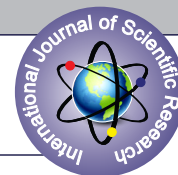


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BACTERIOLOGICAL PROFILE & ANTIMICROBIAL SUSCEPTIBILITY PATTERN OF THE ISOLATES FROM CASES OF CATHETER ASSOCIATED URINARY TRACT INFECTIONS IN ADULT PATIENTS OF INTENSIVE CARE UNIT FROM A TERTIARY CARE HOSPITAL, VADODARA, GUJARAT.

Clinical Microbiology

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ABSTRACT

Introduction: Catheter associated urinary tract infection (CAUTI) is an important healthcare associated infection. More than 80% of nosocomial UTIs are catheter-associated. Patients in intensive care unit have more risk of acquiring CAUTI. **Objectives:** To determine the incidence rate of CAUTI in ICU set-up, to isolate the organisms, to determine the antimicrobial sensitivity pattern and the association of symptomatic CAUTI in relation to high risk factors. **Materials & Methods:** A total of 150 symptomatic catheterized patients admitted in medical and surgical ICU were included. The urine samples were subjected for bacteriological analysis. **Results:** Total 59 patients developed Symptomatic CAUTI, incidence being 39.3%. *Escherichia coli* was the most common isolate (37.9%) followed by *Klebsiella* species (16.7%), *Enterococcus* species (15.2%), *Pseudomonas aeruginosa* (10.6%), *Candida* spp. (13.6%), *Acinetobacter* species (4.5%) and *Staphylococcus aureus* (1.5%). The bacterial isolates were more sensitive to piperacillin-tazobactam and Nitrofurantoin. **Conclusion:** To prevent CAUTI, emphasis should be placed on good catheter management and reducing the duration of catheterization to reduce its incidence. Knowledge of resistant pattern can help in implementing proper antibiotic therapy and infection control policy.

KEYWORDS

Catheter associated UTI, nosocomial, ICU.

INTRODUCTION

Catheter associated urinary tract infection (CAUTI) is an important healthcare associated infection. Urinary tract infection (UTI) is the most common nosocomial infection which accounts for as many as 35%^[1] of the cases. Among these, more than 80% of nosocomial UTIs are catheter-associated (CAUTI)^[1]. As compared to patients in non-critical area, those in intensive care unit have more risk of acquiring CAUTI^[2,3]. Healthcare associated infection (HAI) has emerged as an important health problem throughout the world, causing significant mortality and morbidity^[4]. HAI is defined as clinical infection that develops after 48 hours of admission to a hospital for treatment of a different initial illness. These infections were neither overtly present nor within the incubation period at the time of admission, and are often due to organisms endemic in the hospital^[5]. According to CDC National Healthcare Safety Network (NHSN) division, CAUTI is defined as a UTI in patient who is catheterized for more than 2 days with at least one of the following signs or symptoms: fever (38°C), urgency, frequency, dysuria, suprapubic tenderness, costovertebral angle pain or tenderness and positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganism. According to NHSN, HAI surveillance should be conducted only for high-risk locations such as intensive care units (ICUs). A number of risk factors are implicated in the causation of CAUTI. These include female sex, old age, increased duration of hospital stay and catheterization, impaired immunity, severe underlying illness, diabetes mellitus, renal dysfunction, incontinence, neurological/orthopedic causes, disconnection of drainage system and faulty catheter care^[6,7]. Due to increase in prevalence of multidrug resistant isolates, early detection is crucial. This study will help in planning effective infection control policies and proper antimicrobial policy, thereby decreasing the incidence of antimicrobial resistance.

METHODOLOGY

Cross-sectional study of 150 adult patients admitted in Medical and Surgical ICU of Medical college and SSG Hospital, Baroda, Vadodara having indwelling catheter for ≥ 48 hours and showing signs and symptoms suggestive of CAUTI is included in this study. Study carried out over a period of 1yr. Urine samples were collected, processed and identification of isolates were done. Antibiotic sensitivity was performed by Kirby Bauer disc diffusion method as per CLSI guidelines.

RESULTS

In this study, Total 150 symptomatic patients were studied for assessment of CAUTI, 59 patients were culture positive (significant bacteriuria) and 91 patients were culture negative.

Table 1: Age-wise Distribution

Age Group (years)	Culture Negative	Culture Positive	Total
62			

18 to 30	36	18 (33.3%)	54
31 to 40	20	13 (39.4%)	43
41 to 50	12	4 (25%)	16
51 to 60	9	8 (47%)	17
61 to 70	7	6 (46.2%)	13
71 to 80	5	10 (66.7%)	15
> 80	2	0 (0%)	2
Total	91	59	150

Table 2: Gender-wise Distribution

Gender	Culture Negative	Culture Positive	Total
Male	53	24 (31.2%)	77
Female	38	35 (48%)	73
Total	91	59	150

Table 3: Risk Factor In Study Group

Parameter	Culture Negative	Culture Positive
1. Age 50yrs and above		
Yes	24	24(50%)
No	67	35(34.3%)
2. Duration of catheterization ≥ 10 days		
Yes	46	36(43.9%)
No	44	24(35.3%)
3. Female sex		
Yes	38	35 (47.9%)
No	53	24(31.2%)
4. Neurological causes		
Yes	14	7(33.3%)
No	77	52 (40.3%)
5. Respiratory causes		
Yes	24	14(36.8%)
No	67	45(40.2%)
6. Nephrological causes		
Yes	9	9 (50%)
No	82	50(37.9%)
7. Post-surgery		
Yes	14	13(48.1%)
No	77	46(37.38%)
8. Unconsciousness		
Yes	55	29(34.5%)
No	36	30(45.5%)
9. Spinal injury		
Yes	5	0
No	86	59(40.7%)
10. Diabetes mellitus		

Yes	23	17(42.50%)
No	60	50

Table 4: Microbiological Profile Of Organism Isolated.

Organism Isolated	Number of cases	In Percentage
Candida species		
Candida albicans	3	4.5
Candida krusei	2	3
Candida tropicalis	4	6.1
Enterobacteriaceae		
Escherichia coli	25	37.9
Klebsiella specie	11	16.7
Pseudomonas aeruginosa		
Non-fermenters		
Pseudomonas aeruginosa	7	10.6
Acinetobacter species	3	4.5
Gram Positive organisms		
Staphylococcus aureus	1	1.5
Enterococcus faecalis	10	15.2
Total	66	100

In vitro antibiotic susceptibility pattern of gram negative bacteria is as follow - E.coli showed maximum sensitivity to Nitrofurantoin (76%), doxycycline (36%), nalidixic acid (36%), Co-Trimoxazole (32%), Cefazidime (16%), Cefotaxime (12%) respectively. Klebsiella species showed sensitivity to Nitrofurantoin (63.6%), Levofloxacin (54.5%), Co-Trimoxazole (45.5%), Doxycycline (36.4%), Nalidixic acid (36.4%), Cefotaxime (18.2%) and Cefazidime (318.2%) respectively. Pseudomonas aeruginosa were sensitive to Piperacillin-tazobactam (85.7%), imipenem (57.1%) Levofloxacin (57.1%), ceftazidime (42.9%), Ceftazidime-clavulanic acid (42.9%), Gentamicin (14.3%) respectively. Acinetobacter species isolates were sensitive to Nitrofurantoin (66.6%), Co-Trimoxazole (66.6%), levofloxacin (33.3%). Enterococcus species were sensitive for Linezolid (100%). Vancomycin (80%), High level Gentamicin (50%), Doxycycline (30%) Erythromycin (30%), Levofloxacin (20%) and Penicillin (20%) respectively. One Staphylococcus aureus was isolated, sensitive to vancomycin (100%) linezolid (100%) and showed resistance to Clindamycin, Gentamicin, Amoxiclavulanic acid, Co-Trimoxazole, Cefoxitin, Erythromycin and Penicillin.

Table 5: Distribution of Type of Symptomatic CAUTI in study Group

Type of Symptomatic CAUTI	No of cases	In Percentage
Mono microbial infection	52	88.1
Poly microbial infection	7	11.9
Total	59	100

DISCUSSION

CAUTI is the commonest device associated nosocomial infection. A total of 150 symptomatic patients admitted in medical ICU and Surgical ICU were enrolled in the study under CAUTI. In this study, the incidence of CAUTI was 39.3%. Other study showing wide variation in incidence^[8,9,10,11,12,13]. Due to these variations it is important for a hospital to generate its own data for the implementation on proper infection control programs. The incidence was also higher among females (48%) than males (31.2%). Age group of 50 years and above is an important risk factor. Co-morbid conditions have significant association with the development of CAUTI like 42.50% of diabetic patient developed CAUTI, 33.3% neurological causes, 36.8% respiratory conditions, 50% nephrological cause, 48.2% post-surgical patients, 34.5% unconscious patients. Polymicrobial infection was seen in 11.9% and monomicrobial in 88.1% of the cases. In this study, the predominant isolates were Gram negative bacilli comprising 69.7% of the isolates among which Enterobacteriaceae were 54.6% and non-fermenters were 15.2%. Escherichia coli was the most common isolate (37.9%) followed by Klebsiella pneumonia (16.7%), Pseudomonas aeruginosa (10.6%), Enterococcus species (15.2%), Candida spp. (13.6%), Acinetobacter spp. (4.5%) Staphylococcus aureus (1.5%), Among Candida isolates, non-albicans Candida spp. (66.7%) was predominant similar to other studies^[14,15]. Different studies have shown high degree of antibiotic resistance^[8,9,10,15]. In our study, among Enterobacteriaceae, the organisms were mostly resistant to cefotaxime and ceftazidime. For Nitrofurantoin sensitivity was more- E.coli (76%) and Klebsiella spp. (63.6%). For Doxycycline and Nalidixic acid sensitivity was- E.coli (36%) and Klebsiella spp. (36.4%). P.aeruginosa was sensitive to piperacillin-tazobactam (85.7%), Imipenem (57.1%) and Levofloxacin (57.1%). Acinetobacter

spp. was sensitive to Nitrofurantoin (66.6%) and Co-Trimoxazole (66.6%). Enterococcus species was 100% sensitive to Linezolid, 80% to Vancomycin, 50% to high level gentamicin, 30% to Doxycycline and Erythromycin. One isolate of S.aureus was MRSA which was sensitive to vancomycin and linezolid.

CONCLUSION

This cross-sectional study conducted at Department of Microbiology, Medical College and SSG Hospital Baroda, Vadodra aiming at detecting one of the most common healthcare associated infection i.e. symptomatic catheter associated urinary tract infection. Development of CAUTI is common in critically ill patients. Emphasis should be placed on good catheter management and reducing the duration of catheterization rather than prophylaxis in order to reduce the incidence of catheter-related UTI. Culture and susceptibility testing play an important role in the management of CAUTI. The assessment of risk and need of catheterization should be evaluated. The indwelling catheter should be used in the patients only if there is a valid indication. It should be removed when it is no longer indicated. If the catheter is required for more than 14 days, it should be replaced or alternative methods of catheterization such as condom catheter, etc. should be considered. In catheterized patients, proper catheter bundle care should be followed. Antimicrobial resistance is a growing threat worldwide. There is an increasing resistance to third generation cephalosporins among Gram negative bacilli. The prevalence of extended spectrum betalactamases, constitutes a serious threat to current -lactam therapy lead to treatment failure. There is increase in the emergence of multidrug resistant isolates causing CAUTI. In order to decrease the incidence of drug resistance, prophylactic use of antibiotics should be discouraged. Knowledge of resistant pattern can help in implementing proper antibiotic therapy and infection control policy such as avoidance of overuse of antimicrobials, use of drugs for which pathogens are sensitive.

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