Asymptomatic Bacteriuria among Pregnant Women Attending a Tertiary Care Hospital

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ABSTRACT

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 undertaken 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 45 years, 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 Levofoxacin followed by 12 (80%) to Pipercillin 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 Pipercillin 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       | 0.0001*   |
| Middle                       | 06       | 142      |           |
| 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       | 0.64      |
| Second trimester             | 06       | 106      |           |
| 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.Iavanya 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 pathogens.

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 Citrobacter species 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 Fluoroquinolones 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 Ampicillin 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 socioeconomic status 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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