A Study of Uropathogens associated with Asymptomatic Urinary Tract Infection in Antenatal Patients

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Abstract

Background: India is a developing country with large population of child bearing age group, majority from low socioeconomic status. Unaware of the possibilities of asymptomatic bacteriuria and its complications and often neglecting minor symptoms due to ignorance, lack of medical facilities; ultimately face antenatal, perinatal and postnatal complications. *Aim/Objectives:* This study aimed at uropathogens associated with asymptomatic urinary tract infection in antenatal patients. The objectives of the study were: To determine rate of Asymptomatic Bacteriuria (ASB) in antenatal patients. To identify the uropathogens causing Asymptomatic Bacteriuria and to find out their antimicrobial susceptibility pattern. *Methods:* Clean catch midstream urine specimens were collected from 300 women of any gestational age who attended the Department of Microbiology from April 2014- April 2015. Uncentrifuged urine samples were taken for wet mount preparation. Cultures were done using CLED agar at 37° C. Antimicrobial susceptibility test were assessed using CLSI guidelines on Mueller Hinton agar. *Results:* Out of 300 antenatal patients Asymptomatic bacteriuria was positive in 10% of Women. E. coli and Staphylococcus aureus were the most common pathogen isolated which were found to be sensitive to Ceftriaxone and Ciprofloxacin (100%, 100%) respectively. *Conclusion:* The major pathogen isolated among 30 positive cases of Asymptomatic Bacteriuria were E. coli and Coagulase negative staphylococcus. All isolates of E.coli and Coagulase negative staphylococcus were found to be highly sensitive with antimicrobial particularly Ceftriaxone and Ciprofloxacin. Hence, this study recommends for screening cases of Asymptomatic bacteriuria and timely management is necessary to prevent the complications associated with asymptomatic bacteriuria.

Keywords: Asymptomatic Bacteriuria; Pregnant.

Introduction

Urinary tract infection during pregnancy is the most common health problem caused mainly by the colonization of micro-organism involving lower urinary tract [1].

Asymptomatic bacteriuria (ASB) is defined as significant bacterial count(>10 micro- organisms or colony forming units present per millilitre) in the person without symptoms [2] and is present in approximately 5 – 10 % of the pregnant women [3]) and if untreated, it leads to the development of symptomatic cystitis and pyelonephritis in 50% of patient [4]. Infection may be complicated by low birth weight and prematurity, preeclampsia, maternal anaemia, amnionitis and intrauterine death [5]. Early treatment of bacteriuria not only could avert the occurrence of acute or chronic pyelonephritis, but it could also diminish the risk of prematurity

and perinatal mortality [6].

Thus it becomes mandatory to eradicate the root cause way before it leads to some inevitable complications. Since urinary tract infections are bacterial in origin, the role of microbiologist becomes even more important to isolate the respective causative organism so that appropriate antibiotics can be prescribed for the treatment. An important aspect attached to it is, despite of the importance of ASB in antenatal patient, not much studies have been carried out in the developing countries, which includes the ever progressing India as well. So, with respect to the very fact and keeping in mind the importance of the diagnosis of ASB the present study was aimed to evaluate the causative agents which are causing ASB in antenatal patient.

Material and Method

The study was conducted on 300 urine samples from antenatal patient without symptoms of UTI in Department of Microbiology from April 2014 to April 2015. The ethical clearance were taken from ethical committee. After the detailed clinical history, clean catch midstream urine samples were collected in sterile screw-capped, wide-mouth container. Uncentrifuged urine samples were subjected to wet mount for microscopic examination and cultured on CLED agar. The CLED agar was incubated at 37°C for 24 hours and the selected colonies were subjected to biochemical test and antibiotic susceptibility testing.

Result

Out of 300 urine sample processed, 30(10%) showed the growth on CLED agar. The macroscopic examination of culture positive urine specimen, 73.3% specimen were pale yellow in color, 16.6% were red and 10% were having red-brown color. Appearance include 60% cloudy specimen, 30% milky and clear 10 %. The microscopic examination of urine showed pus cells (80%) followed by red blood cells (16.6%) and calcium oxalate crystals (10%) in antenatal patients with ASB. Majority of bacterial isolate were Escherichia coli (52.5%) followed by Coagulase negative staphylococcus (22.5%), Staphylococcus aureus (12.5%), Klebsiella pneumonia (7.5%) and Enterobacter species (5%), in ASB antenatal case. Antibiotic susceptibility testing showed that Ceftriaxone and Ciprofloxacin were the most sensitive drugs against urinary tract infection followed by Gentamycin.

Table 1: Macroscopic and Microscopic Examination and Findings of Specimen in Antenatal Patients

Macroscopic examination of urine		Percentage
Color	Pale yellow	22(73.3%)
	Red	5(16.6%)
	Red-brown	3(10%)
Appearance	Cloudy	18(60%)
	Milky	9(30%)
	Clear	3(10%)
Microscopic examination	Pus cells	24(80%)
	Red blood cells	2(6.6%)
	Calcium oxalate crystals	3(10%)

Table 2: Distribution of Gram Positive and Gram Negative Bacterial Isolates

Microorganisms (N=40)	Total no. of microorganisms
Escherichia coli	21 (52.5)
Coagulase negative staphylococcus	09 (22.5)
Staphylococcus aureus	05 (12.5)
Klebsiella pneumonia	03 (7.5)
Enterobacter species	02 (5)

Table 3: Antimicrobial Susceptibility Patterns of Gram Negative and Gram Positive Bacteria of Antenatal Patients with ASB

Microorganisms	Gentamycin	Nitrofurantoin	Ceftriaxone	Tetracycline	Ciprofloxacin
Escherichia coli	19(90.47%)	7(33.3%)	21(100%)	15(71.42%)	21(100%)
Klebsiella pneumonia	2(66.66%)	0(0%)	3(100%)	0(0%)	3(100%)
Enterobacter species	2(100%)	0(0%)	2(100%)	0(0%)	2(100%)
Cons	8(88.88%)	2(22.22%)	9(100%)	1(11.11%)	2(22.22%)
Staphyloccusaureus	1(20%)	2(40%)	5(100%)	1(20%)	3(60%)

Discussion

The global prevalence of ASB in pregnancy is found to range from 2-11 %. In the present study 10% of the cases showed culture positivity which was in accordance with Agersew Alemu et al [7] from Northwest Ethiopia (10.4%), while higher positivity rate (16%), (13%), (11%) was shown by Humera Ansari et al [8] from Hyderabad, T. Jeyaseelan Senthinath et al [9] from Tiruchirappalli and S. Jain et al [10] from Gujarat respectively in contrast to it S.V. Lavanya et al [11] from Visakhapatnam, J. Jayalakshmi et al [12] from Tamil Nadu and R Sujatha et al [13] from Kanpur showed (8.4%), (7.4%) and (7.3%) respectively which was lower as epidemiological patterns vary from one country to the other and in different geographic areas in the same country and seasonal variation and climatic conditions also affect its prevalence.

ASB if ignored could lead to different risk factors like anaemia, preterm labour, low birth weight so, thorough screening of urine sample should be done which includes both macroscopic as well as microscopic examination.

In present study 73% antenatal patient were having pale yellow color of urine which indicates definite relation with asymptomatic bacteriuria followed by red color (17%) this is consistent with the previous study conducted by Alex et al [14] that demonstrated that pale yellow color of urine was the major macroscopic finding.

Appearance of urine sample is another parameter in gross examination. In present study 60% of antenatal patients were having cloudy appearance of urine sample which was in concurrence with the presence of leukocytes, bacteria and yeast. Urine sample showed 30% milky appearance in the current study which may be due to neutrophils which is in concurrence with the microscopic finding.

Microscopic examination of specimen in antenatal patients with ASB is associated with the color of urine sample which in order is associated with different complications. In present study 80% of patient were having pus cells this result was closely associated with the positive urine culture and development of ASB. This was in concordance with the Alex et al [14].

The presence of red blood cells in urine denotes hematuria. Ophori et al [15] in his study detected in 6% cases. In present study 6.6% of patients were having hematuria who showed positive results for ASB which may be due to patients of chronic renal disease.

For the accurate identification of causative organism culture is necessary. Causative organisms of asymptomatic bacteriuria in females are usually the commensal bacteria of the female genital tract and the bowel. Different determinants of virulence, such as presence of adhesins, stasis produced by gravid uterus, physiological and morphological changes that occur during pregnancy play a role in causation of UTI. [12,16,17,11]. The present study revealed Escherichia coli (52.5%) as the most isolated organism. This finding correlates with many studies in India and abroad. Jayalakshmi et al [12] (57.4%), Gayathree et al [17] (51.6%), had the similar findings. E. coli is the most common microorganism in the vaginal and rectal area. Because of anatomical and functional changes and difficulty of maintaining personal hygiene during pregnancy, may increase the risk of acquiring UTI from E. coli [18] Followed by Coagulase negative staphylococcus (22.5%) because Staphylococcus (Coagulase negative staphylococcus and Staphylococcus aureus) are common microorganism of skin in vaginal area, which is comparable to result by AgersewAlemu et al [7] (22.5%), Humera Ansari et al [8] (19.05%) and Getachew Feredeet al [19] (14.3%) followed by Staphylococcus aureus (12.5%) which is comparable to studies by Getachew Feredeet al [19] (28.6%), Agersew Alemu et al [7] (10%) and Tazebew D. et al [20] (10.7%) followed by Klebsiella pneumonia (7.5%) which is comparable to result by Agersew Alemu et al [7] (10%), Getachew Feredeet al [19] (14.3%) and Tazebew D. et al [20] (3.6%), and Enterobacter (5%) which is comparable to result by Agersew Alemu et al [7] (5%).

Antimicrobial Sensitivity Testing is necessary for appropriate treatment thereby potentiating the prognosis of the disease.

Antimicrobial Sensitivity Test of Escherichia coli, Coagulase negative staphylococcus, Staphylococcus aureus, Klebsiella pneumonia and Enterobacter species showed that Ceftriaxone, Ciprofloxacin and Gentamycin were the most sensitive drugs which is in concordance with Getachew Feredeet al [19] and Agersew Alemu et al [7]. The high sensitivity to these antibiotics may be due to their broad spectra on bacteria.

Conclusion

Study was conducted in the Department of Microbiology on 300 patients showing no symptoms of urinary tract infection, we excluded those patients showing symptoms of urinary tract infection, from

April 2014- April 2015. The rate of culture positivity was 10%. The Macroscopic and microscopic screening method of urine specimen showed that pale yellow color was most prevalent color of urine and pus cell were more predominant then other findings. *Escherichia coli* and Coagulase negative staphylococcus were the most isolated organism because *Escherichia coli* is the most common microorganism in the vaginal and rectal area and Staphylococcus (Coagulase negative staphylococcus and Staphylococcus aureus) is the common microorganism of the skin near vaginal area. Antibiotic sensitivity pattern showed that Ceftriaxone and Ciprofloxacin were the most sensitive drugs against the bacterial isolates. Henceforth concluded that microbiological diagnosis is very essential for better treatment so that appropriate antibacterial drug can be initiated on time in order to limit the worsening of condition and to prevent complications and to develop the anitibiotic policy so that the drug of choice can be used in case of emergency.

Acknowledgement

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