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Asymptomatic Bacteriuria among Pregnant Women Attending a Tertiary Care Hospital

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A B S T R A C T

Urinary tract infection is one of the most frequently seen medical complications in pregnancy. Related to it further a number of complications such as acute and chronic pyelonephritis, hypertension, prematurity, intrauterine growth retardation and increased perinatal mortality. The detection of bacteriuria allows an approach to be made for the prevention of complications in pregnancy at an early stage. In view of the above, the present study was under taken with an aim to detect asymptomatic bacteriuria in pregnancy. Two hundred antenatal women were included in the study. Culture of the urine sample was done by standard loop technique. Gram stain and wet film examination aided in the identification of organisms and detection of pyuria. Out of the 200 pregnant women 9.5% (n=19) showed significant bacteriuria. *Escherichia coli* was the prevalent pathogen. The incidence of bacteriuria increased along with advanced maternal age, low socio economic status and illiteracy. Screening of bacteriuria is important during pregnancy. Efficacious treatment improves outcome.

Introduction

Asymptomatic bacteriuria is defined as persistently and actively multiplying bacteria in significant numbers i.e. 10^5 bacteria per milliliter within the urinary tract without any obvious symptoms (Rajashekar *et al*., 2013). Urinary tract infection affects all age groups, but women particularly pregnant are more susceptible than men, due to short urethra, easy contamination of urinary tract with fecal flora and various other reasons (Kalantar *et al*., 2008). As many as 50–80% of women in the general population acquire at least one UTI during their lifetime and 20-30% of women have recurrent episodes (Rahim *et al*., 2008). ASB is a major risk factor for developing symptomatic urinary tract infections during pregnancy, and may be associated with adverse effects on maternal and foetal health (Fidelis *et al*., 2015). Significant bacteriuria is defined as the presence of 1,00,000 or more colony forming units (CFU) per ml of urine. Kass first introduced the concept of significant bacteriuria in an attempt to negate the problem of growing contaminants. Though Kass definition of significant bacteriuria retains its general usefulness, there are clinical situations where counts between 10^3–10^5 CFU/ml may be significant (Najar *et al*., 2009). Urine culture is the gold standard screening technique for bacteriuria during pregnancy. The most common infecting

organism is *Escherichia coli*, which is responsible for 75-90% of bacteriuria in pregnancy. Screening and treatment of bacteriuria regardless of symptoms is a must in order to avoid further complications.

Considering the above factors, the present study was under taken to detect bacteriuria in pregnancy, identify the organisms causing bacteriuria in pregnant women. So that complications due to untreated bacteriuria can be minimized during the course of pregnancy.

Materials and Methods

The present study was carried out in the Department of Microbiology, Guntur Medical college/Government General Hospital, Guntur, A.P. during the period June 2013 to May 2014.

A total of two hundred samples were collected from women attending obstetric outpatient department, Government General Hospital, Guntur, were included in the study. The study group comprised of varying ages from 18 years to 45years, from varying Gravida and all three trimesters. Urine samples from a group of fifty non-pregnant women served as control for the study.

Inclusion criteria

1) All pregnant women without symptoms of UTI
2) Pregnant women not on antibiotic treatment (for any cause).

Exclusion criteria

1) Pregnant women with symptoms of UTI.
2) Pregnant women on antibiotics.
3) Renal abnormalities and renal calculi.

Informed consent was taken from all antenatal women included in the study after explaining the details in their own language. A questionnaire was developed and followed accordingly. The pregnant women attending the antenatal outpatient department were specifically screened for urinary tract infection symptoms.

Detailed history of each case was taken regarding the name, age, address, socio-economic status, literacy, obstetric history, gynaec history, any symptoms related to urinary tract infection (frequency, urgency, any pain, discomfort or burning sensation during micturition, any blood staining in urine, lower abdominal pain and fever). They were also enquired about BOH, DM, HTN and any surgical intervention of urinary tract (catheterization or any operation for abnormalities of the urinary tract).

Collection of sample

Urine

The patients were instructed to collect midstream clean catch urine into a labelled wide mouthed sterile container and transported to laboratory without any delay

Processing of sample

The urine samples were processed immediately in the laboratory after noting macroscopic appearance i.e. colour and turbidity of the samples were observed. Urine culture was done by semi quantitative standard loop technique. Organisms were identified by standard conventional methods. Antibiotic susceptibility by Kirby Bauer disk diffusion.

Data analysis

Data analysis was both descriptive and inferential at 95% confidence level using SPSS version 21.0. A P-value of less than or

equal to 0.05 was considered statistically significant.

Results and Discussion

A total of two hundred urine samples were collected in the outpatient department of Gynaec and Obstetric department from pregnant women. Urine was also collected from a group of fifty non pregnant sexually active women which served as control group. In the present study 19 of the 200 pregnant women showed significant bacteriuria (9.5%). And in the control group two out of 50 cases showed significant bacteriuria (4%).Out of 200 cases, 18 cases showed a growth of $>10^5$CFU/ml (9%), 24 cases showed $<10^5$CFU/ml (12%) and 158 cases showed no growth (79%).Urine showing >8 pus cells/ HPF were considered as significant. Significant pyuria was present in 63.16 % of bacteriuria cases. Table 1 shows the influence of demographic characteristics, parity, and gestational age of the participants on ASB. The age, parity and gestational age of the participants did not have any statistical significant influence on ASB. However, women resided in rural areas and women belonging to low socio economical status were more likely to have ASB when compared to urban dwellers. Table 2 contains the frequency distribution of the bacterial isolates from urine culture. *Escherichia coli* was the major isolate constituting 42.1%. Klebsiella was the next major isolate constituting 26.32%. Staphylococcus aureus accounted for 2 cases (21.05%) followed by enterococcus, Staphylococcus saprophyticus, Proteus and Pseudomonas for one case each (5.26%). Of the 15 Gram Negative bacilli, 13 (86.6%) isolates were sensitive to Levofloxacin followed by 12 (80%) to Piperacillin and 11 (73.33%) to Ceftazidime. 10 (67%) isolates were resistant to Cotrimoxazole and 9 (60%) were resistant to Ampicillin. Of the 4 Gram Positive cocci, 3 (75%) isolates were sensitive to Piperacillin and Norfloxacin followed by 2 (50%) to Ampicillin and Vancomycin and almost all isolates were resistant to Cotrimoxazole and 3 (75%) were resistant to Ceftazidime.

Table.1 Influence of demographic characteristics, parity and gestational age on asymptomatic bacteriuria

Demographic factors	Positive	Negative	P - value
Age (years)			
<35	18	174	0.75
>35	01	07	
Socio economic status			
Low	10	26	
Middle	06	142	0.0001*
High	03	13	
Parity			
<1	10	66	0.25
>1	09	115	
Address			
Rural	14	88	0.039*
Urban	05	103	
Gestational age			
First trimester	05	47	
Second trimester	06	106	0.64
Third trimester	08	28	

Note: *P<0.05

Table.2 Uropathogens isolated in the study group

Organism isolated	Number of cases with significant bacteriuria	Percentage
Escherichia coli	8	42.11%
Staphylococcus aureus	2	21.05%
Klebsiella species	5	26.32%
Enterococcus species	1	5.26%
Staphylococcus saprophyticus	1	5.26%
Proteus mirabilis	1	5.26%
Pseudomonas aeruginosa	1	5.26%

The results were compared with other studies and discussed as follows:

In the present study significant growth was found in 9.5% cases and 79% samples were sterile. These results are consistent with reports of recent studies of Kalantar Enayat *et al*., (2008) 8.9% and Girish babu *et al*., (2011) 10%. Overall, the incidence in various Indian studies was found to be in between 5% and 13% and in western studies the incidence ranges from 2% to 7%. Variation in the study is attributed to differences in gestational age, geographical location, socio economic status, setting of study (primary care, community based health care or hospital) and variation in screening methods (Turpin). In the present study, it is observed that pregnant women in the age group 26-35 had highest percentage of infection (63.2%). This results correlated with Imade *et al*., (2010) 53.1% and Girish Babu *et al*., (2011) 60%.

Advanced maternal age was reported as risk factors for bacteriuria in pregnancy. The reasons for higher incidence in older age are that in young females, due to the action of hormones, there is an increased deposition of glycogen. This attracts lactobacillus which is a glycogenphillic. Colonization of the vaginal epithelium by lactobacillus makes the environment acidic and hence prevents colonization by other pathogens. Decreased glycogen deposition and reduction in the lactobacillus colonies is found as a part of ageing process which enhance bacterial adherence and invasion by pathogens and make them more susceptible to UTI (Jeyaseelan *et al*., 2013).

In the present study most cases of bacteriuria were found during third trimester (42.5%) of pregnancy. This result correlated with studies of Okonko *et al*., (2010) 55.1%. It is probably because of anatomical and physiological changes related to later months of pregnancy. This increase in incidence is likely to owing to the increase in frequency of co-morbid conditions. These are associated with neurogenic bladder and increased residual urine volume or urinary reflux (Humera *et al*., 2011).

Lower socio economic status is also considered as risk factor showing the incidence of 52.63% in the present study. It is correlated with studies of S.V.lavanya *et al*., (1999) 66.6% and Robina Ali *et al*., (2012) 60%. This could be due to poor hygienic practices and poor nutrition in low socio economic group.

The incidence in present study is more among illiterates (73.68%) it is correlated with the

study of Jeyaseelan Senthinath *et al*., (2011) 84.6%. Illiteracy leads to ignorance and lack of awareness to personal hygiene, significance of periodic antenatal medical checkups, safe and hygienic sexual practices which will prevent the invasion of the urinary tract by pahogens.

In the present study, *Escherichia coli* was the most predominant organism isolated (42.1%). This finding correlated with the studies of Mohammad *et al*., (2000) 40%, Aziz Marjan Khattak *et al*., (2002) 38.89%, CA Turpin *et al*., (2003) 37.5%, Andabati *et al*., (2009) 51.2%, Okonko *et al*., (2010) 42.1% and Agersew Alemu *et al*., (2011) 47.5%. This could be due to the fact that urinary stasis is common in pregnancy and since most *Escherichia coli* strains prefer that environment, they cause UTI.

In the present study, there were basic similarities in the organisms isolated as in other studies, i.e. Enterobacteriaceae predominated. However, with certain respects, the organisms isolated were different from other studies i.e. Enterobacter species, streptococcus species and Citrobacterpsecies were not isolated in the present study.

This variation may be due to the fact that bacteriuria is a community acquired infection and hence, the organisms isolated in each study differ (Lavanya *et al*., 2002).

Like all other infections, outcome of the UTI is an interplay of the virulence factors of the pathogens and the predisposing host factors which include pregnancy. In addition antibiotic resistance among uropathogens also constitute a major deciding factor in the establishment and eradication of the disease. The antimicrobial sensitivity and resistance pattern varies from community to community and from hospital to hospital. This is because of emergence of resistant strains as a result of indiscriminate use of antibiotics.

The present study showing high susceptibility to Flouroquonolones followed by Cephalosporins correlated with studies of Rajasheker Keruru *et al*., (2011) and Imade *et al*., (2008). Sensitivity to Piperacillin correlated with studies of Girish babu *et al*., (2011). This is unlike with studies of Lavanya *et al*., (1999). High resistance to Ampillicin correlated with studies of Mohammad *et al*., (2000), Imade *et al*., (2008) and Girish babu *et al*., (2011). High resistance to Cotrimoxazole correlated with Mokube *et al*., (2012) and does not coincide with Okonko *et al*., (2010).

The upsurge in antibiotic resistant pattern could be due to antibiotic abuse and self-medication. Also easy availability of drugs could be another contributing factor for antibiotic resistance.

Factors proposed to affect the frequency of bacteriuria during pregnancy include multiparity, age, history of UTI, diabetes mellitus, anatomic urinary tract abnormalities and socio-economic status. In the present study, advanced maternal age, age of gestation, low socio-economic status, illiteracy and immunocompromised state like HIV infection were shown to be risk factors.

In conclusion, the incidence of ASB was 9.5% among pregnant women in this study. With the exception of socioeconomicstatus and rural dwelling, demographic and obstetric characters did not significant influence the risk of ASB in this study population. *Escherichia coli* and klebsiella were the dominant uropathogens isolated among the pregnant women. Levofloxacin, Piperacillin and Norfloxacin had the highest sensitivity pattern to these uropathogens. In view of high prevalence of ASB, routine urine microscopy, culture, and sensitivity testing are recommended for booking antenatal clinic attendees in this region. Health education on ASB and social amenities should be provided,

especially in rural areas, to help stem the tide of this public health problem. A community based study in this subject matter and in the puerperium is recommended.

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