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Research Article

Antibiotic Sensitivity Pattern of Bacteria Isolated from Catheter Associated Urinary Tract Infections in Tertiary Care Hospital, Jamangar

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Abstract: Catheter-related urinary tract infection (UTI) remains a leading cause of nosocomial infections, with significant morbidity, mortality and additional hospital cost. Bacteria isolated from CAUTI are more resistant to antimicrobials compared with community acquired ones. To find out the various bacteria and their antibiotic sensitivity pattern causing the catheter associated urinary tract infection. This was a cross sectional study. Total 200 urinary samples of those patients were taken in study that developed CAUTI after 48 hours of Catheterization. Microorganisms isolated were identified according to colonial morphology, gram-stain reaction and standard microbiological procedures. Antibiotic sensitivity testing of isolated organism was done by Kirby-Bauer disc diffusion method. Out of 200 urine samples, 64 samples were found culture positive. Overall incidence rate of CAUTI was 32%. The most common bacteria isolated was Escherichia coli (40.06%) and second most common isolate was Klebsiella species (21.8%). E.Coli (84%) and Klebsiella (28%) have maximum sensitivity to nitro furantoin, followed by levofloxacin and ampicillin-salbactum. Pseudomonas was resistant to all antibiotics. Acinetobacter was also resistant to almost all antibiotics except levofloxacin and Nitrofurantoin in which sensitivity was only 25%. Both S. aureus and Enterococci are 100% sensitive to Linezolid. In present study we found that mostly all isolates were resistant to almost all primary antibiotics and demands for further antibiotic susceptibility testing with higher antibiotics. The duration and aseptic precautions taken during catheterization can affect the incidence of CAUTI. Continuous monitoring and training of staff is required to ensure that the preventive practices are meticulously undertaken.
Keywords: Catheter Associated Urinary Tract Infection, Isolates, Nosocomial, Antibiotic sensitivity pattern.

INTRODUCTION

Catheter-Associated Urinary Tract Infection (CAUTI) remain the most common nosocomial infection, accounting for more than 15% of infections reported by acute care hospitals [1]. Virtually all healthcare-associated UTIs are caused by instrumentation of the urinary tract. CAUTI has been a leading cause of morbidity and mortality in hospitalized patients [2]. Duration of catheterization is the most important risk factor for the development of Catheter associated–bacteriuria [3]. Risk factors associated with CA-bacteriuria include female sex, lack of antimicrobial therapy, microbial colonization of the drainage bag, catheter insertion outside the operating room, catheter care violations, rapidly fatal underlying illness, older age, diabetes mellitus [3,4].

Escherichia coli remain the most common infecting organism. Other endogenous flora including Enterobacter, Klebsiella, Enterococci and Proteus are common pathogens of the urinary tract and potential colonizers of urinary catheters. . Inadequately decontaminated equipments and hands of health care workers may introduce environmental and common skin bacteria during insertion and maintenance of urinary catheters. Therefore, Pseudomonas aeruginosa, Staphylococcus epidermidis, Staphylococcus aureus, Acinetobacter, and other non-intestinal or environmental microbes can result in health care associated CAUTI [4].

The accepted means to prevent CAUTI are the maintenance of closed urinary drainage system and early removal of the catheter. With currently best practices, CAUTI still occurs at an incidence of 3- 10% per day of catheterization. The infection is followed by bacteremia in 2-4%, and in a few patients by septic shock and death [2].

CAUTIs comprise perhaps the largest institutional reservoir of nosocomial antibiotic-resistant pathogens, the most important of which are multidrug-resistant Enterobacteriacae other than Escherichia coli, such as Klebsiella, Enterobacter, Proteus, Citrobacter, Pseudomonas aeruginosa, enterococci and staphylococci. Catheter-related urinary tract infection (UTI) remains a leading cause of nosocomial infections, with significant morbidity, mortality and additional hospital cost [3].

AIMS AND OBJECTIVES

To find out the various bacteria and their antibiotic sensitivity pattern causing the catheter associated urinary tract infection.

MATERIALS AND METHODS

This was a cross sectional study carried out during period of March 2012 to February 2013 at tertiary care hospital, Jamnagar. Total 200 urine samples were collected from urinary catheterized patients admitted in different wards like Medical Intensive care unit, Surgical Intensive care unit and Gynecology ward. Urine sample were collected with strict aseptic precautions by sterile needle and syringe from clamped catheter port. It was transported to the laboratory within 2 hour & proceedings were done immediately. Urine samples were examined microscopically and then inoculated on MacConkey agar and blood agar by using standard calibrated loop then incubated aerobically overnight at 37˚C. On next day, organisms showing growth and their colony $\geq 10^5$/CFU were taken significant. Microorganisms isolated were identified according to colonial morphology, gram-stain reaction and standard microbiological procedures. Antibiotic sensitivity testing of isolated organism was done by Kirby-Bauer disc diffusion method [5].

Inclusion Criteria

Urinary samples of those patients were taken in study that developed CAUTI after 48 hours of Catheterisation.

RESULTS

Out of 200 urine samples, 64 samples were found culture positive ($\geq 10^5$cfu/ml) for microorganisms and other samples were negative or normal flora. Overall incidence rate of CAUTI was 32% and Highest urinary tract infections were found in Medical ICU(32.85%), followed by surgical ICU(30.55%) and gynecology ward(29.16%).

Table 1: Different organisms isolated from urine sample of catheterized patients.

Organism	Total isolates	Percentage
E.Coli	26	40.06%
Klebsiella	14	21.8%
Pseudomonas	7	10.93%
Acinetobacter	5	07.81%
Proteus	4	06.25%
S.aureus	3	04.68%
Enteroccoci	5	07.81%

Table 1 shows that most common bacteria isolated was Escherichia coli (40.06%) among all isolates. After E. coli second most common isolate was Klebsiella species (21.8%). After that other isolated bacteria were pseudomonas species (10.33%), Acinetobactor(7.81%), Proteus (6.25%), S. aureus(4.68%) and Enterococci(7.81%).

Table 2: Antibiotic sensitivity pattern of Gram Negative bacteria

	Antibiotic sensitivity pattern of Gram Negative organism(%)				
Antibiotic	E.Coli (n=26)	Klebsiella (n=14)	Proteus (n=4)	Pseudomonas (n=7)	Acinetobacter (n=5)
Ampicillin-Sulbactum	19.23	14.28	50	0	0
Cotrimoxazole	15.3	14.28	75	0	0
Ceftizoxime	7.6	0	0	0	0
Cefalexin	0	0	0	0	0
Tetracycline	7.6	14.28	0	0	0
Ciprofloxacin	7.6	0	50	0	0
Levofloxacin	23	21.4	25	0	25
Norfloxacin	7.6	0	75	0	0
Ceftriaxone	15.3	11.5	25	0	0
Gentamicin	11.5	0	0	0	0
Nitrofurantoin	84.61	28.57	25	0	25

In table No 2, E.Coli(84%) and Klebsiella(28%) have maximum sensitivity to nitro furantoin, followed by levofloxacin and ampicillin-salbactum. Pseudomonas was resistant to all antibiotics. Acinetobacter was also resistant to almost all antibiotics except levofloxacin and Nitrofurantoin in which sensitivity was only 25%.

Table 3: Antibiotic sensitivity pattern of Gram Positive bacteria

Antibiotic	Antibiotic sensitivity pattern of Gram positive bacteria(%)	
	S. aureus(n=3)	Enterococci(n=5)
Ampicillin-Sulbactam	100	40
Cotrimoxazole	100	-
Cefalexin	0	-
Tetracycline	100	0
Cefotaxime	33.33	-
Ciprofloxacin	33.33	0
Levofloxacin	100	40
Linezolid	100	100
Cloxacillin	100	0
Roxithromycin	33.33	0
Lincomycin	33.33	-
Gentamicin	100	-

Table 3 shows that Both S. aureus and Enterococci are 100% sensitive to Linezolid. Entersococci was less sensitive in comparison to Staphylococci aureus. As Enterococci is intrinsically resistant to many antibiotics groups including Aminogycosides, Cephalosporines, Cotrimoxazole and Clindamycin. So isolates of Enterococci were not tested against Cefotaxime, Gentamycin, Lincomycin and Cotrimoxazole.

DISCUSSION

Catheter associated urinary tract infections (CAUTIs) are serious health affecting problems in hospitalized patient[6]. The associated morbidity and mortality are a major drain on hospital resources. Patients with indwelling urinary catheters, patients undergoing Surgical manipulations, long-stay, elderly male patients and patients with debilitating diseases are at high risk of developing nosocomial UTIs. The organisms responsible usually originate from patients' endogenous intestinal flora, but occasionally from the hospital environment [4].

Each year, more than 13000 deaths are associated with UTI. [1] In our study E.coli was found 40.06%, Somwang Danchaivijitr[2] et al has found E.coli 15.10% and Bagchi *et al.;* [7] found E.Coli 34.85%. E.coli was the most common isolate in present study and is comparable to studies by Somwang Danchaivijitr et al.; [2] Truls Bjerklund Johansen *et al.;* [8] and Bagchi *et al.;* [7] in which they also found E coli as most common islolate. The second most common uropathogen isolated was Klebsiella species, which was 21.8%. Study by Bagchi *et al.;* also shows klebsiella as second most common uropathogen with isolation rate 19.7%. Bacteria isolated from CAUTI are more resistant to antimicrobials compared with community acquired ones. Eradication of these micro-organisms in the presence of urethral catheter is difficult and is often impossible due to antimicrobial resistance and the presence of biofilm on the inner surface of the catheter. Resistance to antimicrobial agents has been noted since the first use of these agents and is an increasing world-wide problem [9].

The antimicrobial susceptibility pattern confirms that most of the urinary isolates in our environment are resistant to the commonly used antibiotics including the cephalosporin and fluoroquinolones. This high resistant pattern could have resulted from poorly guided antibiotic prophylaxis after catheterization and empiric therapy of catheter associated UTI. In particular, the high resistance of the Gram negative isolates to the fluoro quinolones is worrisome as these are reserve drugs for treating resistant infections [10].

Bacteria isolated from CAUTI are more resistant to antimicrobials compared with community acquired ones. In present study, E. coli and Klebsiella have maximum sensitive to nitro furantoin. Almost all Gram negative organisms are very less sensitive to Cephalosporin and flouro quinolone groups Pseudomonas species are found resistance against all commonly used, so it requires further testing with higher antibiotics like Cabapenam group, beta-lactam/beta-lactamase inhibitor and 3rd generation cephalosporin. The result of present study shows higher

rate of resistance in a tertiary care hospital, which maybe a result of the irrational use of antibiotics. Irrational use of antibiotics bring us at a point, as frightening as the pre antibiotic era for patients infected with multidrug-resistant gram negative bacteria, where there is no magic bullet available. The antimicrobial susceptibility pattern confirms that most of the urinary isolates in our environment are resistant to the commonly used antibiotics including the cephalosporin and fluoro quinolones. This high resistant pattern could have resulted from poorly guided antibiotic prophylaxis after catheterization and empiric therapy of catheter associated UTI. In particular, the high resistance of the Gram negative isolates to the fluoro quinolones is worrisome as these are reserve drugs for treating resistant infections [10]. During the last two decades bacterial resistance mediated by plasmids, which carry resistance genes to a large number of antibiotics, which are rapidly transferred, has worsened the scenario [11]. In this way urinary isolates of E.Coli and pseudomonas were more drug resistant and so urinary tract infection in catheterized patients is difficult to treat.

CONCLUSION

An important problem identified with this kind of infection is the change in microbiological and antibiotic sensitivity pattern of the bacteria. There is an emergence of antibiotic-resistant organisms.

The incidence of Catheter Associated Urinary Tract Infection (CAUTI) in the present study was 32%. From the present study, it can be concluded that insertion of catheter in urinary tract is associated with higher incidence of urinary tract infection in patients. The duration and aseptic precautions taken during catheterization can affect the incidence of CAUTI. Continuous monitoring and training of staff is required to ensure that the preventive practices are meticulously undertaken. In present study we found that Pseudomonas and Acinetobacter is resistant to almost all primary antibiotics and demands for further antibiotic susceptibility testing for higher antibiotics.

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