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Bacteriological Profile and Antibiotic Sensitivity Pattern of UTI Pathogens in Antenatal Women Attending Tertiary Care Teaching Hospital

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Abstract: Urinary tract infections (UTIs) are one of the most common bacterial infections occurring in pregnancy. To study bacteriological profile and antibiotic sensitivity pattern of UTI pathogens in antenatal women attending tertiary care teaching Hospital. Present observational study was conducted among the pregnant women attending government tertiary care teaching Hospital, Hyderabad from the period January 2018 to July 2018. A total of 1350 freshly voided "mid-stream" urine samples were collected and processed according to standard bacteriological techniques. Results: 216 (16%) were found to have significant growth. The bacterial pathogens isolated were *Escherichia coli* (54.6%) followed by *Klebsiella*spp (39.8%) Staphylococcus aureus (3.3 %) and CONS (2.3%). Gram-negative bacteria were sensitive to Norfloxacin(95%),Nitrofurantoin (91.5%)andGentamicin (81.4%). staphylococcus aureus was 100% sensitive to Amoxyclav and Norfloxacin. All antenatal women should be screened for UTI during antenatal period which can prevent serious complications and lead to healthy outcomes for both mother and baby.

Keywords: Bacteriological Profile, Antenatal, Urinary Tract Infection (UTI), Bacteriuria.

INTRODUCTION

Urinary tract infections (UTIs) are one of the most common bacterial infections occurring in pregnancy. This is because of the morphological and physiological changes in the genito urinary tract during gestation [1].

It is a major health problem reported among 20% of the pregnant women and a common cause of admission in obstetrical wards.It results in low birth weight fetus, intrauterine growth retardation, preterm labor and premature babies, intrauterine fetal death, and leading to prenatal mortality and morbidity [2].

Urinary tract infection can be either symptomatic or asymptomatic. Patients with significant bacteriuria who have symptoms referable to the urinary tract are said to have symptomatic bacteriuria. Asymptomatic bacteriuria (ABU) is a condition characterized by presence of bacteria in two consecutive clear-voided urine specimens both yielding positive cultures ($\geq 10^5$cfu/ml) of the same uropathogen, in a patient without classical symptoms [3].

Pregnancy causes urethral dilatation, decrease in urethral tone and reduced urine concentration, leading to urinary stasis. This infact, is the single most important factor that can initiate proliferation of micro-organisms leading to increased susceptibility to UTIs in pregnant women [1]. Among the antenatal women approximately 4% to 10% will have asymptomatic bacteriuria (ASB), and 1% to 4% will develop acute cystitis and 1% to 2% women may develop severe acute pyelonephritis during the second and third trimester of pregnancy [4]. The highest incidence of urinary tract infection occurs in the child bearing age and this has been linked to sexual activity and aging [5].

Organisms that cause UTI are those from the normal vaginal, perineal, and fecal flora. They include *Escherichia coli, Staphylococcus aureus, Proteus mirabilis, Klebsiella species,* and *Streptococcus species* amongst others. *E.Coli,* the predominant isolate in various reports accounts for 80% - 90% infections in pregnancy [6].

These microorganisms vary in their susceptibility to antimicrobials from place to place and time to time. Adequate treatment of these antenatal

women need a thorough knowledge of the bacterial species involved and their antibiotic susceptibility patterns in a given geographical area [7].

MATERIALS AND METHODS

This observational study was undertaken in the Department of Microbiology from January 2018 to July 2018. A total of 1350 freshly voided "mid-stream" urine samples were collected in a sterile container from the subjects suspected with UTI of all age-groups who were admitted in the Tertiary Care level teaching hospital, in Hyderabad under department of obstetrics &gynaecology. 5-10ml of single clean catch midstream urine was collected in a sterile, dry wide necked and leak proof container from all the pregnant women. The bottles were labeled with unique sample number, date, time of collection, and all the urine samples were processed within one hour for aerobic bacterial culture. When delayed, samples were refrigerated and processed within 4 - 6 hours. Microscopy was done to check for the presence of microorganisms, pus cells, epithelial cells, RBC's and crystals. Samples were inoculated on Blood agar and MacConkey agar. Culture plates were incubated aerobically at 37^0C for 18-24 hours. Bacterial counts were done by counting the number of colonies and multiplying the number of Colony Forming Units (CFU) by 1000 to determine the number of microorganisms per millilitre in the original specimen. Colony count $>10^5$CFU/ml was considered significant bacteriuria. Patients with significant bacteriuria were considered as having UTI. Cultures with more than three types of colonies were discarded as contaminants. Bacterial pathogens were identified by gram reactions, motility and biochemical characteristics as per standard Microbiological techniques. The antibiotic susceptibility pattern of the isolates was determined by the Kirby-Bauer disk diffusion method.

RESULTS

A total number of 1350 urine samples collected from antenatal women in different gestational ages of pregnancy were included in this study and processed in Microbiology laboratory from Jan to July 2018. Among 1350 samples, 216 (16%) were found to have significant growth and remaining samples were either did not show any significant growth or found to be sterile.

The age group included in this study ranged between 18 to 45years. The maximum numbers of pregnant women were in the age group of 26 – 30 years (46.8%).

Table-1: Age wise distribution of total participants (n=1350)

Age	No Tested	Percentage (%)
18-20	112	8.3
21-25	324	24
26-30	632	46.8
>35	282	20.9
Total	1350	100%

Table-2: Prevalence of Positive urine cultures among pregnant women

Total cases	positive	Percentage (%)
1350	216	16

Overall incidence of UTI in pregnant women was found to be 16% (Table-2).

UTI was highest in the age group of 26-30 years (49.5%) followed by 21-25 years (28.7%)(Table-3).

Table-3: Age wise distribution of urine cultures positive cases

Age group	No. of Bacterial isolates	Percentage (%)
18-20	11	5.1
21-25	62	28.7
26-30	107	49.5
>35	36	16.7
Total	216	100%

Table-4: Distribution of cases according to gravida

Gravida	No Tested	Percentage %
Primigravida	392	29%
2^{nd}gravida	586	43.4%
Multigravida	372	27.6%
Total	1350	100%

Table-5: Distribution of cases according to gestational age

Gestational age (in weeks)	No tested	Percentage %
1-12	340	25.2%
13-27	316	23.4%
28-40	694	51.4%
Total	1350	100%

Table-6: Distribution of isolates according to Gravida

Gravida	No.of Isolates	Percentage (%)
Primigravida	41	19
2nd gravida	103	47.7
Multigravida	72	33.3
Total	216	100%

Highest number of bacterial isolates were isolated from second gravida (47.7%) followed by 32.8% from Multigravida (Table-6).

The highest number of bacterial isolates were found in the third trimester (44.5%) followed by first trimester (38%)(Table-7).

Table-7: Distribution of Bacterial isolates in relation to gestational age

Gestational age (in weeks)	No.of Isolates	Percentage (%)
1-12	82	38
13-27	38	17.5
28-40	96	44.5
Total	216	100%

Table-8: Bacteriological profile of UTI in pregnant women

Organism	No.of Isolates	Percentage (%)
Escherichia coli	118	54.6
Klebsiellaspp	86	39.8
Staphylococcus aureus	7	3.3
CONS	5	2.3
Total	216	100%

Escherichia coli (54.6%) was the predominant uropathogen isolated followed by *Klebsiella*spp(39.8%) Staphylococcus aureus (3.3 %) and CONS (2.3%).

Table-9: Antimicrobial susceptibility pattern

Antibiotic	E.coli (n=118)	K.pneumonia(n=86)	S.aureus(n=7)	CONS(n=5)
Nitrofurantoin	91.5%	71%	85.7%	100%
Gentamicin	81.4%	74.5%	71.5%	80%
Amoxyclav	78%	84%	100%	100%
Ciprofloxacin	77%	53.4%	85.7%	100%
Ceftazidime	75.4%	92%	85.7%	80%
Cefotaxime	54.2%	93.3%	85.7%	100%
Cotrimoxazole	20.3%	63%	71.5%	60%
Norfloxacin	95%	86%	100%	80%

Rates of susceptibility of Gram-negatives range from 20 % - 100 %

E. coli was most commonly sensitive to Norfloxacin (95%) and Nitrofurantoin (91.5%), Klebsiella and staphylococcus aureus were sensitive to cephalosporins and ciprofloxacin (85.7%). CONS were most commonly sensitive to Norfloxacin (100%) and Amoxyclav (100%).

DISCUSSION

Antenatal women are more prone to develop UTI mainly due to morphological and hormonal changes during pregnancy. Early diagnosis of suspected organism and antibiotic treatment is required because UTI can cause serious complications in mother and baby, if proper treatment is not done in time. A total of 1350 pregnant women were included in the study. The maximum number of pregnant women was in the age

group of 26 – 30 years (46.8%). The overall prevalence of UTI in our study was 16% which is comparable to the study done by Nithyalakshmi J *et al*. from India and A. Masinde*et al*. from Tanzania who reported 14.9% and 14.6% in pregnant women respectively. The prevalence rate of UTI in our study is less than that reported by Mamatha P Samaga(36.2%) and B Parida*et al*. (49.4%) and slightly higher than that reported by A Alemu1 *et al*. (10.4%). These may be due to differences in personal, environmental hygiene and socio economical levels.

In our study prevalence of UTI was found highest in the age group of 26-30 years (49.5%), followed by 21-25 years (28.7%) which is comparable with the studies conducted by N Altaf*et al*. (54%) and U Borkotoki1 *et al*. (66.7%). Higher rate of infection was found in 2ndgravida (43.4 %) followed by 29 % in primigravida in our study which is similar to the study done by V. Kavitha*et al*. (57.142%). In our study, the higher percentage of infection was found in 3rd trimester (25.2%). B Parida*et al*. from Odisha and U Borkotoki*et al*. also found the similar gestational age group has highest incidence of urinary tract infection in pregnancy. Due to progressive obstruction of the urinary tract, it is expected that the highest frequency of UTIs is in 3rd trimester rather than 2nd and 1st trimester. Our study findings showed increased age, multigravida and gestational age increases the risk of infection in pregnant women.

The majority of etiological agents of UTIs in this study were Gram-negative bacteria. A similar finding was found from other studies in Ethiopia and this could be due to the presence of unique structure in Gram negative bacteria which help for attachment to the uroepithelial cells [1]. The bacterial pathogens isolated were predominantly E. Coli (54.6%), followed by Klebsiellaspp (39.8 %), S. aureus (3.3%) and coagulase-negative staphylococci (2.3%). This finding is similar to other reports which indicate that Gram-negative bacteria, particularly E. coli is the most common pathogen isolated in patients with UTIs. Similar findings have been reported in studies done by L Tuli*et al*.Mamatha P Samaga and TDemilie*et al*. The major contributing factor for isolating higher rate of *E.coli*is due to urine stasis in pregnancy which favors for *E.coli*strain colonization [4].

In our study, susceptibility pattern of Gram-negative bacteria showed that most of the isolates were sensitive to norfloxacin(95%), Nitrofurantoin (91.5%)and gentamicin (81.4%). Staph aureus was 100% sensitive to Amoxyclav and Norfloxacin. CONS showed 100% sensitivity to Nitrofurantoin, Amoxyclav, Ciprofloxacin and cefotaxime. Similar antibiotic pattern was cbserved in studies conducted by A. Masinde*et al*. and A Alemu1 *et al*. High resistance to cotrimoxazole (20.3%) observed in our study is similar to study conducted by S J. Moyo*et al*. and M N Mokube*et al*. In our study isolates showed considerable susceptibility to antibiotics used for empirical treatment of UTI in pregnancy like Nitrofurantoin.

CONCLUSION

The prevalence of UTI in pregnant women at our hospital is 16%. UTI is the most common bacterial infection during pregnancy which can lead to complications if undiagnosed and not treated, so screening for bacteriuria in pregnancy should be mandatory. All antenatal women should be screened for UTI during antenatal period which can prevent serious complications and lead to healthy outcomes for both mother and baby. Due to changes in trends of bacterial isolates and their antibiotic susceptibility pattern clinicians should be guided with appropriate antibiotic usage.

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