Clinical Audit

Microbiological Analysis of the Urine Isolates in Kathmandu Medical College Teaching Hospital, Kathmandu, Nepal

Raza S, Pandey S, Bhatt CP

ABSTRACT

Background
Urinary tract infections (UTIs) are the common cause of bacterial infection. Recently UTI become more complicated and difficult to treat because of appearance of pathogen with increasing resistance to antimicrobial agents.

Objective
To determine the etiology of the urinary tract infections and their susceptibility to antimicrobial agents.

Methods
This study was carried out in Kathmandu Medical College, at department of microbiology. Total 3,460 urine samples were tested microbiologically by standard procedure. Antibiotic susceptibility test was performed for all the isolates by Kirby Bauer disc diffusion method and result was interpreted according to National Committee for Clinical Laboratory Standards (NCCLS) guide line.

Results
Out of 3,460 urine samples 680 (19.7%) showed the significant bacteriuria. The most common pathogens isolated were Escherichia coli 75.7% followed by Klebsiella pneumoniae 10.7%, Acinetobacter spp 5.5%, Proteus spp 3.5% and Pseudomonas aeruginosa 1.2%. Most susceptible antibiotic was Amikacin, Ceftriaxone and Ciprofloxacin for most of the isolates. E. coli which was the main isolate was found to be most susceptible to Amikacin 96.1%, Nitrofurantoin 91.3% and Gentamicin 77.7% followed by Ceftriaxone 65.8% and Ciprofloxacin 64.1%.

Conclusion
Regular surveillance of the resistance rate among uro-pathogens is needed to ensure the appropriate therapy of UTI.

KEY WORDS
antibiotic susceptibility, bacteriuria, UTI.

INTRODUCTION

Urinary Tract Infection (UTI) remains the common bacterial infection in human population. It is also one of the most frequently occurring nosocomial infection. About 150 Million people are diagnosed as having UTI per annum with a high risk of morbidity and mortality especially in elderly and account for significant health care cost. UTI is second only to respiratory tract in acquiring microbial infection especially in female. About 20% of women experience a single episode of UTI during their life time and 3% of woman have more than one episode of UTI per year. Microbial resistance to nearly all classes of antimicrobials continue to rise despite increasing awareness and concern world wide. Isolated pathogen frequency and antimicrobial resistant rates can vary dramatically even within the same nation. To ensure appropriate therapy current knowledge of the organism that cause UTI and their susceptibility pattern is mandatory. Herein we studied antimicrobial susceptibilities of bacteria isolated from the urine of the patients attending Kathmandu Medical College.

METHODS

The descriptive cross sectional study was conducted at the department of microbiology in Kathmandu Medical College from June 2009 to February 2010. Total 3,064 mid-stream clean catch urine samples were collected from clinically suspected patients. Urine samples were collected before the start of antibiotic therapy. The patient who had taken antibiotic was not included in the study.

The urine samples were inoculated onto MacConkey agar
and blood agar by semi quantitative culture technique. Culture Plates were incubated for overnight at 37°C. A growth of >10⁵ colony forming unit /ml was considered as significant bacteriuria. Bacterial identification was done based on standard bacteriological techniques. All isolates were tested for susceptibility to antimicrobial agents on Muller- Hinton agar by Kirby Bauer disc diffusion method recommended by NCCLS. Antibiotics used were Amikacin (30μg), Gentamicin (120μg), Nitrofurantoin (30μg), Norfloxacin (10μg), Co-trimoxazole (23.75/1.25μg), Ceftriaxone (30μg), Ofloxacin (5μg) Cephalexin (30μg) and Ciprofloxacin (30μg). Antibiotic discs used were from Hi-Media laboratories, India. Data were entered into Microsoft Excel and analyzed by SPSS version 16.0 program.

RESULTS

Out of 3,460 urine samples collected for the study 680 (19.7%) showed the significant bacteriuria. Isolates are shown in Table 1. The mean age in years was 35.6 (0-93 years). Male were 191 and female 489.

The antibiogram of the isolated pathogens is shown in Table 2. Among the tested antibiotics the highest susceptibility for the Gram negative bacteria was shown by Amikacin, Ceftriaxone and Ciprofloxacin followed by Gentamicin and Nitrofurantoin.

Table 1. Frequencies of isolates.

<table>
<thead>
<tr>
<th>Isolates</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escherichia coli</td>
<td>515 (75.7)</td>
</tr>
<tr>
<td>Klebsiella pneumonia</td>
<td>73 (10.7)</td>
</tr>
<tr>
<td>Acinetobacter species</td>
<td>35 (5.2)</td>
</tr>
<tr>
<td>Proteus species</td>
<td>24 (3.5)</td>
</tr>
<tr>
<td>Citrobacter species</td>
<td>11 (1.6)</td>
</tr>
<tr>
<td>Enterobacter species</td>
<td>9 (1.3)</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>8 (1.2)</td>
</tr>
<tr>
<td>Candida albicans</td>
<td>4 (0.6)</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>1 (0.2)</td>
</tr>
</tbody>
</table>

Table 2. Antibiotic sensitivity pattern of the isolates.

<table>
<thead>
<tr>
<th>Isolates</th>
<th>Antibiotic susceptibility %</th>
<th>Ak</th>
<th>G</th>
<th>Nf</th>
<th>Nx</th>
<th>Of</th>
<th>Cl</th>
<th>Cp</th>
<th>Cf</th>
<th>Co</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escherichia coli</td>
<td>96.1</td>
<td>77.7</td>
<td>91.3</td>
<td>57.1</td>
<td>59.6</td>
<td>63.1</td>
<td>29.7</td>
<td>58.6</td>
<td>38.6</td>
<td></td>
</tr>
<tr>
<td>Klebsiella pneumonia</td>
<td>94.5</td>
<td>80.8</td>
<td>74</td>
<td>64.4</td>
<td>67.1</td>
<td>69.9</td>
<td>26</td>
<td>69.9</td>
<td>52.4</td>
<td></td>
</tr>
<tr>
<td>Acinetobacter species</td>
<td>40</td>
<td>34.3</td>
<td>17.1</td>
<td>11.4</td>
<td>25.7</td>
<td>74.3</td>
<td>14.3</td>
<td>34.3</td>
<td>77.1</td>
<td></td>
</tr>
<tr>
<td>Proteus species</td>
<td>91.2</td>
<td>66.7</td>
<td>41.7</td>
<td>79.2</td>
<td>66.7</td>
<td>70.8</td>
<td>54.2</td>
<td>83.3</td>
<td>37.5</td>
<td></td>
</tr>
<tr>
<td>Citrobacter species</td>
<td>81.8</td>
<td>45.5</td>
<td>54.5</td>
<td>45.5</td>
<td>54.5</td>
<td>54.5</td>
<td>0.0</td>
<td>54.5</td>
<td>36.4</td>
<td></td>
</tr>
<tr>
<td>Enterobacter species</td>
<td>88.9</td>
<td>66.7</td>
<td>77.8</td>
<td>55.5</td>
<td>77.8</td>
<td>77.8</td>
<td>11.1</td>
<td>77.8</td>
<td>44.6</td>
<td></td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>75</td>
<td>62.5</td>
<td>25</td>
<td>37.5</td>
<td>37.5</td>
<td>50</td>
<td>12.5</td>
<td>50</td>
<td>37.5</td>
<td></td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>100</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Candida albicans</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Incase of E. coli which was the principal isolate, most susceptible antibiotics were Amikacin 96.1%, Nitrofurantoin 91.3%, Gentamicin 77.7% followed by Ceftriaxone 65.8% and Ciprofloxacin 64.1%. Klebsiella pneumoniae which was the second most isolated organism, showed high susceptibility to Amikacin 94.5%, Gentamicin 80.8% and Nitrofurantoin 74% followed by Ceftriaxone 69.9% and Ciprofloxacin 69.9%.

DISCUSSION

Recently, growth in the variety of UTI characteristics has occurred as the result of an increase in infections and types of resistance strains. This often causes difficulties for the treatment of UTI patients and unexpectedly high health care costs. For this reason, our study is especially meaningful and provides crucial information about recent urinary pathogens distribution and their antibiotic susceptibility pattern.

The prevalence of significant isolates observed in our study was 19.7%, which was lower in comparison to the finding of Kumari et al 25.7% and Rai et al 37.4% in Kathmandu. However, this was in agreement with another study conducted by Chhetri et al 21.8% in Nepal and Mohanty et al at AIIMS India 14.7%.

UTI was found to more prevalent in female than in male. This result was confirmatory with the study from Nepal, India and other countries.

In our study members of Enterobacteriaceae are the main isolates. Enterobacteriaceae have several factors responsible for their attachment to uroepithelium. The Gram negative aerobic bacterial colonize the uro-epithelial mucosa, with adherin, pilli, fimbriae and p1-blood group pheno type. In this study, Enterobacteriaceae mainly E. coli 75.7%, Klebsiella pneumoniae 10.7% Citrobacter spp 1.6 % and non-lactose fermenter followed by Candida spp 0.6%. This result was similar to study conducted by others.

Present study showed higher rates of susceptibility towards amino glycosides for E.coli, Klebsiella pneumoniae and other non-lactose fermenter. Amikacin showed the highest
susceptibility to all the isolates this study was reinforced by
the study conducted by Mutate et al.19
The urinary isolates showed high degree of resistance to
Norfloxacin and Co-trimoxazole in our study. The above
mentioned result correlates with study done by Rai et al.13
Among the Cephalosporin, Ceftriaxone was second most
effective antibiotic for all isolates. Similarly Ceftriaxone was
one of the most effective drugs of choice for Acinetobacter
species followed by Co-trimoxazole. Where as other
antibiotics were not much effective against Acinetobacter
species. This was because Acinetobacter species were
widely distributed in hospital and able to acquire and
express resistance to most of the antimicrobial agents
including imipenim.9

CONCLUSION
Isolates are showing variation in the antibiotic susceptibility
pattern hence regular surveillance of the resistance rate
among uro-pathogens is needed to ensure the appropriate
therapy of UTI.

REFERENCES
Prevalence of nosocomial infections in representative German
Physician* 1999; 59:1225-34.
3. Kriplani A, Bukshee K, Ratan A. Asymptomatic bacteriuria in pregnant
Indian patients, All India Institute of Medical Sciences, New Delhi, and
Treatment with single dose antimicrobial therapy. *J Obst Gyn of India*
1993; 43:489-91.
5. Belonga EA, Schwartz B. Strategies for promoting judicious use of
acquired Urinary tract infection in Britain. *J. Antimicrob.Chemother*
urinary pathogens in out patient clinic and a hospital in southern
38.
8. Grunberg GN. Antibiotic sensitivities of Urinary pathogens; 1971-
9. Betty AF, Denial FS, Alice SW. editors. In: Cultivation and isolation of
viable pathogens. Baily and Scott’s Diagnostic Microbiology, 10th edn.
10. Liperky BA. Urinary tract infection in men: epidemiology, patho-
physiology, diagnosis and treatment. *Ann Intern Med* 1989; 111:138-
50.
microbial pathogenesis, Immunity Laboratory Diagnosis and control.
13. Rai SK, Pokhrel BM, Sharma AP. A prospective study of antibiotic
sensitivity profile of the organisms associated with clinical infections
among the patients attending TU Teaching Hospital. *Nepal Med Assoc
urinary tract infection at Nepal Medical College Teaching Hospital,
nosocomial uro pathogens in a tertiary care hospital. *Indian J Med Sci*
2003; 57:148-54.
16. Stamm WE, Urinary tract infection and pyelonephritis. In Kaspar DL,
17. Chaudhary SK, Kolar M, Yeung CK. Urinary tract infection: The
resistance patterns in urinary isolates from nursing home residents.
Fifteen years of data reviewed. *J. Antimicrobial Chemother* 1999;
44:113-6.
in symptomatic urinary tract infections in Leon, Nicaragua. *Int’l J