

Prevalence of Bacteriological Study of Urinary Tract Infection in Antenatal Patients.

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Abstract

Background: Urinary tract infection (UTIs) is an infection caused by the presence and growth of microorganisms anywhere in the urinary tract. UTI has been reported among 20% of the pregnant women and it is the most common cause of admission in obstetrical wards. **Subjects and Methods:** Mid-stream clean catch urine was collected from 150 antenatal patients carefully then transported to laboratory and culture and antibiotic susceptibility was performed. **Results:** A total of 52 antenatal patients showed significant bacteriuria while 98 showed no significant bacteriuria from 150 patients. Bacterial agents were isolated from 52 pregnant women and were identified as: *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Enterobacter aerogenes*. *E. coli* (46%) was the commonest bacterial pathogen isolated. Other bacterial pathogens incriminated in this study were *S. aureus* (20%), *K. pneumoniae* (22%), *P. aeruginosa* (8%), *E. aerogenes* (8%). **Conclusion:** UTI in antenatal patients can lead to significant complications viz. fetal growth retardation and even still birth or abortion. In our study, UTI was seen in 34.66% antenatal women and *E. coli* (46%) was most common pathogen. Early diagnosis and treatment in UTI during antenatal period can prevent serious complications and lead to healthy outcomes for both mother and baby.

Keywords: Antenatal Care, Significant Bacteriuria, Urine Culture.

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Introduction

Urinary tract infection (UTIs) is an infection caused by the presence and growth of microorganisms anywhere in the urinary tract. Urinary tract includes the organs that collect and store urine and release it from the body which include: Kidneys, ureters, bladder, and urethra. UTIs are among the most common bacterial infections in humans, both in the community and hospital setting and have been reported in all age groups in both sexes.^[1-3] It is a serious health problem affecting millions of people each year and is the leading cause of Gram-negative bacteremia. UTIs are also the leading cause of morbidity and health care expenditures in person of all ages.

UTI accounts for a significant part of the work load in clinical microbiology laboratories and enteric bacteria (in particular, *Escherichia coli*) remain the most frequent cause of UTI, followed by *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Enterobacter aerogenes*.^[4,5]

UTI has been reported among 20% of the pregnant women and it is the most common cause of admission in obstetrical wards. UTI is defined as the presence of at least 100,000 organisms per milliliter of urine in an asymptomatic patient, or as more than 100 organisms/ml. of urine with accompanying pyuria (>5 white blood counts/HPF) in a

symptomatic patient. Particularly in asymptomatic patients, a diagnosis of UTI should be supported by a positive culture for a uropathogen (Tamalli et al. 2013).^[6] Numerous reports have also suggested that UTI can occur in both male and females of any age, with bacterial counts as low as 100 colony forming units (CFU) per milliliter in urine.^[2,4] Female are however believed to be more affected than males except at the extremes of life.^[2,6] Untreated upper UTI in pregnancy carries well documented risk of morbidity, and rarely, mortality to the pregnant women.⁵ Sexually active young women are disproportionately affected. An estimated 40% of women reported having had a UTI at some point in their lives.^[7]

Therefore, we conducted this study to evaluate the epidemiology of UTI in antenatal women attending Vardhman Institute of Medical sciences, Pawapuri, Nalanda, Bihar, India.

Subjects and Methods

Study Area

Department of Microbiology, Vardhman Institute of Medical sciences, Pawapuri, Nalanda, Bihar, India.

Study Population

Urine samples were collected from a total of 150 pregnant

women between the aged ranges from 18 to 40 years. All these persons were out patients attending the Vardhman Institute of Medical sciences, Pawapuri, Nalanda, Bihar, India.

Urine Specimen Collection

Early morning clean-catch midstream urine was collected from each pregnant woman into a wide-mouthed sterile screw capped container.

Urine Culture and Antibiotic Susceptibility Test

With a calibrated micro-loop, 0.001 ml of urine was cultured on to a cystine lactose electrolyte deficient agar, blood agar, MacConkey agar and Muller Hinton Agar plates. After overnight incubation at 37°C for 24 h, colony counts yielding bacterial growth of ≥10⁵/ml was taken as being significant in both symptomatic and asymptomatic pregnant women. Antibiotic susceptibility of an isolated species namely, E. coli, Klebsiella spp., Proteus spp., and P. aeruginosa and E. aerogens were tested for their susceptibility to some antibiotics (amikacin, ciprofloxacin, cefotaxime, ofloxacin, norfloxacin, nitrofurantoin, ampicillin and cotrimoxazole (Hi-Media Lab, India) by modified disc-agar diffusion technique (Kirby-Bauer method).^[8]

Results

[Table 1] show various bacteria isolated from the urine sample E. coli (44.20%), K. pneumonia (19.20%), S. aureus (21.10%), P. aeruginosa (7.60), E. aerogens (7.60). [Table 2] show incidence of UTI by parity (no. of pregnancy), in 1st pregnancy (19.2%) positive, 2nd pregnancy (32.6%), 3rd pregnancy (48%). [Table 3] show antibiotic sensitivity pattern of isolated organisms. In this table E. coli highly sensitive to nitrofurantoin, K. pneumoniae highly sensitive to ciprofloxacin, E. aerogens highly sensitive to ceftazidine, P. aeruginosa highly sensitive to ceftazidine, S. aureus highly sensitive to levofloxacin and nitrofurantoin.

Table 1: Various bacteria isolated from the urine sample

Isolated organisms	Number of positive sample (n=52) (%)
E. coli	23 (44.20)
K. pneumoniae	10 (19.20)
S. aureus	11 (21.10)
P. aeruginosa	4 (7.60)
E. aerogens	4 (7.60)

Table 2: Incidence of UTI by parity (number of pregnancy)

Parity	Number tested	Number positive (%)
1st pregnancy	45	10 (19.2)
2nd pregnancy	55	17 (32.6)
3rd pregnancy	50	25 (48)
Total	150	52 (34.66)

Discussion

Total of 150 urine specimens were collected from pregnant women and processed. Significant bacteriuria >10⁵ CFU per ml was found in 52 patients among 150 patients

examined.

The most commonly isolated bacteria were E. coli 23 (44.2%), K. pneumoniae 11 (21.1%), S. aureus 10 (19.2%), P. aeruginosa 4 (7.6%), E. aerogens 4 (7.6%).

In the present study, out of 52 positive urine sample from 150 cases, Gram-negative bacteria were more prevalent 41 (78%) than Gram-positive bacteria, which constituted 11 (22%) which was similar from previous study by Sabrina et al. who found that 38.1% of the total UTI were cause by Gram-negative bacteria. Similar findings have been reported by Blomberg et al.^[9-12]

Table 3: Antibiotics susceptibility pattern of isolated organisms

Antibiotics	E. coli	K. pneumoniae	E. aerogenes	P. aeruginosa	S. aureus
Gentamycin	8	7	2	2	5
Amicacin	1	8	2	3	5
Ceftazidine	1	9	4	4	7
Ciprofloxacin	1	10	2	2	8
Tobramycin	6	5	1	1	5
Chloramphenicol	1	8	3	2	4
Imipenem	6	2	3	3	7
Polymyxin-B	1	5	2	2	7
Levofloxacin	1	5	2	4	9
Nitrofurantoin	1	8	3	3	9
Penicillin	-	-	-	-	8
Cotrimoxazole	6	1	1	1	4
Erythromycin	-	-	-	-	7
Vancomycin	-	-	-	-	9
Norfloxacin	7	2	3	2	3

E. coli was major pathogen isolated from the urine cultures and accounted for one-third of the positive cultures with significant bacteriuria. E. coli is considered uropathogenic due to a number of virulence factors specific for colonization and invasion of the urinary epithelium, such as the P-fimbria and S-fimbria adhesions.^[13] K. pneumoniae and Staphylococci were the second and third most common bacteria isolated. In our study, out of 52 positive samples, E. coli seen 23 (44.2%) so it was major uropathogen of UTI.

In the present study, women in their 2nd and 3rd trimester were found to have the higher incidence of UTI; 32.6% and 48%, respectively. A higher prevalence of UTI in antenatal women was found in an earlier study by Okonko et al. They observed that the prevalence of UTI was 41.4% in 2nd trimester and 55.1% in 3rd trimester.^[14]

The most implicating organism causing UTIs among these pregnant women in this study was E. coli and it was responsible for (44.2%) of the cases of UTI. This was followed by S. aureus (19.2%), K. pneumoniae (21.1%), P. aeruginosa (7.6%) and E. aerogenes (7.6%). This finding is similar to other reports which suggest that gram negative

bacteria, particularly *E. coli* is the commonest pathogen isolated in patients with UTI.^[15-19]

Conclusion

UTI is one of the most common bacterial infections in the human population, and more frequent infection during pregnancy. With due consideration that most of UTIs during pregnancy are asymptomatic, they could lead to serious complications such as prematurity, low-birth weight, hypertension, and higher fetal mortality rates if untreated. In the present study, of 52 positive samples, 30 women suffered from asymptomatic bacteriuria while 22 women were suffering from symptomatic UTI.

The bacterial isolate were *E. coli* (44.2%), *S. aureus* (19.2%), *K. pneumoniae* (21.1%), *P. aeruginosa* (7.6%), *E. aerogenes* (7.6%).

Gram-negative bacteria were more prevalent 39 (78%) than Gram-positive bacteria which constituted 11 (22%). The most commonly isolated bacteria was *E. coli*, which is similar to the findings of many other similar studies. Although antibiotic susceptibility of isolated bacteria in this study does not show significant differences with other studies.

Therefore, early diagnosis and treatment of UTI in antenatal women should be done to prevent complications and improve pregnancy outcomes for both the mother and the baby.

References

1. Morgan MG, McKenzie H. Controversies in the laboratory diagnosis of community-acquired urinary tract infection. *Eur J Clin Microbiol Infect Dis* 1993;12:491-504.
2. Ebie MY, Kandakai-Olukemi YT, Ayanbadejo J, Tanyigna KB. Urinary tract infection in military hospital. *Niger J Microbiol* 2001;15:31-7.
3. Hooton TM, Winter C, Tiu F, Stamm WE. Randomized comparative trial and cost analysis of 3-day antimicrobial regimens for treatment of acute cystitis in women. *JAMA* 1995;273:41-5.
4. American Academy of Family Physicians (AAFP). Urinary Tract Infections: A Common Problem for Some Women. Washington, DC: AAFP; 2004. [Reviewed/Updated: 08/04 Created: 03/01].
5. National Institute of Health (NIH). What I Need to Know About Urinary Tract Infections. Bloomington, MN: NIH Publication; 2004. p. 04-4807.
6. Tamalli M, Sangar B, Alghazal MA. Urinary tract infection during pregnancy at Al-khoms, Libya. *Int J Med Med Sci* 2013;3:455-9.
7. Karen C, Deron CH, Donal HV, Clenn CR, Lesile TH, John MM. Laboratory evaluation of urinary tract infection in an ambulatory clinic. *Am J Clin Pathol* 1994;101:100-3.
8. Collee JG, Fraser AG, Marmion BP, Simmons A. Mackie & McCartney Practical Medical Microbiology. 14th ed. Edinburgh, U.K: Churchill Livingstone.
9. Gebre-Selassie S. Asymptomatic bacteriuria in pregnancy: Epidemiological, clinical and microbiological approach. *Ethiop Med J* 1998;36:185-92.
10. Delzell JE Jr, Lefevre ML. Urinary tract infections during pregnancy. *Am Fam Physician* 2000;61:713-21.
11. Nicolle LE. Epidemiology of urinary tract infection. *Infect Med* 2001;18:153-62.
12. Schnarr J, Smaill F. Asymptomatic bacteriuria and symptomatic urinary tract infections in pregnancy. *Eur J Clin Invest* 2008;38:50-7.
13. Sheffield JS, Cunningham FG. Urinary tract infection in women. *Obstet Gynecol* 2005;106:1085-92.
14. Okonko IO, Ijandipe LA, Ilusanya OA, Donbraye-Emmanuel OB, Ejembi J, Udeze AO et al. Incidence of urinary tract infection (UTI) among pregnant women. *J Biotechnol* 2008;8:6649-57.
15. Burbige KA, Retik AB, Colodny AH, Bauer SB, Lebowitz R. Urinary tract infection in boys. *J Urol* 1984;132:541-2.
16. Okonofua EE, Okonofua BN. Incidence and pattern of asymptomatic bacteriuria of pregnancy in women. *Med Pract* 1989;17:354-8.
17. Ebie MY, Kandakai-Olukemi YT, Ayanbadejo J, Tanyigna KB. Urinary tract infections in hospital. *Niger J Microbiol* 2001;15:31-7.
18. Njoku CO, Ezissi NH, Amadi AN. Observations on bacterial infection of urinary tract patients. *Int J Environ Health Hum Dev* 2001;2:57-61.
19. Akinyemi KO, Alabi SA, Taiwo MA, Omonigbehin EA. Antimicrobial susceptibility pattern and plasmid profiles of pathogenic bacteria isolated from subjects with urinary tract infections in Lagos, Nigeria. *Niger Q J Hosp Med* 1997;1:7-11.

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