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URINARY TRACT INFECTION ASSOCIATED WITH INDWELLING CATHETER IN POST OPERATIVE PATIENTS ADMITTED IN J.L.N. HOSPITAL, AJMER

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ABSTRACT

Background: Among UTIs acquired in the hospital, approximately 75% are associated with a urinary catheter. The daily risk of bacteriuria with catheterization is 3% to 7%, approaching 100% after 30 days. Propose of this study was to find out Causative organism and Incidence rate of CAUTI, association of CAUTI with duration of catheterization and antimicrobial sensitivity pattern of causative organism of CAUTI. **Methodology:** Samples were collected for microscopic examination, culture and sensitivity, from the catheter tube after clamping and disinfecting. Concentration of ≥105 colony forming unit (CFU)/mL was taken as significant bacteriuria. **Results:** Out of 138 catheterize patients, mean age was 40.20 ± 15.88 years, ranging from 18 – 82 years. Incidence of CAUTI was 18.8% (26/138). Twelve (46.2%) patients were more than 50yr of age. Female [24.3% (9/37)] had more CAUTI than male [16.8% (17/101)]. Gram negative (85.7%) were more common than Gram positive (14.3%) bacteria. E coli (39.3%) was most common organism followed by Pseudomonas and Klebsiella (14.3% each). Most of Gram negative organism were sensitive to Meropenam, Pipracilline-Tazobactum and highly resistant to Cefepime and Nalidixic acid. Among Gram positive organism Enterococcus is more common followed by Staphylococcus. These are highly resistant to Clindamycin, Erythromycin whereas sensitive to Vancomycin and Teicoplanin and Linezolid. **Conclusion:** There is high incidence of CAUTI in elderly patients, female sex and duration of indwelling catheter. E coli is the commonest organism isolated. Most of organism is resistant to commonly used antibiotics.

KEYWORDS : CAUTI, UTI, Catheter-associated urinary tract infection, urinary catheterization

INTRODUCTION

Urinary tract infections (UTI) are a common health problem. UTIs may be classified as uncomplicated or complicated. Uncomplicated UTIs, typically representing community-onset cystitis, and occur in otherwise healthy individuals without structural or neurologic abnormalities of the urinary tract. On the other hand, complicated UTIs are associated with patient-level factors that compromise urodynamics or host defenses, such as indwelling or intermittent urinary catheterization, urinary obstruction or retention, immunosuppression, renal failure, renal transplantation, and pregnancy

Catheter-associated urinary tract infection (CAUTI) is a common device-associated infection in hospitals. CAUTI has been associated with increased morbidity, mortality, hospital cost, and length of stay. CAUTI accounts for over 1 million cases in the United States alone and almost 80% of the nosocomial infections worldwide and often leads to secondary bloodstream infections.[1] Among UTIs acquired in the hospital, approximately 75% are associated with a urinary catheter, which is a tube inserted into the bladder through the urethra to drain urine.[2] Between 15-25% of hospitalized patients receive urinary catheters during their hospital stay.[2]

The source of microorganisms causing CAUTI can be endogenous, typically via meatal, rectal, or vaginal colonization, or exogenous, such as via contaminated hands of healthcare personnel or equipment. The most common organisms to cause CAUTI derive from the patient's perineal flora or from the hands of HCWs.[2] The daily risk of bacteriuria with catheterization is 3% to 7%,[3] approaching 100% after 30 days, which is considered the delineation between short and long-term catheterization.

Several pathogens can be associated with urinary tract infections, of which Gram negative bacteria are the most frequent. Uropathogenic *Escherichia coli (*UPEC) is the major causative agent of both uncomplicated UTI and CAUTI.[4], other are *Klebsiella* spp., *Staphylococcus saprophyticus*, *Enterococcus* spp, group B streptococcus (GBS), *Proteus* spp, and *Pseudomonas aeruginosa.*, and *Morganella morganii* spp. etc are more frequently involved.

Furthermore, patients with catheter-associated bacteriuria have a 3% risk of developing bacteremia.[11] If inadequately treated, CAUTI can lead to such complications as prostatitis, epididymitis, and orchitis in males, and cystitis, pyelonephritis, gram-negative bacteremia, endocarditis, vertebral osteomyelitis, septic arthritis, endophthalmitis, and meningitis in patients. Complications associated with CAUTI cause discomfort to the patient, prolonged hospital stay, and increased cost and mortality. It has been estimated that each year, more than 13,000 deaths are associated with UTIs.[3]

MATERIALS & METHODS

This study was carried out in the Department of Microbiology J.L.N Medical College, Ajmer. from the period of Aug 2021 to Sept 2022. Samples were collected for microscopic examination, culture and sensitivity, from the catheter tube after clamping and disinfecting. Concentration of $\geq 10^5$ colony forming unit (CFU)/mL was taken as significant bacteriuria. Only those patients, whose urine found sterile before catheterization will be include in this study. The uropathogens were identified by using standard microbiological procedure by colony characteristics, morphology, motility testing and standard biochemical test. Each isolate was subjected to antimicrobial susceptibility test by Kirby Bauer disc diffusion technique as per CLSI 2022 guidelines.[5]

RESULTS

Table No-1: Association of catheter related urinary tract infection with duration of catheterization (n = 138)

Outcome	Day 0	<48 hours	3rd day	4th day	5th day
Negative	138	131	124	115	105
Positive	0	7	14	23	33
Total	138	138	138	138	138

Cochran's Q test; Test statistic 82.585 with df = 4; p-value < 0.001

Table No-2: Incidence rate of CAUTI according to age distribution (n=138)

Age group	No of patients	CAUTI	Percentage
≤ 20	17	2	11.8
21-30	26	3	11.5
31-40	28	4	14.3
41-50	31	5	16.1
51-60	22	5	22.7
61-70	9	4	44.4
>70	5	3	60
Total	138	26	18.8

The chi-square statistic is 11.0987. The p-value is 0.0254 (S)

Table No-3: Distribution of etiological agents: (n=138)

	Bacterial species	Frequency	Percentage
Gram negative bacilli	Escherichia coli	11	39.3
	K. pneumoniae	4	14.3
	P.aeruginosa	4	14.3
	Enterobactor	2	7.1
	Citrobactor	2	7.1
	Proteus	1	3.6
Gram positive cocci	Staphylococcus aureus	1	3.6
	Enterococcus	3	10.7
Total		28	100

Total 138 patients consecutively enrolled, who met study inclusion criteria, were included in the study.

Out of 138 catheterize patients, 101 (73.2%) were male and 37 (26.3%) were female. Male to female ratio is 3:1. Median age was 40 years and mean age was 40.20±15.88 years, ranging from 18 – 82 years.

Incidence of CAUTI was found 18.8% (26/138). Twelve (46.2%) patients with CAUTI were more than 50yr of age (p-value 0.0254). Higher incidence rate of CAUTI were found in >70 year of age group i.e., 60% followed by 61-70 years (44.4%). Least incidence of CAUTI was found in younger age group i.e., 21-30 years (11.5%) followed by ≤ 20 years (11.8%). The association of CAUTI with age group found statistically (table-2).

Out of 101 male patients, 17 (16.8%) found CAUTI positive whereas out of 37 female patients, 9 (24.3%) were found CAUTI positive. Female had more CAUTI than male. However statistically it is not significant (p-value >0.05).

Table-1 shows total 33 urinary tract infection found in 138 catheterized patients. Total 7 sample urinary tract infection found positive in < 48 hour of duration so they were not included as a CAUTI. Incidence of CAUTI was increasing with duration of catheter(p-value < 0.001).

Total 26 urinary samples found positive for gram staining. Out of which 24 samples on culture found mono isolate whereas 2 samples found mix isolate. Out of 28 isolates, Gram negative [24(85.7%)] were more common than Gram positive [4(14.3%)] bacteria. Among gram negative isolate *E coli* (39.3%) was most common organism followed by *Pseudomonas* and *Klebsiella* (14.3% each), *P.aeruginosa* (14.3%), *Enterobactor* (7.1%), *Citrobactor* (7.1%) and *Proteus*(3.6%). Among gram positive cocci, *Enterococcus* (10.7%) was predominant isolate followed by *Staphylococcus aureus (*3.6%) (Table no-3).

Most of Gramnegative organism were sensitive to Meropenam, Pipracilline-Tazobactum and highly resistant to Cefepime and Nalidixic acid. Among Gram positive organism *Enterococcus* is more common followed by *Staphylococcus*. These are highly resistant to Clindamycin, Erythromycin whereas sensitive to Vancomycin and Teicoplanin and Linezolid.

DISCUSSION

In our study incidence rate of catheter associated urinary tract infection (CAUTI) was 18.8%. Our study is comparable with studies by Simaranjit Kaur et al[6], Filippo Binda et al[7,] Chanda R. Vyawahare et al[8].

Female (24.3%) had more catheter associated urinary tract infections (CAUTI) than male (16.8%). This study is comparable with studies by Arunagiri Ramesh et al[9], Simaranjit Kaur et al[6] and various other studies.

Higher incidence rate of CAUTI were found in >70 year of age group i.e. 60%. Arunagiri Ramesh et al[9] and Yisiak Oume et al[10] and Filippo Binda et al[7] were also found higher incidence rate in elderly patients.

Gram negative isolate were 85.7% whereas Gram positive isolate were 14.3% in our study. Studies by Chanda R. Vyawahare et al[8], Simaranjit Kaur et al[6], Hanumantha et al[11], Dr. Jagadish et al[12], Bhavana A Kakaria et al[13] and many other studies also found that Gram negative isolates were more common than gram positive

CONCLUSION

There is high incidence of CAUTI in elderly patients, female sex and duration of indwelling catheter. *E coli* is the commonest organism isolated. Most of organism is resistant to commonly used antibiotics. Appropriate health education, infection control practices of patients, staff, caretaker and early surgical intervention to correct the indications leading to prolonged catheterization are required to reduce CAUTI. Appropriate antibiotic policies, proper guided bundle care of catheter are need of the hour to prevent the CAUTI.

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