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

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Citation

Raza S, Pandey S, Bhatt CP. Microbiological Analysis of the Urine Isolates in Kathmandu Medical College Teaching Hospital, Kathmandu, Nepal. *Kathmandu Univ Med J* 2011;36(4):295-7.

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.[1] 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.[2] UTI is second only to respiratory tract in acquiring microbial infection especially in female.[3] 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.[4]

Microbial resistance to nearly all classes of antimicrobials continue to rise despite increasing awareness and concern world wide.[5] Isolated pathogen frequency and antimicrobial resistant rates can vary dramatically even within the same nation.[6,7] To ensure appropriate therapy current knowledge of the organism that cause UTI and their susceptibility pattern is mandatory.[8] 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.[9] culture Plates were incubated for overnight at 37ºC. A growth of >105 colony forming unit /ml was considered as significant bacteriuria.[10] 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.[11]

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.

Isolates	Frequency (%)
Escherichia coli	515 (75.7)
Klebsiella pneumoniae	73 (10.7)
Acinetobacter species	35 (5.2)
Proteus species	24 (3.5)
Citrobacter species	11 (1.6)
Enterobacter species	9 (1.3)
Pseudomonas aeruginosa	8 (1.2)
Candida albicans	4 (0.6)
Staphylococcus aureus	1 (0.2)

Table 2. Antibiotic sensitivity pattern of the isolates.

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

Ak; Amikacin, G; Gentamicin, Nf; Nitrofurantoin, Nx; Norfloxacin, Ci; Ceftriaxone, Cp; Cephalexin, Of; Ofloxacin Cf; Ciprofloxacin, Co; Co-trimoxazole

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.[12,13] 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%.[14,15]

UTI was found to more prevalent in female than in male.[16] This result was confirmatory with the study from Nepal, India and other countries.[16,17]

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 adhesin, 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.[14,18]

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.

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