

## DIAGNOSIS OF CULTURE POSITIVE URINARY TRACT INFECTIONS AND THEIR ANTI-MICROBIAL SENSITIVITY PROFILE IN TERTIARY CARE CENTRE

Prince Sreekumar Pius<sup>1</sup>, Suresh Kumar<sup>2</sup>, Manivel Ganesan<sup>3</sup>

<sup>1</sup>Professor, Department of General Medicine, Kanyakumari Government Medical College, Kanyakumari.

<sup>2</sup>Postgraduate Student, Department of General Medicine, Kanyakumari Government Medical College, Kanyakumari.

<sup>3</sup>Intern, Department of General Medicine, Kanyakumari Government Medical College, Kanyakumari.

### ABSTRACT

#### BACKGROUND

Urinary tract infection is very common all over the world and in India more than 10 million cases are reported per year. It is one of the common infections diagnosed in the outpatients as well as the hospitalised patients. Empirical treatment of community acquired urinary tract infections are determined by the antibiotic sensitivity in a population. This study was conducted to determine the antimicrobial sensitivity amongst the uropathogens to help establish local guidelines on treatment of urinary tract infection.

#### MATERIALS AND METHODS

In this study, we collected 1306 samples from patients in whom we suspected to have urinary tract infection based on clinical signs and symptoms (e.g. with fever (greater than 38°C) without another explanation or from a patient who had at least one urinary symptom (dysuria, urgency, frequency, or suprapubic pain or tenderness) in our hospital during January 2016-June 2016.

#### RESULTS

Urine cultures were positive for 18% of the patients. Among these cultures, Klebsiella pneumonia (41%), Escherichia coli (35%) and Pseudomonas aeruginosa (7%) were the common organisms found. Highest antimicrobial sensitivity amongst these pathogens was found with cefoperazone/sulbactam and amikacin.

#### CONCLUSION

Cefoperazone/sulbactam and amikacin were the highly sensitive systemic antibiotics while ciprofloxacin and norfloxacin were the sensitive oral antibiotics in our locality.

#### KEYWORDS

Culture Positive Uropathogens, Anti-Microbial Sensitivity Profile.

**HOW TO CITE THIS ARTICLE:** Pius PS, Kumar S, Ganesan M. Diagnosis of culture positive urinary tract infections and their anti-microbial sensitivity profile in tertiary care centre. J. Evid. Based Med. Healthc. 2016; 3(102), 5650-5653. DOI: 10.18410/jebmh/2016/1168

#### BACKGROUND

Urinary Tract Infection (UTI) is one of the most common infectious diseases seen in the community.<sup>1</sup> Empirical antibiotic therapy is usually applied here and for this, knowledge of the common uropathogens and their susceptibility to commonly used antibiotics is needed. Treatment becomes even more challenging in the presence of risk factors such as higher age, co-morbidity and immunosuppression. Poor patient compliance and incomplete course of antibiotic therapy have resulted in the evolution of resistance to many of the antibiotics. However,

the diagnosis of UTI in hospitalised patients is not always straightforward and antimicrobial therapy may not be appropriate just because there is bacteriuria. Challenges faced by clinicians in determining the significance of a urine culture result include the presence of nonspecific or atypical clinical presentations in bacteriuric patients or the inability of a hospitalised patient to express or describe urinary symptoms.<sup>1</sup> Asymptomatic bacteriuria generally defined as bacteriuria in the absence of urinary symptoms is relatively common in adults, but in most cases should not be treated. Although, the management of asymptomatic bacteriuria in hospitalised patients has not been addressed in published guidelines.<sup>2,3</sup> In the present study, we wished to determine the circumstances under which adult patients admitted to our hospital had urine cultures obtained and to describe the pattern of antimicrobial use in response to urine culture results. Various studies done worldwide have shown changing patterns in the aetiology of UTIs. But, studies on UTIs and the pattern of antibiotic resistances in tertiary care centre are few. The present trends of the uropathogens and their susceptibility to various antibiotics are essential to

*Financial or Other, Competing Interest: None.*

*Submission 03-12-2016, Peer Review 15-12-2016,*

*Acceptance 21-12-2016, Published 22-12-2016.*

*Corresponding Author:*

*Dr. Suresh Kumar,*

*Room No. 44, CRRI Hostel,*

*Kanyakumari Medical College,*

*Kanyakumari, Tamil Nadu.*

*E-mail: suresh\_kumardr@yahoo.co.in*

*DOI: 10.18410/jebmh/2016/1168*



formulate guidelines for the empirical treatment of UTIs while awaiting the culture sensitivity.

**MATERIALS AND METHODS**

The study was conducted in Kanyakumari Government Medical College Hospital during the period of January 2016-June 2016. This is a hospital-based prospective study. The study protocol was approved by the Institutional Ethical Committee. 1306 samples collected from patients suspected with urinary tract infection. Clear midstream urine samples were taken under sterile precautions and culture and sensitivity was done.

**OBSERVATION AND RESULTS**

Among the 1306 samples, 230 cultures (18%) were positive. Incidence among age groups.

Age	No. of culture positive samples
20-30 years	46
31-40 years	24
41-50 years	20
51-60 years	33
61-70 years	47
70 yrs. and above	60

Our study also shows that the incidence of UTIs decreases during the middle age, but it increases among the older adults, which is similar to the other comparable studies across different countries.<sup>4,5,6</sup>

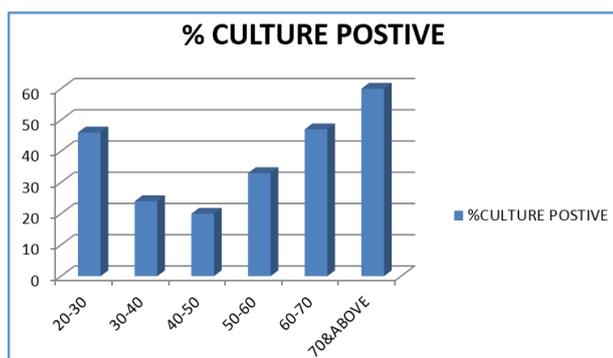


Figure 1

**INCIDENCE OF UTIs AMONG DIABETICS**

Out of the 230 culture positive urine samples, 72 culture positive patients were found to be diabetics. It shows about 31.3% UTIs were associated with diabetic patients.<sup>7</sup>

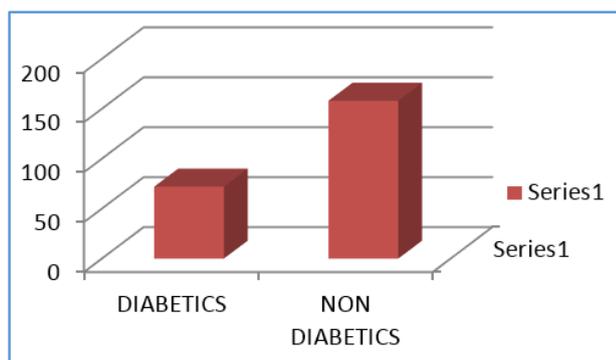


Figure 2

**PATHOGENS**

Among the culture positive organisms, the commonest pathogens found were Klebsiella pneumonia (41%), Escherichia coli (35%) and Pseudomonas aeruginosa (7%).

Their corresponding antimicrobial sensitivity was done. In Klebsiella pneumonia, 91% of them were sensitive to cefoperazone/sulbactam, 46% were sensitive to amikacin, 18% sensitive to ceftazidime, 14% sensitive to ciprofloxacin and gentamycin and 13% were sensitive to norfloxacin and cefuroxime.

In Escherichia coli, 94% of them were sensitive to cefoperazone/sulbactam, 72% were sensitive to amikacin, 27% were sensitive to ceftazidime, 22% were sensitive to gentamycin and 16% were sensitive to cefuroxime, ciprofloxacin and norfloxacin.

In Pseudomonas aeruginosa, 100% of them were sensitive to cefoperazone/sulbactam, 70% were sensitive to amikacin, 61% were sensitive to gentamycin, 46% were sensitive to ciprofloxacin and norfloxacin and 38% were sensitive to ceftazidime.

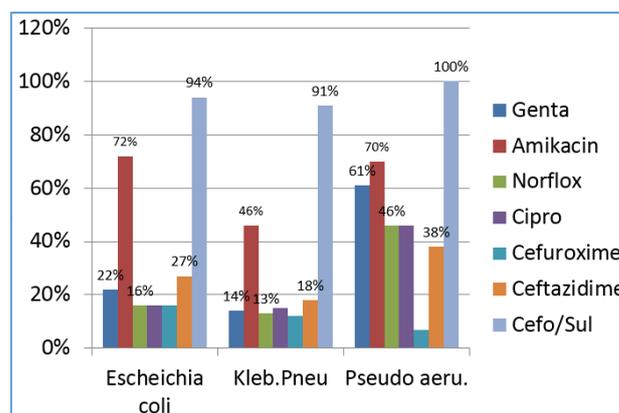


Figure 3

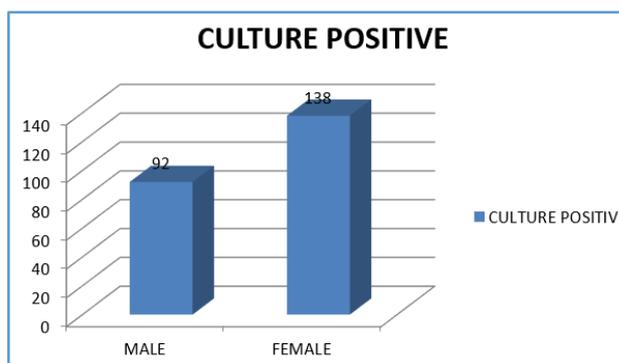


Figure 4

**DISCUSSION**

Urinary tract infections are common conditions worldwide and the pattern of antimicrobial sensitivity varies in different regions. The study was confined to UTIs in adults. Despite advances in antimicrobial therapy, UTIs remain a significant cause of morbidity. The sex distribution of patients in our study is consistent with those of other reported studies showing a predominance of females with UTI (138 samples out of 230, i.e. 60% of positive cultures).

The elevated level of infection among females is related to differences between the males and female genitourinary systems and microflora.

High urine glucose content and defective host immune factors predispose to urinary tract infections in diabetics. Hyperglycaemia causes neutrophil dysfunction by increasing intracellular calcium levels and interfering with actin and thus diapedesis and phagocytosis. This explains the higher incidence of UTIs among diabetics.<sup>7,8</sup>

The uropathogens identified in our study are similar to those of many other studies conducted in different regions. The similarities and differences in the type and distribution of uropathogens may result from different environmental conditions and host factors and practices such as healthcare, socioeconomic standards and hygiene practices in each region.

The prevalence of gram-positive cocci was not high in our study. This is similar to other studies in different countries. Apart from gram-positive cocci, the other isolates are inhabitant of large bowel. The Enterobacteriaceae family were the most common microorganisms isolated from urinary tract infection in the present study and among them *Klebsiella* and *E. coli* were the common organisms. There are other earlier studies in agreement to the present finding. Based on this study, it was revealed that susceptibility of bacteria to ciprofloxacin and norfloxacin antibiotics was similar to many studies. According to our results, the efficacy of cefoperazone/sulbactam and amikacin was comparable to other reports.

Main international guidelines recommend empirical therapy in UTI. The efficacy of such empirical therapy depends on periodic assessment of antimicrobial sensitivity profiles.<sup>9</sup> Although, the spectrum of bacteria isolated from patients with UTI worldwide has remained largely unchanged in which *E. coli* is the most prevalent microorganism, but our study shows that in our locality, *Klebsiella* sp is the most prevalent organism than *E. coli*. There have been significant changes in the sensitivity patterns of uropathogens over the past few year.<sup>10</sup>

### Limitations

Although, it is local, we believe that in this observational prospective study, we reached our goal in terms of obtaining precise scientific data dealing with the sensitivity rates of uropathogens in a tertiary care hospital serving to the Kanyakumari district.

Further studies with larger number of isolates from each individual geographical region are needed to confirm our results. However, clinicians should be aware of regional sensitivity rates and it should be taken into consideration before initiating empirical antimicrobial therapy for UTI.

### CONCLUSION

Clinical presentation plays a minor role in establishing diagnosis in UTI. Treatment of asymptomatic bacteriuria appears to be an important cause of inappropriate antibiotic use in hospitals and may therefore contribute to the emergence of antimicrobial resistance.<sup>2</sup> Strategies to ensure appropriate ordering of urine cultures and an appropriate

response to those that are positive need to be developed and evaluated. For example, in a randomised-controlled trial, a multifaceted diagnostic and treatment algorithm that incorporated evidence-based guidelines for obtaining urine cultures and starting antimicrobial therapy was found to be effective in reducing inappropriate antibiotic use in nursing home residents with bacteriuria.<sup>11</sup> A strong decision has to be established regarding the antibiotics policies for UTI and stringent measures to be taken to ensure the effectiveness of the same. The irrational use of antibiotics against these community acquired urinary tract infections will further aggravate the drug resistances among these organisms. Therefore, this study concludes that *Klebsiella* and *E. coli* isolates were more sensitive to cefoperazone/sulbactam and amikacin compared to the other antibiotics tested and therefore these maybe the drug of choice for the treatment of community-acquired UTIs in our region. While ciprofloxacin and norfloxacin were moderately sensitive and maybe used as empirical oral antibiotics of choice in our region.

### REFERENCES

- [1] Wilson ML, Gaido L. Laboratory diagnosis of urinary tract infections in adult patients. *Clin Infect Dis* 2004;38(8):1150-1158.
- [2] Nicolle LE, Bradley S, Colgan R, et al. Infectious diseases society of America guidelines for the diagnosis and treatment of asymptomatic bacteriuria in adults. *Clin Infect Dis* 2005;40(5):643-654.
- [3] Gross PA, Patel B. Reducing antibiotic overuse: a call for a national performance measure for not treating asymptomatic bacteriuria. *Clin Infect Dis* 2007;45(10):1335-1337.
- [4] Jackson SL, Boyko EJ, Scholes D, et al. Predictors of urinary tract infection after menopause: a prospective study. *Am J Med* 2004;117(12):903-911.
- [5] Foxman B, Barlow R, D'Archy H, et al. Urinary tract infection, self-reported incidence and associated costs. *Ann Epidemiol* 2000;10(8):509-515.
- [6] Eriksson I, Gustafson Y, Fagerstrom L, et al. Prevalence and factors associated with urinary tract infections (UTIs) in very old women. *Arch Gerontol Geriatr* 2010;50(2):132-135.
- [7] Zhanel GG, Nicolle LE, Harding GK. Prevalence of asymptomatic bacteriuria and associated host factors in women with diabetes mellitus. The Manitoba Diabetic Urinary Infection Study Group. *Clin Infect Dis* 1995;21(2):316-322.
- [8] Nicolle LE, Bjornson J, Harding GKM, et al. Bacteriuria in elderly institutionalized men. *N Engl J Med* 1983;309(23):1420-1425.
- [9] Walker S, McGeer A, Simor AE, et al. Why are antibiotics prescribed for asymptomatic bacteriuria in institutionalized elderly people?: a qualitative study of physicians' and nurses' perceptions. *Can Med Assoc J* 2000;163(3):273-277.

[10] Hecker MT, Aron DC, Patel NP, et al. Unnecessary use of antimicrobials in hospitalized patients: current patterns of misuse with an emphasis on the antianaerobic spectrum of activity. *Arch Intern Med* 2003;163(8):972-978.

[11] Loeb M, Brazil K, Lohfeld L, et al. Effect of a multifaceted intervention on number of antimicrobial prescriptions for suspected urinary tract infections in residents of nursing homes: cluster randomised controlled trial. *BMJ* 2005;331(7518):669.