



ANTIBIOTICS SENSITIVITY PATTERN OF PATIENT WITH INDWELLING CATHETER IN ICU

Microbiology

**Dr. Manish
Nagendra**

Associate Professor, Department of Microbiology, NSCB Medical College Jabalpur (M.P.).

ABSTRACT

Introduction :- Catheter associated Urinary tract infections (CAUTI) are the most common nosocomial infection. Though urinary tract catheterization is an important aspect of medical care, its inappropriate use may lead to significant morbidity and mortality with increased hospitalization.

Objective :- This study was carried out to identify the etiological agents of UTI and its antibiogram among inpatients with indwelling catheters.

Methods :- A total of 160 urine samples were collected over a period of 10 months. Microscopic and macroscopic examinations were performed. Isolation, identification was performed by standard microbiological methods. Antimicrobial susceptibility patterns of each isolate was carried out by the Kirby- Bauer disk diffusion method as per guidelines of CLSI.

Results: Majority of isolates of *Escherichia coli* 57 (51.82%) were obtained from inpatients with indwelling catheters urine. The isolated pathogens showed 100% sensitive to Polymyxin-B and Colistin. Least sensitive to Co-trimoxazole (25%).

Conclusion: The results confirmed the occurrence of high level of resistance among bacteria causing CAUTI limits the use of antimicrobial agents for therapy. The encouraging finding was its sensitivity to Polymyxin-B and Colistin as an effective antibiotic for the treatment. It therefore calls for a very judicious, rational treatment regimens prescription by the physicians to limit the further spread of antimicrobial resistance among the *Escherichia coli* strains.

KEYWORDS

Escherichia coli, antimicrobial sensitivity, indwelling catheters.

INTRODUCTION

Now a day's hospital acquired infections (HAIs) are an important public health problem in developing as well as in developed countries.¹ Indwelling urinary catheters are standard medical devices utilized in both hospital and nursing home settings to relieve urinary retention and urinary incontinence. The most common urinary catheter in use is the Foley's indwelling urethral catheter, a closed sterile system that is comprised of a tube inserted through the urethra and held in place by an inflatable balloon to allow urinary drainage of the bladder.² Due to the frequent and sometimes unnecessary use of indwelling catheters during hospitalization (21 to 50% of patients) many patients are placed at risk for complications associated with the use of these devices.³ The most notable complication associated with indwelling urinary catheters is the development of nosocomial urinary tract infections, known as catheter associated Catheter associated urinary tract infection (CAUTI). CAUTI is a common problem with considerable economic impact.²

Current studies was antimicrobial sensitivity profiles of CAUTI are essential to find out the susceptibilities of this pathogen against commonly prescribed antibiotics in any health care facility. This would help the physicians to optimize the current therapeutic treatment options. So this study was therefore designed to find out the current antimicrobial susceptibility patterns of CAUTI.

MATERIALAND METHOD

The present observational prospective study was conducted in the Department of Microbiology, Jawaharlal Nehru Medical College and Acharya Vinoba Bhave Rural Hospital, Sawangi (Meghe), Wardha, for the period of 10 months. All the patients admitted in ICU with urinary catheter insertion for >48 hours were included in the study. The urine samples were collected with standard norms with proper aseptic precaution. Total no. of 160 isolates from various patients was included in the present study. Only 110 samples were significant growth of organism $\geq 10^5$. All collected were observed routine microscopy with inoculated on routine culture media like CLED agar, Nutrient agar and blood agar etc. A battery of tests were performed that included Gram's staining, colony morphology, motility tests, sugar fermentation tests and biochemical tests such as oxidase test, urease and Phenyl puruvic acid test and IMViC (indole, methyl red, Voges-Proskauer and citrate) tests for the identification of different isolated organisms.

Susceptibility test:

All isolated strains were subjected to antimicrobial susceptibility test by modified Kirby-Bauer disk diffusion method as per CLSI guidelines. A panel of antimicrobials of standard strengths as follows: Amikacin 30 µg/disc, Ciprofloxacin 5 µg/disc, Ceftazidime 30

µg/disc, Netillin 30µg/disc, Colistin 10µg/disc, Piperacillin-tazobactam 100/10 µg/disc, Nitrofurantion 300 µg/disc, vancomycin (30 µg/disc), erythromycin (15 µg/disc) and penicillin (10 units) Imipenem 10 mcg, Polymyxin-B 300 units/disc (Hi Media Laboratories Pvt. Ltd., Mumbai, India). *Escherichia coli* ATCC 25922, *S. aureus* ATCC 25923, *Pseudomonas aeruginosa* ATCC 27853 was used as control strain.

RESULTS:-

All these 110 patients included 78 males (70.91%) and 32 females (29.09%). So M/F ratio observed in the present study was 1.6:1. As shown in table no. 1.

Table No.1 Showing Age and sex distribution of the patients (n=110)

Age group	Male	Female
15 -30 Years	10 (12.82%)	04 (12.50%)
31 - 45 Years	30 (38.46%)	10 (31.25%)
46 - 60 Years	18 (23.08%)	09 (28.13%)
61 -75 Years	15 (19.23%)	06 (18.75%)
76 - 90 Years	05 (6.41%)	03 (9.38%)
Total (n=110)	78 (70.91%)	32 (29.09%)

Amongst 78 males patients, Maximum no. of males patients 30 (38.46%) were in the age group of 31 to 45 Years.

Amongst 32 females patients, Maximum no. of females patients 10 (31.25%) were in the age group of 31 to 45 Years.

Table no. 2 Showing Organism isolated from patients with indwelling catheter (n=110)

S.No.	Organism	No. of Samples (n=110)
1	<i>Escherichia coli</i>	57 (51.82%)
2	<i>Klebsiella pneumoniae</i>	18 (16.39%)
3	<i>Pseudomonas aeruginosa</i>	13 (11.79%)
4	<i>Staphylococcus aureus</i>	9 (8.19%)
5	<i>Enterobacter spp.</i>	8 (7.29%)
6	<i>Enterococcus faecalis</i>	2 (1.81%)
7	<i>Proteus mirabilis</i>	2 (1.81%)
8	<i>Acinetobacter spp.</i>	1 (0.9%)
Total (n= 110)	110 (100%)	

Table no. 2 showing that in 110 samples 57 (51.82%) were *Escherichia coli* followed by *Klebsiella pneumoniae* 18 (16.39%), *Pseudomonas aeruginosa* 13 (11.79%), *Staphylococcus aureus* 09 (8.19%), *Enterobacter spp.* 08 (7.29%), *Enterococcus faecalis* 02 (1.81%), *Proteus mirabilis* 02 (1.81%) and *Acinetobacter spp.* 01 (0.9%).

Maximum isolate were *Escherichia coli* 57 (51.82%).

Table no. 3 Antibiotic sensitivity profile of various Isolated organism from patients with indwelling catheter (n=110)

Antibiotics →	Amikacin	Ciprofloxacin	Co-trimoxazole	Ceftazidime	Imipenem	Netilin	Piperacillin/Tazobactam	Nitrofurantoin	Polymyxin B	Colistin	Penicillin	Vancomycin	Erythromycin
Isolated Organism ↓													
<i>Escherichia coli</i>	65%	58%	25%	35%	90%	88%	92%	87%	100%	100%	NA	NA	NA
<i>Klebsiella pneumoniae</i>	55%	45%	20%	35%	91%	90%	93%	90%	100%	100%	NA	NA	NA
<i>Pseudomonas aeruginosa</i>	12%	8%	2%	30%	93%	89%	89%	85%	100%	100%	NA	NA	NA
<i>Staphylococcus aureus</i>	94%	80%	25%	38%	95%	95%	NA	80%	NA	NA	2%	100%	65%
<i>Enterobacter spp.</i>	75%	70%	62%	40%	94%	96%	90%	89%	100%	100%	NA	NA	NA
<i>Enterococcus faecalis</i>	76%	72%	60%	49%	NA	NA	NA	80%	NA	NA	2%	100%	68%
<i>Proteus mirabilis</i>	50%	0	0	50%	100%	50%	100%	50%	100%	100%	NA	NA	NA
<i>Acinetobacter spp.</i>	0	0	0	0	100%	0	100%	0	100%	100%	NA	NA	NA

DISCUSSION

In this study, a total of 110 isolates of various organism were isolated and identified from patients admitted in ICU with urinary catheter insertion for >48 hours from the hospitalized patients and their antimicrobial susceptibility patterns were determined. Amongst 110 patients studied 78 (70.91%) were males and 32 (29.09%) were females and male to female ratio was 1.6:1. Sandhu *et al* (2018)⁴ in their prospective study of 161 hospitalized patients reported Male/Female ratio 1.5:1 is comparable to the studies.

In the present study maximum no. of male 30 (38.46%) were in the age group of 31 to 45 Years and females patients 10 (31.25%) were in the age group of 31 to 45 Years. It is comparable to the Sandhu *et al* (2018)⁴ reported 32% in the age group 31 to 40 years. Karkee *et al* (2017)⁵ reported age group of 31 to 45 years (38.3%).

In present studied maximum no. of 57 (51.82%) were *Escherichia coli* isolated. It is comparable with Majumder *et al* (2014)⁶ were reported in 60 (60%) samples out of 100 samples. Karkee *et al* (2017)⁵ reported in their study of 161 samples isolated in 52.3%. Das *et al* (2017)² also report maximum no of *Escherichia coli* in urine sample 66.66%. *Klebsiella pneumoniae* 18 (16.39%), *Pseudomonas aeruginosa* 13 (11.79%), *Staphylococcus aureus* 09 (8.19%), *Enterobacter spp.* (7.29%), *Enterococcus faecalis* 02 (1.81%), *Proteus mirabilis* 02 (1.81%) and *Acinetobacter spp.* 01 (0.9%) it is comparable with Majumder *et al* (2014)⁶ *Klebsiella spp* 14%, *Pseudomonas aeruginosa* 7%, *Acinetobacter spp* 1%, *Enterococci* 2%, and *Proteus* 1%.

Escherichia coli were maximum sensitive to polymyxin-B and colistin respectively (100%) followed by Piperacillin/Tazobactam (92%), imipenem (90%) and amikacin (65%) and lest sensitive to Ceftazidime (35%) followed by Co-trimoxazole (25%). Das *et al* (2017)² maximum sensitive reported imipenem (95%), Amikacin (70%), Ceftazidime (45%) followed by Co-trimoxazole (30%) is comparable. Also *Klebsiella sp* imipenem (91%) and Nitrofurantoin (90%) sensitive is comparable with Majumder *et al* (2014)⁶ were reported imipenem (88.88%) and Nitrofurantoin (82%) sensitive.

In the present study *Pseudomonas aeruginosa* were maximum sensitive to polymyxin-B and colistin respectively (100%) followed by imipenem (93%). This finding correlates with studied of Rahbar *et al.* (2010)⁸ reported *Pseudomonas aeruginosa* was 89.9% sensitive to imipenem and Bose *et al* (2013)⁷ reported *Pseudomonas aeruginosa* was 100% sensitive to polymyxin-B, colistin.

CONCLUSION

The present study on the bacteriological profiles of the CAUTI showed that the rate of such infections is high, even though it was within the reported range. The insertion of indwelling catheter needs careful prophylactic aseptic standards like stringent adherence to hand washing practices Polymyxin-B and colistin was the only antimicrobial drugs against which all isolates were fully sensitive. We suggest a more restricted and a more rational use of this drug in this hospital setting. In addition, regular antimicrobial surveillance is essential for monitoring of the resistance patterns.

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