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Original Research Paper

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BACTERIAL PROFILE AND DRUG SUSCEPTIBILITY PATTERN OF ASYMPTOMATIC BACTERIURIA IN PREGNANCY & ITS ASSOCIATION WITH GESTATIONAL AGE

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ABSTRACT

Background: Asymptomatic bacteriuria is the presence of actively multiplying bacteria within the urinary tract in the absence of any symptoms. Anatomical and physiological changes make women more susceptible to UTI in pregnancy. The objective of present study was to determine microbiological profile of patients with asymptomatic bacteriuria & its association with trimester of pregnancy.

Methods: 401 asymptomatic antenatal women were recruited for this study. Clean catch mid-stream urine sample was collected and semi quantitatively cultured. Significant bacteria was identified and antibiotic sensitivity found out by conventional methods.

Results: Significant growth was observed in 41 samples. Escherichia coli were the commonest organism isolated. E.coli was found in 75.61% of cases .second common isolate was Klebsiela found in 14.63% of cases followed by pseudomonas which was found in 9.76% of cases.cefixime & Amoxicillin +Clavunic were safe and effective antibiotics. highest prevalence found in third trimester.

Conclusions: Gram negative bacteria are the main culprit. It is rational to screen & treat the pregnant females with asymptomatic bacteriuria to avoid complications.

KEYWORDS : Asymptomatic bacteriuria , Isolates, Screening tests, Semi-quantitative culture, Trimester

INTRODUCTION

Urinary tract infections are amongst the most common infections encountered in clinical practise. About 50% of women experience at least one episode of urinary tract infection during their life time[1]. UTI in pregnancy can be symptomatic or asymptomatic[1-4].

Asymptomatic bacteriuria (ASB) is defined as persistently and actively multiplying bacteria in significant numbers i.e., 105 bacteria per ml within the urinary tract without any obvious symptoms[1-5]. It is also known as Covert bacteriuria. Females are more susceptible for these infections because of the short length of urethra along with proximity to warm, moist anal canal[4]. Sexual intercourse facilitate the ascent of bacteria into bladder. The pregnant females are two times more commonly affected than age matched non-pregnant females. The reason behind this is urinary stasis due to progesterone effect in pregnancy in addition to different anatomical changes occurring during pregnancy[2,4].Various studies from the west have documented the prevalence of asymptomatic bacteriuria in pregnancy to be between 2 and 7% while in India it was found to be on higher side i.e., between 5 and 17%[6-10]. Common organisms causing asymptomatic bacteriuria are E.coli,coagulase negative staphylococcus,klebsiella species ,proteus ,pseudomonas.

Nicolle et al 2005.[11]reported that the diagnosis of AB should be based on the result of a urine specimen culture that has been collected with minimal contamination and that, in the case of asymptomatic women, bacteriuria should be diagnosed based on two consecutive voided urine specimens with isolation of the same bacterial strain in quantitative counts of $\geq 10^5$ colony-forming units (cfu)/ml, or a single catheterized urine specimen with one bacterial species isolated with a quantitative count of $\geq 10^2$ cfu/ml.

Infectious Diseases Society of America (ISDA) 2005 guidelines for the diagnosis and treatment of ASB in adults recommended screening urine during pregnancy and treatment of a positive urine culture.[11]A number of studies have found that early screening and treatment for AB during pregnancy is associated with benefits for both the mother and the fetus.[12,13–14] .Lin and Fajardo 2008,[15] stipulated that screening for AB should be undertaken either during the first prenatal visit or between weeks 12 and 16 of pregnancy. Hooton et al.[16] reported that rescreening for bacteriuria could be considered in women who are at high risk, for example women with haemoglobin S, women during preterm labour and women with urinary tract abnormalities.

Hooton et al 2012.[16] stated that, despite the aforementioned, in clinical practice, only one voided urine specimen is usually obtained and treatment is usually commenced in women with asymptomatic bacterial counts of $\geq 10^5$ cfu/ml without a confirmatory repeat culture. Hooton et al.[16] also reported that, in order to avoid the risk of infection, routine catheterization to screen for bacteriuria is not warranted.[16]

Hooton et al.[16] reported that in order to avoid false-positive results, proper handling and processing of the specimen is vital. Isolation of more than one species, or the presence of Lactobacillus or Propionibacterium, may suggest a contaminated specimen, and isolation of Lactobacillus necessitates treatment if it is the only organism that has been isolated in consecutive urine cultures with high colony counts, although the significance in pregnancy is unknown.

A number of studies that have examined rapid screening tests, for example reagent strip, enzymatic screen or interleukin 8, have found that the sensitivity, specificity and predictive value of these tests for the detection of AB in pregnant women are nowhere near those of urine culture and therefore should not be used.[17,18] Furthermore, urine cultures are beneficial in guiding therapy and this can be pertinent in pregnancy, when there is reduction in the number of safe therapeutic alternatives.

MATERIAL & METHODS

The prospective study was conducted from 1st June 2013 to 31st October 2014 in NSCB Medical College Jabalpur,Department of obstetrics & Gynaecology & Department of Microbiology. 401 asymptomatic pregnant females, at their 1st visit antenatal visit in OPD, were briefed about the study & consent taken to participate in the study.

INCLUSION CRITERIA;-

- All antenatal cases at there first visit in ANC OPD.
- Patient's willingness

METHODOLOGY

Pregnant women coming to the OPD was briefed about the study and their consent was taken to get enrolled in the study.

Pregnant females were counselled regarding method of collection of clean catch mid stream urine sample. The samples were

immediately transferred & processed within 1-2 hr. of collection. In the laboratory they was subjected to semi quantitative culture method. The culture was done by surface streaking method on 5% sheep blood agar and Mac-Conkey agar. Plates were incubated at 37°c for further 24 hrs. if no growth obtained.

Identification of isolates were done by colony characteristics, gram Staining, motility test, catalase test, Coagulase Test & Routine biochemical test. All identified pure bacterial isolates were subjected to in vitro susceptibility testing using Kirby Bauer disk diffusion method as described in Clinical Laboratory Standard Institution (CLSI) guideline and interpreted accordingly.

The plates were incubated at 37oc for 24hours .Diameters of zone of inhibition around the discs were measured to the nearest milimetre using a metal caliber,and the isolates were classified as susceptible & resistant.

Interpretation of Results

1- Sterile- If no growth obtained
2- Significant – The growth obtained was confluent or the number of colonies correspond to 10^5 Colony farming Unit (CFU) per ml.
3- Insignificant – if colony count less than 10^5 CFU per ml urine except in case of growth of staphylococcus aureus where even 10^2 CFU/ml were taken as significant.

- Follow up of patients with significant urine culture was done to find out impact of asymptomatic bacteriuria in maternal & perinatal outcome.

RESULT

Total 401 asymptomatic antenatal women screened out, significant bacteriuria was found in 10.22%(95% CI 7.44-13.61) cases, of which 73.17%(95%CI 57.05-85.78%) cases were of younger age group(≤25years). 25/41 ie 60.98%(95%CI;44.50-75.80%) cases were booked and belonged to urban background. With respect to socioeconomic status 7.8%(95% CI;4.84-20.52%), 13.67%(95% CI;8.43—20.52%) and 33.3% (95%CI;4.33-77.72%) positive cases were belongs to low, middle and upper class respectively. According to parity.In parity wise distribution 19/199 were nullipara ,13/140 primipara, and 9/62 were multi para. As per trimester of pregnancy incidence was 12/105 in 1st trimester,8/155 in 2nd trimester and 21/141 found positive in 3rd trimester of pregnancy. The commonest isolate detected in urine culture was E.coli 75.61%(95% CI 59.70-87.64) cases followed by Klebsiella 14.63%(95% CI 5.56-29.17) and Pseudomonas 9.76%(95%CI 2.72-23.13) cases. Among all isolates highest sensitivity was found for Amikacin 58.1% Ecoli, 66.7% Klebsiella and 50% Pseudomonas was found sensitive to Amikacin.sensitivity also found for cefixime ,Levofloxacin ,Gentamicin,Ofloxacin,Norfloxacin,Tobramycin and Ampicillin.Six isolates ie 14.5% were found resistant to all tested antibiotics. Out of total tested antibiotics only ampicillin(FDA pregnancy category B),Cefixime (pregnancy category B),Augmentin(pregnancy category-B),Ceftriaxone(pregnancy category –B) ,Cefoparazon (pregnancy category B) are safe in pregnancy.

DISCUSSION

Our study found higher incidence of bacteriuria in last trimester. Awonuga DO et al 2010 conducted a descriptive cross sectional study at university college hospital of Ibaden to identify predictors of asymptomatic bacteriuria among obstetric population of ibaden and found highest incidence of bacteriuria in third trimesters of pregnancy .they reported that second and third trimester of pregnancy were the identified possible predictors of bacteriuria in pregnancy.[19]

Oli et al, Okafor CL et al 2010[20] found highest prevalence of bacteriuria (25.68%) in third trismester and least prevalence in first trimester. R J Girishbabu ,R Shrikrishnan,ST Ramesh(2011) observed that most cases of asymptomatic bacteriuria were found during third trimester of pregnancy 40%.[21]

The bacteria responsible for asymptomatic bacteriuria are of fecal origin which colonize the periurethral area. The gram negative bacteria are the main culprit, Lavnya et al(2002)[22], Sharma JB et al(1999)[23] Mac et al(2000)[24] in there studies was found E.coli to be commonest isolate, as was found in our study. The commonest isolate detected in our study was E.coli, which alone was responsible for 75.61% of cases, followed by Klebsiella Pneumoniae in 14.61% cases and Pseudomonas in9.76% cases.

A prospective study conducted in Indra Gandhi medical college and kamla Nehru hospital Shimla[25] in 2005 on 463 asymptomatic pregnant female with period of gestation 28 weeks or less found E.coli in 79.5% of cases.

Shamweel Ahmad et al 2011 conducted a study[26]; prevalence of asymptomatic bacteriuria among pregnant women in Kashmir; and reported that commonest organism organism causing bacteriuria was Escherichia coli, which was seen in 70.8 % of cases, followed by Klebsiella which was seen in 16.7% of cases.

All the bacterial isolates were tested for antibiotic sensitivity pattern. six isolates i.e. 14.6% were found to be resistant to all first line antimicrobial drugs included Ampicillin, Cefixime, Norfloxacin, Ofloxacin,, Levofloxacin, Amoxicillin +clavilanic acid, etc. Out of these six isolates 4 were E.coli and two were pseudomonas. Among all isolates highest sensitivity was found for Amikacin. 58.1% E.coli, 66.7% Klebsiella Pneumoniae and 50% Pseudomonas was found sensitive to Amikacin. Sensitivity also found for Cefixime, Levofloxacin, Gentamicin, Amoxicillin+ clavilanic acid. Ofloxacin, Norfloxacin,Tobramycin , Ampicillin etc.

The results of this study demonstrate that routine screening increases the increase detection rate of bacteriuria, for whom timely treatment can be given. thus the outcome of these pregnancies might be improved by recognizing these additional cases of UTI.

Conclusion- This study revealed 10.22% prevalence of asymptomatic bacteriuria among pregnant women.Which is a matter of concern. So routine testing of urine of antenatal women during all trimesters must be done, & first antenatal visit should include urine culture sensitivity testing as a routine procedure. The predominant organisms isolated were *Escherichia coli ,Klebsiella spp. and pseudomonas* Cefixime & augmentin are safe and effective against urinary pathogens in pregnancy. Although further research is needed,as antibiotic sensitivity pattern is different in many other studies.

Table-1 Demographic variable

Age group	Poaitive cases n=41	percentage	Odds Ratio (95% CI)	P value
≤25 years (n=279)	30	73.2%	2.17 (0.28-16.92)	0.449
26-30 yrs (n=103)	10	24.39%	1.93 (0.23-16.27)	0.536
31-40 yrs (n=19)	1	2.4%	1 Reference	-
Locality	**Positive cases n=41**	**percentage**	**0dds Ratio (95%CI)**	**P value**
Urban (n=207)	25	60.97%	1.53 (0.78—2.96)	0.206
Rural (194)	16	39.02%	Reference	-
Socioeconomic status	**Positive Cases**	**%**	**Odds Ratio (95% CI)**	**P value**
Low (n=256)	20	7.8%	Reference	-
Middle (n=139)	19	13.7%	1.87 (0.96-3.65)	0.063

Upper (n=6)	2	33.2%	5.90 (1.00-34.91)	0.026
Parity	**Positive cases (n=41)**	**%**	**Odds Ratio(95%CI)**	**P value**
Nulli Para (n=199)	19	9.54%	Reference	-
Primi Para (n=140)	13	9.2%	0.97 (0.46-2.04)	0.935
Multipara (n=62)	9	14.51%	1.61 (0.68-3.78)	0.271

Table-2 DISTRIBUTION WITH RESPECT TO TRIMESTER

Trimester	Positive Cases (n=41)	Percentage	Odds Ratio(95%CI)	P value
1st Trimester (N=105)	12	11.42%	Reference	-
2nd Trimester N=155	8	5.1%	0.42(0.16-1.08)	0.063
3rd Trimester N=141	21	14.8%	1.36(0.63-2.90)	0.431

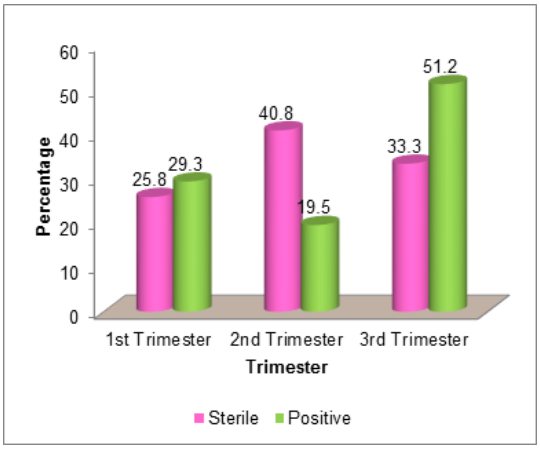

Figure 1 Distribution of patients with respect to trimester

Table -3 ANTIMICROBIAL SUSCEPTIBILITY PATTERN OF BACTERIA

Drugs Tested	E.Coli	Klebsiella	Pseudomonas	Total
Ampicillin	0.0	33.3%	0.0%	4.9%
Amikacin	58.1%	66.7%	50%	58.5%
Cefixime	32.3%	33.3%	0.0%	29.3%
Tobramycin	6.5%	33.3%	50%	14.6%
Netilmicin	6.5%	33.3%	0.0	9.8%
Ceftriaxone	6.5%	0.0	0.0	4.9%
Norfloxacin	12.9%	0.0	0.0	9.8%
Augmentin	16.1%	0.0	0.0	12.2%
Gentamicin	19.4%	33.3%	50.0%	24.4%
Cefoparazone	0.0	33.3	0.0	4.9%
Levofloxacin	25.8%	66.7%	50.0%	34.1%
ofloxacin	22.6%	0.0%	0.0	17.1%
Resistant to all	12.9%	0.0	50.0%	14.6%

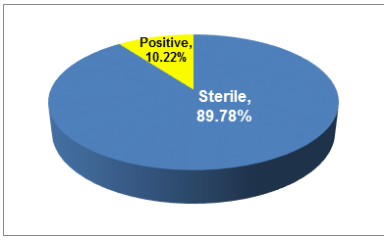

Figure 2 Prevalence of asymptomatic bacteriuria

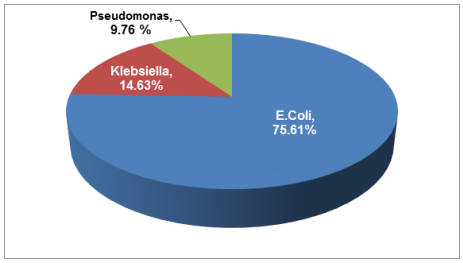

Figure-3 Distribution of bacterial isolates

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