH were observed to have significant bacteriuria. 5 cases out of the 20 symptomatic pregnant women (25%) and 2 cases out of 16 asymptomatic pregnant women (12.25%) from GGH were observed to have significant bacteriuria (Table 4).

Bacteria isolated	Symptomatic		Asymptomatic		Total
	MGH	GGH	MGH	GGH	
E. coli	15	2	5	1	23
Klebsiella	8	1	2	---	11
Enterococci	3	1	1	1	06
Staphylococcus aureus*	2	1	1	---	04
Staphylococcus Saprophyticus*	1	---	1	---	02
Pseudomonas aeruginosa	1	---	1	---	02
Total	30	5	11	2	48

Table 4: Organisms isolated from urine culture in cases of significant bacteriuria.

In the present study, the pregnant women included in the study from Mamata General Hospital were HIV negative. The pregnant women included in the study from Government General Hospital were in-patients of HIV antenatal ward. They were HIV positive. The details are described in the table 5.

HIV status	Symptomatic		Asymptomatic		Total
	MGH	GGH	MGH	GGH	
HIV positive	---	20	---	16	036
HIV negative	80	---	120	---	200
Total	80	20	120	16	236

Table 5: HIV status of pregnant women involved in study.

Five symptomatic and two asymptomatic HIV positive antenatal women urine samples revealed significant bacteriuria with bacterial counts of more than 10^5 CFU/ml and all their CD4⁺ counts varied between 260/mm³ to 350/mm³. The antenatal women who had bacteriuria of less than 10^3 CFU/ml were detected to have CD4⁺ counts between 350/mm³ to 500/mm³ (Table 6).

CD4 count	Bacterial count	HIV positive		Total
		Asymptomatic	Symptomatic	
More than 260/mm ³	More than 10 ⁵ CFU/ml	01	03	04
More than 350/mm ³	More than 10 ⁵ CFU/ml	01	02	03
350-500/mm ³	Less than 10 ³ CFU/ml	14	15	29
Total		16	20	36

Table 6: Bacteriuria in HIV positive (GGH) antenatal women in relation to their CD4 count.

In the present study, various symptoms were recorded in the symptomatic women from MGH and GGH, the maximum number of cases have shown Dysuria which was found to be the commonest symptom (Table 7).

Presenting symptom	Symptomatic	
	MGH	GGH
Dysuria	35	8
Frequency and urgency	16	5
Abdominal pain and fever	02	---
Vaginal discharge and itching	27	7
Total	80	20

Table 7: Presenting symptoms of UTI in symptomatic women from MGH and GGH.

Discussion and Conclusion

Urinary tract infection is a serious health problem that affects millions of people each year, which results from a complex interaction of host factors and the infecting organism [11]. Defence mechanisms preventing urinary infection are the vaginal and urine pH, the normal vaginal flora, "wash-out" effect of flowing urine and the mucopolysaccharide lining produced by the urothelium [12]. Other important factors are the secretion of immunoglobulin A (IgA) and blood group antigens, which inhibit bacterial adherence. The majority of infections in pregnancy are asymptomatic. The present study includes 200 pregnant women, who attended the outpatient.

Department of obstetrics and gynaecology, Mamata General Hospital, Khammam and 36 antenatal women who were admitted as in-patients in antenatal ward for HIV positive women at Government Hospital, Khammam. All the patients were evaluated for the symptoms related to urinary tract infection.

A study on asymptomatic bacteriuria in 500 antenatal women urine samples showed 42 (8.4%) culture positive. This study revealed that incidence increased as socio economic status of the patients decreased [13]. Similarly, other study [14] with urine samples from 900 pregnant women, 62 samples of urine were positive for culture indicating significant bacteriuria of 6.8%, *Escherichia coli* emerged as the most frequent uropathogen (51.61%). Our study closely co-relates with the above three Indian studies in the prevalence of ASB (9.16%) as well as predominant uropathogen isolated. i.e. *Escherichia coli*.

Obiogbolu and co-workers [15] included 100 pregnant women, out of which 54 urine samples were culture positive with significant bacteriuria. This shows an incidence of 54%, in this study the most predominant organism was *Escherichia coli* (37%) and the next common organism being *Klebsiella* spp (20.4%). In our present study significant bacteriuria was observed in 30 cases out of 80 symptomatic pregnant women giving a prevalence rate of 37.5%, which is less compared to the above study.

Another study done on detection of Urinary Tract Infection among pregnant women was 47.5% [16]. In our study the prevalence of ASB was 9.16% and it was higher in symptomatic urinary tract infection with a prevalence of 37.5% in our study pyuria was observed only in 56 antenatal women out of 236 total study group.

The most distressing symptom that prompts patients to seek treatment was dysuria. Thomas Vogel and co-workers [17] study showed 31% presenting with dysuria as first presenting symptom. 33% of his patients presented with frequency. 35 cases out of 80 symptomatic antenatal women (43.75%) of cases in our study presented with dysuria. The second most common presenting symptom was frequency and urgency 16 out of 80 symptomatic pregnant women from MGH making upto 30% in this study, of the 80 symptomatic patients.

Among the 80 symptomatic cases from MGH, 27 women presented with vaginal discharge or itching vulva in addition to urinary symptoms, making a percentage of 33.75%. Similarly finding were also observed by earlier by Dwight et al from Birmingham reported vaginal infections mimicking UTI as 25 - 35% [18]. Urinary tract infection represents a considerable health problem amongst HIV infected patients. Recent reports suggest that the incidence of urinary tract infection (UTI) is increased in HIV positive patients. Furthermore, there is evidence that bacteriuria is more common as HIV disease progresses [19].

To conclude, screening for bacteriuria is important during pregnancy, as this could lead to Pyelonephritis and adverse obstetric outcomes such as prematurity, low birth weight and higher foetal mortality rates. There is strong evidence that treatment is efficacious in improving outcome. Given the benefits of detecting asymptomatic bacteriuria in pregnancy, prenatal testing should be carried out by urine culture (rather than by urinalysis) to reduce the risk of false negatives.

In view of the grave consequences due to asymptomatic UTI, in pregnant women involving not only these women but also their unborn babies, there is need for screening of all pregnant women, by routine microbiological analysis and culture of mid-stream urine samples. Treatment by appropriate antibiotic reduces both the maternal and foetal risk.

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