Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Scholars Research Library

Annals of Biological Research, 2011, 2 (5) : 516-521
(http://scholarsresearchlibrary.com/archive.html)

Annals of Biological Research
Scholars Research Library
ISSN 0976-1233
CODEN (USA): ABRNBW

Uropathogens and their Drug susceptibility patterns among pregnant women in a teaching hospital

Shazia Parveen .S[1], Sharada.V.Reddy[2], M.V.Rama Rao[3], Janardhan Rao.R[3]

[1]Department of Microbiology, Bhaskar Medical College ,Ranga, Reddy Dist, Andhra Pradesh, India
[2]Department of Microbiology, Bhaskar Medical College ,Ranga, Reddy Dist,Andhra Pradesh, India
[3]Department of Microbiology, Bhaskar Medical College ,Ranga, Reddy Dist,Andhra Pradesh, India

---

ABSTRACT

Urinary tract infections (UTIs) are a common problem in women at all stages of life; this is particularly true of pregnant women. Women are anatomically predisposed to UTIs because of their shorter urethra and the proximity of the urethra to the anus and vagina. UTIs are an especially important topic in pregnancy, as this may cause complications such as pyelonephritis, hypertensive disease of pregnancy, anemia, chronic renal failure, premature delivery and fetal mortality. Knowledge about the type of pathogens responsible for urinary tract infections and their resistance patterns may help the clinician to choose the correct empirical treatment. Therefore, the aim of this study was to identify the etiologic agents of UTI and to determine the patterns of antimicrobial drug susceptibility among pregnant women attending antenatal clinic. Retrospective analysis was carried out for 180 mid-stream urine specimens processed for culture and antimicrobial drug susceptibility testing between January and December 2010. Significant bacteriuria (cultures with > 10^5 colony forming units (cfu) of bacteria/mL of urine) was found in 14/180 (7.7%) of the urine specimens. Gram-negative bacteria were more prevalent (78.56%) than Gram-positive bacteria (21.42%). Of the 14 isolates, the most commonly isolated bacteria were Escherichia coli 8 (57.14%), Klebsiella spp 2 (14.28%), Proteus species1 (7.14%), coagulase negative Staphylococcus 2 (14.28%) and Staphylococcus aureus 1 (7.14%) . The isolated uropathogens showed resistant to ampicillin, co-trimoxazole , ciprofloxacin , ceftazidime and sensitive to nitrofurantoin cephotaxime. In conclusion, E coli was found to be the common cause of UTI among the pregnant women. The presence of bacterial isolates with very high resistance to the commonly prescribed drugs leaves the clinicians with very few alternative options of drugs for the treatment of UTIs. So Culture and sensitivity of the isolates from urine samples should be done as a routine before advocating the therapy.

Key words: Urinary tract infection, pregnant women, uropathogens, antimicrobial susceptibility pattern.

INTRODUCTION

Urinary tract infections (UTIs) are the most commonly encountered infectious diseases by clinicians in developing countries with an estimated annual global incidence of at least 250 million. [1,2] UTI affects all age groups, but women are more susceptible than men, due to short urethra, absence of prostatic secretion, pregnancy and easy contamination of the urinary tract with faecal flora [3].

Pregnant women are more susceptible to UTI due to a number of factors including ureteral dilatation, increased bladder volume and decreased bladder tone, along with decreased ureteral tone which contributes to increased urinary stasis and ureterovesical reflux [4].Development of glycosuria seen in 70% of pregnant women encourages bacterial growth in the urine [5].

UTI may manifest as asymptomatic bacteriuria (ASB) or symptomatic bacteriuria (SB). The prevalence of asymptomatic UTI has been previously reported to be 2% to 13% in pregnant women [6,7,8,9,10]compared with that of symptomatic UTI which occurs in 1–18% during pregnancy [11,10].

Failure to treat bacteriuria during pregnancy increases the risk of development of acute pyelonephritis by 25% and may result in complications, such as preterm labour, transient renal failure, acute respiratory distress syndrome, sepsis, shock and haematological abnormalities [12,13,14]. Woman with untreated UTI during their third trimester of pregnancy are at-risk of delivering a child with mental retardation or developmental delay [15]. The incidence of these complications can be decreased by promptly treating UTI during pregnancy [6]. To ensure appropriate therapy current knowledge of the organisms that cause UTI and their antibiotic susceptibility is mandatory[16]. Although a variety of etiology is involved with UTI, *E. coli* and other coliforms account for large majority of naturally acquired urinary tract infections[17,18,10]. Microorganisms causing UTI vary in their susceptibility to antimicrobials from place to place and time to time.

The present study was therefore carried out to determine the spectrum of bacterial isolates and their antibiotic susceptibility among pregnant women attending antenatal clinic.

MATERIALS AND METHODS

Study area

A retrospective analysis of laboratory records on urine culture specimens from pregnant women attending ANC at Bhaskar General Hospital in Ranga Reddy Dist was carried out. Data was collected from laboratory registers in the Microbiology Section. And the information was recorded on the type of bacterial isolates from the urine specimens and antibiotic susceptibility patterns.

Bacterial isolation and antimicrobial susceptibility testing

Urine samples received at the microbiology Laboratory were plated on Mac-Conkey and Blood agar plates and incubated at 37^{o}C for 24 hours. . A significant bacterial count was taken as count

equal to or in excess of 10^5per milliliter Identification of pure isolates was done by observing morphological, cultural and biochemical characters.[19].

Antibiotic sensitivity testing was performed using the Kirby–Bauer disc diffusion method according to the Clinical and Laboratory Standards Institute Guidelines [*32*].

Antimicrobial drug susceptibility testing for Ampicillin 10 µg, Amoxicillin/clavulanic acid(augmentin)20/10 µg, Gentamicin 10 µg, Cefotaxime 30 µg, Ceftriaxone (30µg), Ceftazidime(30µg)Cotrimoxazole 25 µg, Ciprofloxacin (5 µg), Amikacin 30 µg, Nitrofurantoin (300 µg)and Norfloxacin (10 µg) was done on all bacteria isolated. Interpretation of results was done based on the diameter of the zone.

RESULTS

A total of 180 urine specimens were received from ANC during January and December 2010 and these were processed in the laboratory. Significant bacteriuria (cultures with > 10^5 colony forming units (cfu) of bacteria/mL of urine) was found in 14/180 (7.7%) of the urine specimens. Gram-negative bacteria were more prevalent (78.56%) than Gram-positive bacteria (21.42%). Of the 14 isolates, the most commonly isolated bacteria were *Escherichia coli* 8 (57.14%), *Klebsiella* spp 2 (14.28%), *Proteus* species1 (7.14%), coagulase negative *Staphylococcus* 2 (14.28%) and *Staphylococcus aureus* 1 (7.14%)[Table.1] .

Table 1: Distribution of bacteria isolated from urine samples of pregnant women presenting with symptoms of UTI

Organism isolated	No of isolates	Percentage (%)
Escherichia coli	8	57.14%
Klebsiella species	2	14.28%
Proteus species	1	7.14%
Coagulase negative staphylococcus	2	14.28%
S.aureus	1	7.14%
Total positive urine culture	14	7.77%

Bacterial uropathogen isolates from patients with UTIs revealed the presence of high levels of single and multiple antimicrobial resistances against commonly prescribed drugs (shown in Table 2).

E.coli which is the predominant cause of UTI, showed high percentage of resistance to ampicillin(87.5%), cotrimoxazole(75%), ceftazidime(62.5%), ciprofloxacin(62.5%), ceftriaxone (50%) and norfloxacin (50%)and low resistance to Augmentin (25%), cefotaxime(37.5%), Gentamycin(25%), nitrofurantoin(12.5%), but all were sensitive to amikacin. *Klebsiella* spp which is the second most prevalent pathogen of UTI displayed a similar resistance pattern as of E.coli and showed hundred percent resistant to ampicillin however, and all others gram negative isolates were similarly resistant to most of the antibiotics as that of *E. coli* and *K. pneumonia.*

Of the Gram-positive organisms 100% resistance to Ampicillin, ceftazidime 56%, Cefotaxime 54%, Amikacin 37.5% ciprofloxacin 29%, Gentamicin 27% was noted.

Table.2 Resistance of organisms to Antibiotics

S.no	Name of antibiotic	% of resistance
1.	Ampicillin	87.5
2.	Augmentin	25
3.	Gentamicin	25
4.	Cotrimoxazole	75
5.	Amikacin	0
6.	Norfloxacin	50
7.	Ciprofloxacin	62.5
8.	Ceftazidime	62.5
9.	Cefotaxime	37.5
10.	Ceftriaxone	50
11.	Nitrofurantoin	12.5

DISCUSSION

Bacterial infection of the urinary tract is one of the common causes for seeking medical attention in the community [20]. Micro organisms causing UTI vary in their susceptibility to antimicrobials from place to place and from time to time[21]. So identification of the etiological agent and the selection of an effective antibiotic agent to the organism in question is very important for effective management of patients suffering from bacterial UTIs [22].

UTIs are caused by a variety of microorganisms, including both gram positive and gram negative ones. In our study Escherichia coli (50%) was predominant isolate followed by Klebsiella spp. (21.42%) and Proteus spp. (7.14%) respectively. This finding is similar to many reports which indicated that gram negative bacteria mostly *E. coli* & *Kleb. pneumoniae* are the commonest pathogens isolated in patient with urinary tract infections [25-30].

Although the spectrum of agents causing UTI in pregnant women is relatively constant, their antibiotic susceptibility patterns are different in different geographical locations Cotrimoxazole in the present study was no longer found to be effective for UTI as 75% of uropathogens showed high degree of resistance to it. Previously this antibiotic was used as the drug of choice for empirical treatment of UTI.

These findings are similar to previous studies [17,23,24]. The most useful antibiotics in this study were, Amikacin, Nitrofurantoin, Cephotaxime notably. Ampicillin, Ciprofloxacin, Norfloxacin antibiotics which were used to treat UTI, had shown resistance. Similar findings were observed by many workers around the world.[25-29] The broad spectrum activity of Fluoroquinolones has made them as one of the best therapeutic options for UTI. In the present study the isolates showed low degree of susceptibility (37%) to Fluoroquinolones which indicates that they can no more be opted for treating UTI.[23,31] It is also noted in our study that there is increased resistance to third generation cephalosporin, Ceftazidime. A possible explanation for the resistance found might be the presence of Extended Spectrum Beta-Lactamase (ESBL) in these strains.

Almost all organisms are sensitive to Amikacin , so we can suggest Amikacin to be prescribed as the empirical treatment for UTI . This is similar to the findings reported previously in India. [31].

CONCLUSION

To conclude, *E coli* was found to be the common cause of UTI among the pregnant women. In the present study most of isolated uropathogens showed multiple antibiotics resistance. This gives idea about the common trend of increased antibiotics resistance of uropathogens in this region, which may be due to geographic variation or indiscriminate or sublethal use of antibiotic. This data not only help in proper treatment of UTI patients but also discourage the indiscriminate use of antibiotics and prevent further development of bacterial drug resistance.

In our study it was found that only 180 urine specimens out of 3132 antenatal clinic attendees were tested for culture and antibiotic susceptibility patterns during one year. This indicates that only those suspected to have UTI were investigated. ASB can be present in 2% to 13% of pregnant women [6,9,10]and if untreated can lead to serious complications..So we recommend screening of all pregnant women for significant bacteriuria .

REFERENCES

[1] Ronald AR, Nicolle LE, Stamm E, *et al*. *Int J Antimicrob Agents* **2001**; 17:343-348.
[2] Barisˇic´ Z, Babic´-Erceg A, Borzic´ El, *et al*. *Intl J Antimicrob Agents* **2003**; 22: S61-S64.
[3] Baron EJ, Finegold SM, Eds Microorganisms encountered in the urinary tract**.** In Bailey & Scott's diagnostic microbiology (9thedition). (Mosby publishers, St. Louis, Missouri) **1994**:256.
[4] Chaliha, C. & Stanton S.L*British Journal of Urology International*. (**2002**). 89, 469-476.
[5] Al-Issa, M.. *Middle East Journal of Family Medicine* **(2009**),7
[6] Delzell, J.E. Jr & Lefevre ML. *American Family Physician*(**2000**) **, 61**, 713-21.
[7] Christensen, B. *Journal of Antimicrobial Chemotherapy* **(2000)** 46, 29-34.
[8] Kutlay, S., Kutlay, B., Karaahmetoglu, O., Ak, C. & Erkaya, S. *Journal of Reproductive Med*icine**(2003)** 48, 627-630.
[9] McIsaac, W., Carroll, J.C., Biringer, A., Bernstein P., Lyons E., Low D.E., Permaul J.A.. *Journal of Obstetrics and Gynaecology Canada* **(2005).**27, 20-24.
[10] Masinde, A., Gumodoka, B., Kilonzo, A. & Mshana, S.E. *Tanzania Journal of Health Research*(**2009) ,** 11, 154-159.
[11] Dwyer, P.L. & O'Reilly M. *Current Opinion in Obstetrics and Gynecology***(2002)** 14, 537–543.
[12] Mohammad M et al. *Southeast Asian journal of tropical medicine and public health*, **2002,**33(3):575–80.
[13] Stein G, Funfstuck R.. *Medizinische Klinik*, **2000**,95:195–200.
[14] Gilstrap LC, Ramin SM.. *Obstetrics and gynecology clinics of North America*, **2001,** 28:581–91.
[15] McDermott S et al.. *Journal of family practice*, **2001**, 50:433–7.
[16] Grubenberg GN (1984**).**; Antimicrob Chemotherapy; **1971-1982,** 14: 17 – 23.
[17] Gupta, K., Hooten, T.M. & Stamm, W.E. *Annals of Internal Medicine***(2001),** 135, 41-50.
[18] Nicolle, L.E**.** *Infections in Med*icine **(2001),** 18, 153-162.

[19] Collee JG, Duguid JP, Fraser AG and Marmion BP. Mackie & McCartney Practical Medical Microbiology, 13th Ed. Vol 2, Churchill Livingstone, Edinburgh, **1989:**Pg 115.(s)
[20] Kebira AN, Ochola P, and Khamadi SA**.**. *J. Appl. Biosci***. 2009;** 1320-1325.
[21] Orrett F A, Shurland S M. Singapore Med J. **1998** June**;** 39(6): 256-9. (s)
[22] Water G, Harrison B, and Kunin G**.**. N. Eng Med. J **1996;** 248-250.
[23] Arredondo-García, J.L. & Amábile-Cuevas, C.F**.** *Journal of Infection in Developing Countries*. **(2008) ,**5, 350-353.
[24] Arredondo-García, J.L., Soriano-Becerril, D., Solórzano-Santos, F., Arbo-Sosa, A., Coria-Jiménez, R. & Arzate-Barbosa, P. *Current Therapeutic Research***(2007**) 68, 120-126.
[25] Mbata Theodore. *The Internet J Microbiol* **2007**; 3(2). (s)
[26] Barnett BJ, Stephens DS.. *Am J Med Sci*.**1997;** 314: 245-249. (s)
[27] Gupta V, Yadav A, Joshi RM. *Indian J Med Microbiol* **2002;**20:96-8
[28] Varma NC, Taneja OP, Saxena SN. *J Ind Med Ass* **1972**;58:155-58.
[29] Ojumba U. C *Niger J Clin Pract.* **2005**; 8: 107 -109. (s)
[30] Inabo HI, Obanibi HBJ *Afr. J.biotechnol*. **(2006**). 5 (5): 487-489.
[31] K.R. Rajesh, S. Mathavi, R.Indra Priyadarsini. *IJBMS* **2011**Vol.2 ,No.4.
[32] Clinical and Laboratory Standards Institute **(2006)** Sixteenth Informational Supplement. CLSI document M100-S16 [ISBN 1-56238-588-7]. Clinical and Laboratory Standards Institute, 940 West Valley Road, Suite 1400, Wayne, Pennsylvania 19087-1898 USA.