International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Verma A et al. Int J Reprod Contracept Obstet Gynecol. 2016 Feb;5(2):407-410
www.ijrcog.org

pISSN 2320-1770 | eISSN 2320-1789

DOI: http://dx.doi.org/10.18203/2320-1770.ijrcog20160379

Research Article

Asymptomatic bacteriuria and antibacterial susceptibility during pregnancy

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Received: 03 December 2015
Accepted: 07 January 2016

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ABSTRACT

Background: Urinary tract infections are more common in women than in men and still more in pregnant women because of anatomical and physiological changes during pregnancy. Incidence of asymptomatic bacteriuria is 2-10% globally and it is still more in developing countries. Untreated asymptomatic bacteriuria can lead to many prenatal and maternal complications; hence early detection and treatment is of considerable importance.
Methods: Total 220 pregnant women at their first visit were screened during one year. Midstream urine samples were inoculated and results were interpreted after 24-48 hours.
Results: Incidence of asymptomatic bacteriuria was 12.27%. *E. coli* was the commonest pathogen detected and Nitrofurantoin was found to be effective against commonest pathogens.
Conclusions: Ectopic pregnancy can have varied presentations and misdiagnosis can be seen in Surgical, Medical and Gynaecology Universal screening of aymptomatic bacteriuria is recommended because of its high prevalence and prenatal and maternal complications, if left untreated. Nitrofurantoin can be advocated because of its low cost and high effectiveness where culture is not possible because of inadequate resources.

Keywords: Asymptomatic bacteriuria, Antibacterial susceptibility, Pyelonephritis, Nitrofurantoin

INTRODUCTION

Urinary tract infections (UTIs) are more common in women than in men, because of shorter urethra and its proximity to anus and vagina. The incidence is still more in pregnant women because of morphological and physiological changes that occur in urinary system during pregnancy.

UTIs may be symptomatic or asymptomatic. Asymptomatic bacteriuria (ASB) is defined as presence of actively multiplying bacteria within the urinary tract, excluding the distal urethra, at a time when patient has no urinary symptoms.[1]

Globally asymptomatic bacteriuria affects 2-10% of all pregnant woman.[2] As many as 20-40% of pregnant patients with ASB, if left untreated, will eventually develop pyelonephritis later in pregnancy compared with <1% of pregnant women without ASB.[3] Pyelonephritis is the most common severe bacterial infection that can lead to prenatal and maternal complications, including premature delivery, infants with low birth weight, fetal mortality, pre-eclampsia, pregnancy induced hypertension, anemia, thrombocytopenia and transient renal insufficiency.[3-6] Hence early detection and treatment is of considerable importance not only to forestall acute pyelonephritis and chronic renal failure in the mother, but also to reduce prematurity and fetal mortality in the offspring.[7]

It has been demonstrated through randomized trials that antimicrobial treatment of asymptomatic bacteriuria during pregnancy will decrease the risk of subsequent pyelonephritis from 20-35% to 1-4% and the risk of having a low birth weight baby from 15% to 5%.[5]

The U.S Preventive Services Task Force (USPSTF) recommends screening for asymptomatic bacteriuria with urine culture for pregnant women at 12 to 16 weeks of gestation or at the first prenatal visit, if later.[8]

In contrast to the global prevalence of ASB, high incidence has been reported in India and neighbouring countries.[9-12]

Present study was carried out to know the prevalence of ASB, most common causative organism and antibacterial susceptibility patterns in India.

METHODS

This was a prospective study, carried out in Department of Obstetrics and Gynaecology in association with Department of Microbiology and Medicine in Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India. A total of 220 women were screened during period of 1 year from July 2013 attending antenatal clinic at their first visit. After ethical clearance from the ethical committee, informed consent was taken from all patients. The women were asked to collect midstream urine in a sterile container with tight fitting lids. The urine samples were inoculated in nutrient and MacConkey agar plate. After 24-48 hours of aerobic incubation at 37 degree centigrade, the results were interpreted. Colony count of single microorganism of $>10^5$ colony forming units (cfu/ml) were interpreted as significant bacteriuria, while presence of multiple organisms or of skin flora were considered as contaminants.

Inclusion criteria

Pregnant women attending antenatal Obstetrics and Gynaecology OPD at Geetanjali Medical College and Hospital at their first antenatal visit.

Exclusion criteria

History of:

1. Urinary symptoms like frequency, urgency or dysuria.
2. Fever
3. Diabetes mellitus or Gestational diabetes
4. Renal stones or urinary tract anomalies
5. Antibiotic intake in preceding 2 weeks

The Standardized Kirby Bauer disc diffusion test of the Clinical and Laboratory Standards Institute (formerly NCCLS) was used for antibiotic susceptibility testing and interpretations were carried out accordingly.[13]

Antibacterial susceptibility for following antibiotics was noted:

Gentamicin, amikacin, cefuroxime, ceftizoxime, ceftriaxone, cefixime, amoxycilin+clavulinic acid, ampicillin, sulbactam, ciprofloxacin, levofloxacin and nitrofurantoin. T-value, p value and confidence level were calculated between the variables.

RESULTS

Among 220 pregnant women, 27 were found to have significant bacteriuria with a prevalence of 12.27%. Among 27 patients, 11 (40.74%) were primigravida, while 16 (59.25%) were multigravida. Highest incidence of ASB (33.33%) was reported in age group 20-25 and more than half of cases were in second trimester (55.55%).

Table 1: Demographic profile of women with ASB.

Characteristics	Significant bacteriuria (no.)	Percentage
Age		
<20	1	3.70
20-25	9	33.33
26-30	7	25.92
31-35	5	18.51
>35	5	18.51
Total	27	
Trimester		
First	5	18.51
Second	15	55.55
Third	7	25.92
Total	27	
Parity		
Nulliparous	11	40.74
Multiparous	16	59.25
Total	27	

E. coli was found to be the most common pathogen affecting 59.25% of women, followed by *Enterococcus* (22.22%) and *Klebsiella* (7.4%).

Table 2: Pathogens detected in significant bacteriuria.

Pathogens	Number	Percentage
E. coli	16	59.25
Enterococcus	6	22.22
Klebsiella	2	7.4
Proteus vulgaris	1	3.7
Pseudomonas	1	3.7
Candida kruser	1	3.7
Total	27	

Antibacterial sensitivity of nitrofurantoin against *E. coli* was documented 93.75%, while 100% sensitivity for this

antibiotic reported against enterococcus and *klebseilla*. 50% strains of *E. coli* were susceptible to cefuroxime and amoxy-clavulinic acid combination (Table 3). Overall nitrofurantoin was reported to be highly sensitive (>90%-100%) against all strains except pseudomonas.

Table 3: Antibacterial susceptibility (%) against commonest pathogens.

Antibiotic	*E. coli*	*Enterococcus*	*Klebsiella*
Nitrofurantoin	93.75	100	100
Ampicillin + sulbactam	56.25	100	0
Amoxicillin + clavulinic acid	50	100	0
Cefixime	56.25	0	0
Cefuroxime	50	0	0
Ceftriaxone	68.75	0	0
Ceftizoxime	75	16.67	0

DISCUSSION

Incidence of asymptomatic bacteriuria in our study was 12.27%, while globally it affects 2-10% of all pregnant women.[2] A similar or higher incidence has been reported from India and Indian subcontinent.[1,10,14] Girish babu et al[1] reported 10%, Jain et al16.9% while R. Sujatha et all reported 7.3% incidence of ASB in India.[10] Praveen Kawser et al found a prevalence of 26% in a population from Dhaka, Bangladesh.[15]

Maternal age was not a significant factor in our study, highest incidence (33.33%) reported among age group 20-25 years. More than half (55.55%) of ASB were from second trimester, similar to Onuh et al.[16] Girishbabu et al reported an incidence of 20% in first trimester and 40% each in second and third trimester, while higher incidence (45.45%) was reported in first trimester by Sujatha et al.[1-14] ASB was more common in multiparous women (59.25%) consistent with other studies while no relation with parity seen by Onuh et al.[1,14-17]

Commonest pathogen detected was E.coli seen in 59.25% cases, same reported by Jain et al, Khattak et al, Sujatha et al,while Girishbabu et alreported equal (30% each) incidence of *E. coli* and *Klebsiella* Pneumoniae.[1,10,11,14]

In our study, the most susceptible antibiotic was nitrofurantoin, 93.75%, effective against *E. coli* and 100% effective against next two commonest microbes cultured i. e. *enterococcus* and *klebsiella*. Cefuroxime which is commonly being prescribed showed 50% effectiveness against *E. coli*, while all strains of enterococcus and *klebsiella* were resistant to it. High sensitivity was seen for gentamicin, amikacin (90-100%), ciprofloxacin and levofloxacin (81% and 93.75%) against *E. coli* but these drugs are not safe during pregnancy.

We can consider Nitrofurantoin as a gold standard antibiotic against commonest pathogens compared to other antibacterials used during pregnancy. Significant efficacy was demonstrated for nitrofurantoin (p value ≤ 0.01, Table 4) except for ceftizoxime which is injectable and hence not convenient. Nitrofurantoin's long record of safety in pregnancy and its bioavailability in urine make it a good choice.[18]

Table 4: Comparison of nitrofurantoin efficacy against *E. coli* with other antibacterials.

Antibiotics	Sensitivity to *E. coli*	t value	p value	Confide-nce level
Ampicillin+ sulbactam	56.25%	2.72	0.01*	98%
Amoxicillin + clavulinic acid	50.00%	3.15	0.005*	99%
Cefixime	56.25%	2.72	0.01*	98%
Cefuroxime	50.00%	3.15	0.005*	99%
Ceftriaxone	68.75%	1.91	0.05*	90%
Ceftizoxime	75.00%	1.512	0.10**	80%

*Significant, **Not significant

Different studies have shown nitrofurantoin/fosfomycin as drug of of choice during pregnancy.[1,10,19,20] Resistance against commonly used antibiotics like ampicillin and cefuroxime may be because of self medication and over the counter sale of these drugs.

Hence screening and treatment of asymptomatic bacteriuria during antenatal care will be one of the most cost-effective interventions at the primary care level for mothers and newborns in developing countries to achieve the millennium development goals for health.[21]

CONCLUSIONS

Universal screening of asymptomatic bacteriuria should be advocated as it is cost-effective if incidence >2%. Implementation may be difficult because of poor resources and unawareness especially in rural and tribal areas. If culture and sensitivity facility is not available, nitrofurantoin can be advocated in symptomatic UTI because of its low cost and high effectiveness against commonly found pathogens. Awareness programmes regarding genital hygiene, birth spacing need to be introduced, as high incidence of asymptomatic bacteriuria has been reported in developing countries especially in lower socio economic class.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Verma A, Vyas A, Shrimali L, Sharma M. Asymptomatic bacteriuria and antibacterial susceptibility during pregnancy. Int J Reprod Contracept Obstet Gynecol 2016;5:407-10.