A Cross Sectional Study of Asymptomatic Bacteriuria in Pregnancy At A Tertiary Care Hospital

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Abstract : *Asymptomatic Bacteriuria is a very common condition in pregnancy and goes undiagnosed till overt U.T.I. occurs. It leads to various maternal and fetal complications.The study was undertaken to find out the occurrence of asymptomatic bacteriuria in pregnancy and to evaluate the bacteriological profile. It was a hospital based observational study done in the antenatal clinic of a tertiary care hospital over a period of one year. 450 women before 20 weeks were included in study.Their urine was sent for complete microscopy and culture and sensitivity and data was analysed. 8.22% had asymptomatic bacteriuria.E.coli was the commonest organism followed by coagulase negative staphylococcu.It is concluded that all pregnant women should be universally screened for asymptomatic bacteriuria.Treatment must be initiated early to avoid maternal and fetal complications.*

Keywords: *Asymptomatic Bacteriuria, pregnancy, observational study, universal screening.*

I. Introduction

Urinary tract infection is one of the commonest of all infections in pregnancy due to the progesterone effects in pregnancy , anatomical and physiological changes occurring during pregnancy. Detection of asymptomatic bacteriuria(ASB) during pregnancy is important as subsequently it may lead to symptomatic infection and various pregnancy associated complications like anemia, hypertension, phlebitis, low birth weight babies, preterm labour , abortions etc[1].

Asymptomatic bacteriuria has been reported among 13.0% pregnant women [2] . Very few studies have been reported from India, as ASB screening is not carried out routinely probably due to cost implications.

Hence, the present study was undertaken to determine the magnitude of asymptomatic bacteriuria among pregnant women attending antenatal outpatient of a tertiary care hospital and to identify the organisms causing it.

II. Material and Methods

This was a Hospital Based Prospective Observational Study. Cases were selected randomly from pregnant women with a period of gestation 20 weeks or less, attending the antenatal clinic of a tertiary care hospital over a period of one year from 1st April 2014 till 31st March 2015. Sample size was calculated at 95% confidence level assuming the incidence of asymptomatic bacteriuria to be 10% of pregnant woman [according to the study of Chandel L R [3]. At absolute precision of 3, minimum 400 pregnant women were required as sample size. It was further enhanced & rounded off to 450 patients assuming 10% attrition or contamination of sample.

Pregnant women with symptoms of urinary tract infections like lower abdominal pain, fever, burning micturition, frequency of micturition, dysuria or with vaginitis were excluded from the study.Written informed consent was taken from women participating in the study.Complete history was taken,general and obstetrical examination was done.After routine antenatal investigations and ultrasound for fetal well being, urine for complete examination,microscopy and culture and sensitivity was done of all women.They were instructed about giving mid stream urine sample by clean catch method.The samples were immediately transferred in a close container protected from sun light for the examination and culture. These sample were processed within an hour of collection.

Gross examination was done to note the colour, transparency, suspended particles and gross deposits. Urine microscopy was done. Observation for the presence of pus cells, epithelial cells, red blood cells, casts, crystals, bacterial flora was noted. Pus cells per high power field were calculated. A count of 10 or more pus cells per high power field was taken as an indication of urinary tract infection.All the samples which revealed large number of squamous epithelial cells were discarded and repeated because they indicated vaginal contamination.Chemical analysis was done by dipstick test for the presence of protein and sugar.

Specimens were subjected for culture by semi-quantitative analysis by inoculation on 5% sheep blood agar plate and Mac conkeys agar plate.Both plates were incubated overnight at 37 degree C temperature for 24

hr.Prolonged incubation was done for further 24 hr if no growth obtained. It was reported sterile if no growth was seen after 48 hrs.

It was reported as significant if the growth obtained was confluent or the number of colonies corresponded to 1,00,000 colony forming units (CFU) per ml.In-significant growth was reported if colony count obtained corresponded to less than 10^5 CFUs per ml of urine. Mixed growth of two or more organisms was considered as contamination. The samples were repeated if there was insignificant or contaminated growth.

The organisms were isolated and species identified.The antibiogram against commonly used antibiotics/ chemotherapeutic agents recommended in pregnancy were used and sensitivity noted.

All the women who had pus cell >10/HPF on microscopy, Tab Nitrofurantoin 100mg 12 hourly was given for 3 days while urine for culture and sensitivity report was awaited. Report was collected within 72 hrs, treatment was given according to results, for 10 days.Urine culture and sensitivity was repeat after 1 week of completion of treatment.If culture was sterile, no further intervention done.If second culture still showed significant bacteriuria, second course of antibiotics were chosen on the basis of sensitivity for 10 days.Cultures were repeated in the same way after 1 weeks of completion of therapy.If found sterile, no further intervention done.If third culture still show significant bacteriuria,long term low dose antibiotic suppressive therapy was given for 3 month with careful monitoring till delivery.

All the patients who had first culture positive were followed up till delivery .

III. Statistical Analysis

Data thus collected was entered in excel sheet and was subjected for statistical analysis. Quantitative data was summarized as mean and SD whereas qualitative data as percentage. Paired and unpaired "t" test was used for comparison of quantitative data, 'Chi-square,' test was used for qualitative data.

IV. Results

450 asymptomatic pregnant females were screened. Seventy-nine percent of the samples were sterile. Significant bacteriuria was found in 8%.. Table 1. Eight samples had insignificant growth and culture was repeated.Culture was also repeated when growth of more than two organism was present [contaminated urine sample] Table 2. In our study, 414 samples had pus cell 0-10/HPF. Among those, six had urine culture positive Table 3. E.coli was the most common micro-organism in 55.55% asymptomatic pregnant women. The other Gram negative microorganism cultured were Enterobacter cloacae (8.33%), Pseudomonas (5.55%), Enterobacter aerogens (2.77%), Acinetobacter (2.77%). The Gram positive organism cultured were Coagulase positive staphylococcus and Enterococcus in 3(8.33%) asymptomatic pregnant women, Streptococcus sp (5.55%), Coagulase negative staphylococcus (2.77%).Klebsiella was not detected in our study.Table 4 After the second culture, out of 36, 8 still showed significant bacteriuria. Among them four had E.coli and two Coagulase Negative Staphylococcus, one each was Streptococcus and Enterococcus . Antibiotic sensitivity of these organisms was changed and given according to the sensitivity pattern. After course of antibiotic, third culture and sensitivity was done, two showed significant bacteriuria, both had E.coli.These women were carefully monitored till term with long term antibiotic suppressive therapy (Nitrofurantoin 50 mg OD).

We followed all the women with asymptomatic bacteriuria.Two had abortion ,four women had premature rupture of membranes before labour, three had preterm delivery and intrauterine growth retardation each. Table 5

V. Discussion

In our study, significant bacteriuria in asymptomatic pregnant women was present in 8% which was similar to the few studies done in India across various states , Uttar Pradesh 7.3-8.8% [4],[5] ,13.87% Tamilnadu [6], 11% in West Bengal [7], 9% in Karnataka[8] and 7.34% in Himachal Pradesh [3]. Olaniya J A et al [9] in their study in Nigeria reported a high prevalence of asymptomatic bacteriuria (37.1%).

Pregnant women are more susceptible to urinary tract infections due to increased urinary content of amino acids, vitamins, and other nutrients, which encourage the persistence of infection. Physiological increase in plasma volume during pregnancy decreases urine concentration and almost 70% pregnant women develop glycosuria which is considered to encourage bacterial growth in urine[1]. In addition, some maternal defence mechanisms are less effective during pregnancy. Approximately 90% of pregnant women develop ureteral dilatation, which persists until delivery. And it contributes to increased urinary stasis and ureterovesical reflux.[10]

Insignificant bacteriuria may occur if the woman drinks excessive water before collecting the sample or if she holds urine for a long time or if the sample is not processed within 2 hours of collection.[11]

The sensitivity of urine microscopy was 83.33% (30/36) and specificity was 100% (408/408) . Positive predictive value of the test was 100% (30/30) and negative predictive value 98.55% (408/414).There were no

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false positive of urine microscopy. Urine culture only is considered as the gold standard for diagnosis of asymptomatic bacteriuria.

N Jubaida et al [12] reported in their study that pus cell 0-10/HPF were found in 84.1% pregnant women, of which 4.6% had positive culture. Pus cell >10/HPF was found in 15.9% of pregnant women, out of whom 39.5% had culture positive report. Women with higher number of pus cell in urine, had significantly higher asymptomatic bacteriuria. Pus cells>20/HPF were found in 60 pregnant women, of them 50% had asymptomatic bacteriuria while in our study 92% had pus cell 0-10/HPF of which only 1.45% had positive culture and 6.67% had pus cell >10/HPF, all of whom had positive culture. Women with higher number of pus cell in urine, had significantly higher asymptomatic bacteriuria.

Similar to our study,Sujatha R et al [4] , Goyal A et al[5] , Kerure S B et al[8] , Olaniyan J.A.et al [9] Rajshekhar et al [7] also reported E.coli as the most common organism (39- 77 %),others were Staphylococcus aureus Enterococcus sp,Pseudomonas aeruginosa . The high infection with E.coli is attributed to the fact that it is the normal commensal of the bowel.The close proximity of the urethral orifice to the rectum and poor hygiene are responsible for the perineal microbes reaching the urinary tract[13].

However Awonuga D.O. et al [14] reported Klebsiella species as the most common uropathogen (36.4%), followed by Staphylococcus aureus (18.2%), E.coli (9.1%), Streptococcus spp (9.1%).

Similar to our study,Jain V et al [15] also reported incidence of preterm labour as 8.6% and of IUGR 5.2%, which was associated with poor fetal outcome.

Toll-like receptors (TLRs) are cell-surface proteins responsible for recognition of pathogens. They initiate the host innate immune response, inducing a proinflammatory cascade involving cytokines, chemokines, prostaglandins that result in the characteristic phenomena of preterm labor and preterm rupture of fetal membranes. [16].Besides,chorioamnionitis is often associated with a fetal inflammatory response(FIRS) which leads to poor cardiorespiratory, neural, retinal, and renal outcomes observed in preterm infants exposed to it.[17]

VI.   Conclusion

Universal screening for the asymptomatic bacteriuria in pregnancy should be done as it would be one of the most cost effective strategies for preventing morbidity both for mother and fetus. Microbiological analysis and antibiotic sensitivity test of mid-stream urine samples of all pregnant women should be done. On diagnosis of infection,prompt therapeutic intervention should be initiated. It is important to take the full course of treatment . A follow-up urinalysis helps to confirm that the urinary tract is infection-free.

There is a need to raise awareness of asymptomatic bacteriuria in pregnancy. There should also be public education programmes on the importance of personal hygiene and good environmental sanitation.

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Table. 1: Result of First Urine Culture of Pregnant Women

	No. of Pregnant Women	**%**
Sterile	357	79.33
Significant Bacteriuria	33	7.33
Insignificant Bacteriuria	9	2
Contaminated	51	11.33
Total	450	100.00

Table 2: Repeat Urine Culture of Contaminated and Insignificant Bacteriuric Samples

Insignificant Bacteriuria	Sterile	8
	Significant Bacteriuria	1
Contaminated	Sterile	49
	Significant Bacteriuria	2

Table 3. Co-Relation of Urine Microscopy with Urine Culture

No. of pus cells/HPF	**Total No.**	**Positive culture**	**Negative Culture**
0-10	414	6	408
>10	30	30	0

Table 4: Profile of Bacteria Isolated from Cases of Significant Bacteriuria

Micro-organism	**No. (%)**
E. coli	20(55.55%)
Pseudomonas	2(5.55%)
Enterobacter aerogens	1(2.77%)
Enterobacter cloacae	3(8.33%)
Acinetobacter	1(2.77%)
Coagulase negative staphylococcus	1(2.77%)
Coagulase positive staphylococcus	3(8.33%)
Streptococcus sp.	2(5.55%)
Enterococcus	3(8.33%)

Table 5. Fetal Outcome of Women who had Asymptomatic Bacteriuria

Fetal outcome	**No.**	**%**
Abortion	2	5.55
IUGR	3	8.33
Preterm	3	8.33
PROM	4	11.11