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RESEARCH ARTICLE

MICROBIOLOGICAL PROFILE OF CATHETER ASSOCIATED URINARY TRACT INFECTIONS IN PATIENTS OF DHIRAJ HOSPITAL

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ABSTRACT

This prospective study was carried out on 150 cases having indwelling urinary catheterization for more than 48 hours, to study the microbiological profile of catheter associated urinary tract infections and to find out Antibiotic susceptibility and resistance pattern of various bacterial isolates and ESBL detection from catheter associated urinary tract infection from Dhiraj General Hospital. METHOD: Patients were admitted in Dhiraj General Hospital in various wards and ICU. The study was conducted in 100 patients, whom an indwelling Foley's catheter was inserted in patients during Catheter Associated Urinary Tract Infection (CA-UTI) and Catheter Associated asymptomatic bacteriuria (CA-ASB) were studied along with microbiological profile and Antibiotic sensitivity patterns of isolated bacteria and ESBL detection during August 2011 to August 2012, in different medical wards, surgery wards and ICU. The catheterized urine sample was collected after catheterization on 5th day onwards on indwelling catheterization. RESULT: Seventy nine per cent of symptomatic catheterized patients showed significant bacteriuria (CA-UTI). Most common pathogen was E.coli (29.4%) followed by Klebsiella spp. (23.16%). Duration of catheterization, Age > 50 and < 12 years, diabetes were associated risk factors. INTERPRETATION AND CONCLUSION: Reducing the use of indwelling catheters, using alternative methods and reducing the duration of catheterization are some of the measures recommended to significantly reduce the consequences thereof CA-UTI in hospitalized patients.

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INTRODUCTION

Urinary tract infection (UTI) is the single most common hospital-acquired infection, and the majority of cases of nosocomial UTI are associated with an indwelling urinary catheter. Catheter-associated urinary tract infection (CAUTI) had been relatively neglected in clinical research until recently. However, external forces, such as mandated public reporting of nosocomial infections and the climate of "zero tolerance" for hospital-acquired infections have led to an increased interest in this infection (Curr Opin Infect Dis, 2010). Most of these infections 66% to 86% follow instrumentation of the urinary tract, mainly urinary catheterization (Martin, 1962). The risk of acquiring a urinary tract infection depends on the method and duration of catheterization, the quality of catheter care, and host susceptibility. Reported infection rates vary widely, ranging from 1%-5%, after a single brief catheterization (Turck, 1962) to virtually 100% for patients with indwelling urethral catheters draining into an open system for longer than 4 days (Kass, 1956).

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Catheter associated bacteriuria (CA-ASB) develops in at least 10-15% of hospitalised patients with indwelling urethral catheters. The risk of infection is almost 3-5% per day of catheterisation. These patients who are reservoirs of bacteriuric organisms are sources of nosocomial outbreaks among patients with bacteriuria. Recent studies suggest that most episodes of low colony count bacteriuria (10^2-10^4 cfu/ml) rapidly progress to high (10^5/ml) colony counts within 24-48 hours (Stammwe, 1991). CA- UTI in patients with indwelling urethral, indwelling suprapubic, is defined as the presence of symptoms or signs compatible with UTI with no other identified source of infection along with > 10^3 colony forming unit/ml of atleast one bacterial species in a single catheter urine specimen or in a midstream voided urine specimen from a patient whose urethral, suprapubic, or condom catheter has been removed within the previous 48 hour (IDSA, 2009). Hospital acquired UTI is different from community acquired UTI in many ways. Underlying serious illnesses Diabetes, extremes of age, resistance offered by various bacteria to routinely used antibiotics, wide spectrum of such resistant strains of bacteria implicated in hospital acquired UTI make the management difficult in cases of hospital acquired UTI. 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 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. Although these devices were originally designed for short-term use in patients, indwelling catheter use is now commonplace in the long-term setting (Clinical microbiology review, 2008).

Guidelines on strategies to avoid unnecessary catheterization and to remove catheters as soon as they are not necessary are in place. However due to the frequent and sometimes unnecessary use of indwelling catheters during hospitalization many patients are placed at risk for complications associated with the use of these devices. CA-ASB in patients with indwelling urethral, indwelling suprapubic, or intermittent catheterization is defined by the presence of $\geq 10^5$cfu/mL of 1 bacterial species in a single catheter urine specimen in a patient without symptoms compatible with UTI. (IDSA, 2009) Signs and symptoms compatible with CA-UTI include new onset or worsening of fever, rigors, altered mental status, malaise, or lethargy with no other identified cause; flank pain; costovertebral angle tenderness; acute hematuria; pelvic discomfort; and in those whose catheters have been removed, dysuria, urgent or frequent urination, or suprapubic pain or tenderness .In patients with spinal cord injury, increased spasticity, autonomic dysreflexia, or sense of unease are also compatible with CA-UTI . Catheter associated asymptomatic bacteruria is the most common event after indwelling catheterization. All CA-ASB do not develop into CA-UTI and only very few develop, therefore unnecessary antimicrobial therapy for CA-ASB is not recommended. However such patients are a reservoir of uropathogenic bacteria (IDSA, 2009) .This study has followed CA-ASB upto the identification of colonizing organisms but has not followed them further. A study of 1,540 nursing home residents determined that the risk of hospitalization, length of hospitalization, and length of antibiotic therapy were three times higher in catheterized residents than innoncatheterized residents (Kass, 1956). This study is done to study the microbiological profile of catheter associated urinary tract infections and to find out Antibiotic susceptibility and resistance pattern of various bacterial isolates from catheter associated urinary tract infection from Dhiraj General Hospital Deshmukh *et al* in year 1998, studied 44 cases of CA-UTI in Department of Paediatrics, Seth G. S. Medical College, Mumbai where in 44 patients, 51 catheters were inserted. Average days of catheter in-situ was 5.16 days per patient (two days to 16 days). Colonization of urinary catheter tip was seen in 21 out of 51 samples (41.18%) with isolation of 28 organisms. Bacteriuria was seen in ten out of 51 samples (19.61%) with isolation of 14 organisms. The commonest organisms colonizing the tip of the urinary catheter were *E. coli* (46.43%), *Pseudomonas* (17.86%), *Klebsiella* (17.86%), *Citrobacter* (10.71%) and *Acinetobacter* (7.14%). *E. coli* colonizing the urinary catheter tip had maximum susceptibility to amikacin and cefuroxime while *Pseudomonas* was susceptible to quinolones and amikacin. Common organisms isolated from the urine collected through the catheter (bacteriuria) were *E. coli* (64.29%), *Pseudomonas* (14.29%), *Proteus* (7.14%), *Citrobacter (7*.14%) and *Klebsiella* (7.14%). E. coli thus isolated had maximum susceptibility to nitrofurantoin, amikacin and cefuroxime while *Pseudomonas* was maximally susceptible to amikacin. Rohan Chaudhari, Anjali Deshpande *et al*. in year 2002 June to August studied 32 cases of CA-UTI in Topiwala National Medical College and BYL Nair Charitable Hospital, Mumbai. The study includes 32 patients out of which 24 were men and 8 were women who were catheterized with a Foley's catheter. The new appearance of bacteriuria greater than 10^3 cfu/ml was considered to represent nosocomial CA-UTI. In this study we found the incidence of UTI to be 44%.The commonest organism isolated in this study in urine was *Klebsiella spp*. (42.8%), followed Pseudomonas species and *E. coli* (21%). Karina Billote-Domingo, Myrna T. Mendoza *et al* in year 1998 studied 242 cases of CA-UTI in Philippine General Hospital where Serial quantitative urine cultures were obtained. 214 were include in the final analysis, 28 were excluded because these patients expired before the observable endpoint. These were the critically ill patients who were catheterized for urine output monitoring but expired at a mean of 3.04 days from catheter insertion (range, 2 to 5 days). Computed incidence of catheter-related UTI was 51.4%. Ninety one percent were acquired within seven days of catheterization. *Escherichia coli* was the most common pathogen (22.3%) along with other gram-negative organisms. Gram- positive organisms and *Candida species* were isolated in 15.7% and 17.4%, respectively. Three risk factors were significantly associated with the acquisition of the infection: duration of catheterization, female gender and diabetes mellitus**.** Susan E Hazelett, Margaret Tsai *et al* in year 2004 studied 379 cases of CA-UTI in acute care hospital in USA where, 73 percent of patients who received an IUC in the ED (Emergency Department) were elderly (≥65 years old). During the study period, 277 elderly patients received an IUC prior to admission. Of these, 77 (28%) were diagnosed with UTI during their hospitalization. Fifty three (69%) of those diagnosed with a UTI by discharge either had the UTI diagnosed in the ED or had bacteriuria $\geq 10^5$ organisms/ml prior to IUC placement. Of the 24 elderly patients who developed a catheter-associated UTI (i.e., 9% of the elderly population who received an IUC), 11 of the IUCs were placed inappropriately. The overall rate of nosocomial UTI due to an inappropriately placed IUC was the same in males and females.

MATERIALS AND METHODS

This is prospective and analytic study. The study is carried out on urine samples of catheterized patients admitted to Dhiraj General Hospital, in a one year period from January 2012 to December 2012. During this period we set up a database including all patients currently having an indwelling catheter for longer than 48 hours. The patients were catheterized during their stay at the unit. Indwelling urethral catheters were inserted by nurses or physicians using the following technique : meatal disinfection with povidone-iodine and aseptic insertion of the sterile equipment. Silicone Foley catheters were systematically used.

INCLUSION CRITERIA

According to IDSA, 2009 Patient had an indwelling urinary catheter in place at the time of specimen collection for >48 hours and at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), suprapubic tenderness, or costovertebral angle pain or tenderness, were catagorised as CA-UTI. Patients having no signs and symptoms who were catheterized for > 48 hours were categorized as Catheter associated Asymptomatic Bacteriuria (CA-ASB).

EXCLUSION CRITERIA:- Patient had no indwelling catheter in place at the time of specimen collection.

COLLECTION OF SAMPLE

The catheter tubing was clamped above the port to allow collection of freshly voided urine. The catheter wall of the tubing was cleaned with 70% ethanol and urine aspirated via needle and syringe (Susan *et al*., 2006). 10 ml of urine was aspirated and transferred into sterile wide mouth urine container. The sample was processed within 2 hours after collection in microbiology laboratory. And in case where it was not possible it was refrigerated both during storage. For each patient Clinical Diagnosis, Age, Sex, Ward, Underlying debilitating disease, Indication of Catheterization, Days of Catheterization, Antibiotic given, Relevant symptoms were noted.

PROCESSING OF URINE SAMPLE

Gross examination:- Was done to observe colour, turbidity were noted.

Wet mount examination:- Was done to observe pus cells, RBCs, parasites and any other finding. All the observations were recorded.

Gram stain:- Was performed on all uncentrifuged samples and examined.

Culture:- Was done on MacConkey agar, cysteine lactose electrolyte deficient (CLED), Sabourauds dextrose agar (SDA). All media was from Hi Media except Blood Agar which was prepared in the lab. The plate was incubated aerobically at 37 °C for 24 hours. Isolation of uropathogens was performed by a surface streak procedure using calibrated standard loop method for semi-quantitative culture (Popham, 2003). An inoculating loop of standard dimensions of 3.26 mm diameter which holds 0.004 ml of urine was used to spread uncentrifuged urine over a plate of agar culture. After culture number of colonies were counted and that number was used to calculate viable bacteria per ml of urine by calculating colonies/ ml of urine (Mackie & McCartney, 2008). If 0.004 ml of urine is inoculated (4µl) to make up 1 ml (1000µl).Colonies / 4µl × 250 cfu/ml.

Colony counting: The petridish containing bacterial colonies was kept on the wolffhuegel grid glass plate. The instrument is provided with 100 mm diameter magnifying lens and colonies were manually counted. A specimen was considered positive for UTI where not more than 2 organism were obtained at a concentration of $\geq 10^3$ CFU/ml each for CA-UTI and $\geq 10^5$ for CA-ASB (Martin and Bookrajian, 1962). Bacteriuria was not considered significant if colony count was $< 10^3$CFU/ml, however as they were symptomatic their observation are recorded and presented. Samples showing no growth after 48 hours of aerobic incubation were also recorded. Biochemical tests :-tests were performed according to standard guidelines (Jean F Mac Faddin, 2000) Indole, Citrate, Oxidase, Urea hydrolysiss, Triple sugar iron H2S production, Gas production ,Catalase, Coagulase and Mannitol. Observations were recorded.

ANTIBIOTIC SENSITIVITY TEST

Antibiotic Sensitivity test was performed according to CLSI guidelines by Modified Kirby Bauer disc diffusion method. As per the CLSI guidelines three to five well isolated colonies of same morphology were selected from the Nutrient agar plate. The top of each colony were touched with a loop and the growth is transferred to Peptone water broth. The broth is then incubated at 37°C. The turbidity of the broth is checked every hour and compared with 0.5 McFarland Standard. It took on an average of 4hrs to reach the turbidity of the standard (Clinical Laboratory Standard Institutes, 2006; Popham, 2003). Within 15 minutes of adjusting turbidity of inoculum suspension, a sterile cotton swab was dipped into the adjusted suspension. While taking the soaked swab it was rotated several times and pressed firmly on inner side of tube wall above the fluid level to ensure removal of excess inoculum from the swab. The dried Mueller-Hinton plates were then inoculated by streaking the swab over the entire agar surface. The same procedure was repeated twice by rotating the plates approximately for 60° each time. As a final step, the rim of the agar was swabbed (Clinical Laboratory Standard Institutes, 2006; Popham, 2003; Luzzaro *et al*., 2004). The antibiotics which were tested by disc diffusion method are mentioned in table no. A standard inoculum adjusted to 0.5 McFarland was swabbed on to Muller-Hinton agar antibiotic disc were dispensed after drying the plate for 15 min and incubated at 37°C. The reference strains used as control were *E. coli* (ATCC 25922), *S. aureus* (ATCC25923) and *P. aeruginosa* (ATTC 27853).

Esbl screening by phenotypic confirmatory disc diffusion method

As per guideline provided by CLSI (Clinical Laboratory Standard Institutes, 2006) discs of ceftazidime (30 µgm), ceftazidime (30 µgm) + clavulanic acid (10 µgm) are kept on Muller Hilton agar plate. Ceftazidime discs are obtained from Himedia laboratory, Mumbai. Discs of ceftazidime + clavulanic acid and were obtained from Becton Dickenson Microbiology System USA. Increase of 5 mm or more than that in disc containing Clavulanic acid than the respective antibiotic disc than the isolate is confirmed ESBL producer, and if no increase in the zone diameter then the isolate is ESBL non producer. A≥ 5 mm increase in zone of inhibition (arrow) for ceftazidime Clavulanic acid (CAA) versus its zone diameter when tested alone by ceftazidime, confirmed an ESBL-producing organism.

RESULTS

In this study total of 150 catheterized samples were studied for assessment of CA-UTI, 100 (67%) were Symptomatic and 50 (33%) were asymptomatic. Fifty samples which were asymptomatic were cultured but not tested for Antibiotic sensitivity. Out of 100 symptomatic patients were studied, 64 patients showed significant bacteriuria ($\geq 10^3$)/ml, 21 showed no growth and 15 patients had colony count ($<10^3$)/ml. (Refer Table 1)

Table 1. Distribution of outcome of urine culture in symptomatic Patients

Sy Symptomatic patients	Outcome of culture
No growth	21
Significant Bacteriuria ($\geq 10^3$)/ml	64
Others($<10^3$)/ml	15
Total	100

In this study total of 50 Catheterized asymptomatic patients were studied, 28 patients showed growth but less than

($\leq 10^3$)/ml and 22 showed no growth, these samples were not processed further. (Refer table 2)

Table 2. Outcome of urine cultures in Catheterized asymptomatic Patients

CA-ASB	Outcome
Growth($\leq 10^3$)/ml	28
No growth	22
Total	50

In this study total of 100 symptomatic indwelling catheterized patients were studied, 62 patients were Males and 38 were Females. The age group distribution is given as follows. (Refer table 3).

Table 3. Distribution of age in symptomatic CA-UTI

Age	Number	Percentage
2-12	31	31%
13-17	10	10%
18-37	19	19%
38-67	33	33%
> 68	9	9%

A total 100 patients with indwelling urinary catheters were studied, largest group of patients were from Pediactrics ward 38 (38%), out of which 30 (37.97%) patients had significant growth followed by Male Surgery Ward 25 (25%), out of which 19(24.05%) patients had significant growth, Intensive Care Unit 17 (17%) out of which 12(15.19%) patients had significant growth. (Refer table 4)

Table 4. Distribution of ward in symptomatic CA-UTI

Ward	Number	Percentage
Pediactrics	38	38%
MSW	25	25%
ICU	17	17%
FSW	4	4%
Gynacology	4	4%
ICCU	4	4%
Obstetrics	3	3%
MMW	2	2%
Special room	2	2%
Total	100	100

Total of 150 indwelling catheterized patients were studied. Hundred patients were symptomatic and 50 were asymptomatic. Number of days of catheterization in symptomatic CA-UTI and CA-ASB is as follows. (Refer table 5)

Table 5. Number of days of catheterization in symptomatic CA-UTI and CA-ASB

Days of catheterization	CA-UTI	CA-ASB	Total
> 48 hrs	26 (26%)	12 (24%)	38
> 1 wk	38 (38%)	18 (36%)	56
>10 days	36 (36%)	20 (40%)	56
Total	100	50	150

Total of 100 indwelling catheterized patients were studied. Maximum number of patients 36 (45.57%) had Significant bacteriuria who had urethral catheter in place for more than 10 days and within 48 hours and 1 week is given below. (Refer Table 6). A total of 95 microbial isolates were recovered from the 79 patients with significant bacteriuria. In 63 (79.75%) patients, only one species of organism was recovered while in 16 (20.25%) two species were recovered. *Escherichia coli* 28 (29.47%) was most common pathogen, followed by *Klebsiella spp* (2.11%) and rest of the organisms as follows. (Refer table 7).

Table 6. Duration of catheterization in relation to development of Significant bacteriuria ($\geq 10^3$)/ml in Symptomatic CA-UTI

Days of catheterization	Significant growth	No growth	Total
> 48 hours	18 (69.23%)	5 (19.23%)	26
> 1 week	25 (80.65%)	6 (19.35%)	31
> 10 days	36 (78.26%)	10 (21.74%)	46
Total	79	21	100

Table 7. Microbiological profile of symptomatic CA-UTI

Organisms	Number	Percentage
E.Coli	28	29.47
Klebsiellaspp.	22	23.16
Pseudomonas aeruginosa	17	17.89
Enterococcus spp.	11	11.58
Acinetobacterspp.	4	4.21
Candida albicans	4	4.21
Citrobacterfreundii	3	3.16
Proteus mirabilis	2	2.11
Proteus vulgaris	2	2.11
Staphylococcus aureus	2	2.11

The *in vitro* antibiotic susceptibility pattern of the Gram positive organisms is as follows:-*Staphylococcus aureus* showed sensitivity to antibiotics like Lenezolid, Oxacillin, Vancomycin, Gatifloxacin, Gentamicin and Doxycycline (50%) respectively, and *Enterococcus spp*. showed maximum sensitivity Lenezolid and Vancomycin (81.82%) (Refer table 8).

Table 8. Sensitivity pattern of Gram positive Cocci in symptomatic CA-UTI

Antibiotics	Enterococcus spp.(11)	Staphylococcus aureus (2)
Erythromycin	1 (9.09%)	0 (0%)
Penicillin	0 (0%)	0 (0%)
Co-Trimoxazole	2 (18.18%)	0 (0%)
Lenezolid	9 (81.82%)	1 (50%)
Oxacillin	0 (0%)	1 (50%)
Vancomycin	9 (81.82%)	1 (50%)
Gatifloxacin	0 (0%)	1 (50%)
Gentamicin	1 (9.09%)	1 (50%)
Doxycycline	5 (45.45%)	1(50%)

The in vitroantibiotic susceptibility pattern of the Gram negative organisms is as follows

Maximum number of sensitivity is shown by *E.Coli* which show maximum sensitivity to Imipenem (100%) followed by Amikacin (75%). And rest of the sensitivity is given as follows (Refer table 9). Sensitivity pattern in *Pseudomonas spp.* is given as follows. (Refer table10). Production of Extended spectrum beta lactamase enzyme in Gram negative isolates (61) with significant growth ($\geq 10^3$)/ml is given as follows. (Refer table 11) Distribution of production of extended spectrum beta lactamase enzyme in Gram negative bacterial isolates (61) were studied. (Refer table 12)

DISCUSSION

Urinary tract infection is single most common Hospital Acquired infection (HAI) and majority of cases of hospital acquired infections are associated with indwelling urinary catheters. HAI contribute to lot of Morbidity and Mortality annually.Patients with severe underlying illnesses are more vulnerable to hospital acquired infections. Catheter associated urinary tract infections contribute to around 40% of Hospital acquired infections.

Table 9. Sensitivity pattern of Gram negative bacilli in Symptomatic CA-UTI

Antibiotics	E.Coli (28)	Klebsiellaspp (22)	Acinetobacterspp (4)	Citrobacterspp (3)	Proteus mirabilis (2)	Proteus vulgaris (2)
Amoxycillin+Clavulanic acid	3(10.71%)	3 (13.64%)	1 (25%)	1 (33.33%)	1(50%)	0(0%)
Gentamicin	7 (25.00%)	5 (22.73%)	1 (25%)	0 (0%)	0 (0%)	0 (0%)
Amikacin	21 (75.00%)	11(50.00%)	1(25%)	1 (33.33%)	1 (50%)	0 (0%)
Cefuroxime	4 (14.29%)	4 (18.18%)	1 (25%)	1 (33.33%)	1 (50%)	0 (0%)
Cefepime	2 (7.14%)	5 (22.73%)	1 (25%)	0 (0%)	1 (50%)	0 (0%)
Cefotaxime	3 (10.71%)	5 (22.73%)	1 (25%)	1 (33.33%)	1 (50%)	0 (0%)
Ciprofloxacin	4 (14.29%)	6 (27.27%)	1 (25%)	2 (66.67%)	1 (50%)	0 (0%)
Imipenem	28 (100%%)	19 (86.36%)	1 (25%)	2 (66.67%)	2 (100%)	2 (100%)
Co-Trimoxazole	6 (21.43%)	6 (27.27%)	1 (25%)	0 (0%)	1 (50%)	0 (0%)

Table 10. Sensitivity pattern of Pseudomonas spp in symptomatic CA-UTI

Antibiotics	Pseudomonas spp. (17)
Piperacillin	7 (41.18%)
Gentamicin	7 (41.18%)
Amikacin	7 (41.18%)
Cefepime	4 (23.53%)
Ciprofloxacin	5 (29.41%)
Imipenem	14 (82.35%)
Piperacillin-tazobactam	7 (41.18%)
Aztreonam	3 (17.65%)
Ceftazidime	3 (17.65%)

Table 11. Production of Extended spectrum beta lactamase enzyme in Gram negative bacterial isolates

Significant growth ($\geq 10^3$)/ml	ESBL Producer	ESBL non Producer
61	13 (21.31%)	48 (78.69%)

Table 12. Distribution of production of Extended spectrum beta lactamase enzyme in *E.coli* and *Klebseilla spp*

Organism	ESBL Producer	ESBL non Producer
E.Coli (28)	8 (28.57%)	20 (71.43%)
Klebsiella spp. (22)	5 (22.73%)	17 (77.27%)
Total	13	37

Table 13. Symptomatic CA-UTI and CA-ASB in various studies

Studies	Total cases included	Symptomatic CA-UTI	CA-ASB
Nirmanmoh Bhatia, Mradul K Daga *et al* ,2010	89	20 (22.4%)	69 (77.52%)
Indranil Bagchi , Dr. Neelam K Jaitly etal, 2013	220	64 (29.09%)	156 (70.90%)
Susan E Hazelett, Margarat *et al*, 2004	57	34 (59.65%)	23 (63.16%)
Taiwo SS ,Aderounmu *et al*, 2006	122	90 (83.3%)	14 (11.5%)
Blazquez R Guerrero *et al*, 2000	142	63 (44.36%)	79 (55.63%)
Present study, 2012	150	100 (66.67%)	50(33.33%)

Table 14. Microbiological profile of CA-UTI in various National studies

Study	Ecoli	Klebseilla spp	Pseudomonas spp	Enterococcus spp	Acinetobacter spp	Candida albicans	Citrobacter freundii	Proteus	Staphylococcus aureus
MS Tullu, CT Deshmukh *et al*, 1998	64.29%	7.14%	14.29%				7.14%	7.14%	
Rohan chaudhari, Anjali Deshpande *et al*, 2002	21%	42.80%	21%						
Nirmanmoh Bhatia, Mradul K Daga *et al* ,2010	59.10%	19.69%		6.06%					15.15%
Manish N, Tankhiwala NS *et al*, 2011-12	57%	20%	5%	6%	4%				8%
Dr. Indranil Bagchi , Dr. Neelam K Jaitly , *et al*, 2013	34.85%	19.70%	12.12%	6.06%		10.60%	3.03%	3.03%	4.55%
Present study, 2012	29.47%	23.16%	17.89%	11.58%	4.21%	4.21%	3.16%	4.22%	2.11%

Table 15. Microbiological profile of CA-UTI n various international studies

Study	Ecoli	Klebseilla spp	Pseudomonas spp	Enterococcus spp	Acinetobacter spp	Candida albicans	Citobacter freundii	Proteus spp	Staphylococcus aureus
Karina Billote *et al* 1998	22.30%	21.50%	6.60%	7%	9.90%	17.40%		1.70%	2.50%
Taiwo SS *et al*, 2006	20.60%	36.60%	27%			3.20%		3.20%	9.50%
Toshie Tsuchidaa *et al*, 2005	20%		13%	32%		13%			
Present study, 2012	29.47%	23.16%	17.89%	11.58%	4.21%	4.21%	3.16%	4.22%	2.11%

Recently with stronger infection control measures and policies in place, CA-UTI have come in arena of clinical research. CA-UTI is defined as presence of signs and symptoms compatible with urinary tract infection with no other identified source of infection with more than > 10^3 CFU/ml for atleast one bacterial spp. in single catheter urine sample (IDSA, 2009) Catheter associated Bacteruria is the most common Healthcare infection worldwide and is result of widespread use of urinary catheterization. On many occasions it is inappropriate particularly in long term care facilities. It is essential to clinically differentiate between symptomatic CA-UTI and CA-ASB because treatment is not recommended for CA-ASB. Urine in CA-ASB should not be screened in routine except in selected clinical situation as in pregnant women. (Diagnosis, Prevention, and Treatment of Catheter – associated Urinary Tract Infection in adults, 2009) Vast literature is available on incidence, microbiological profile, risk factors like age, underlying severe illness and duration of catheterization, in cases of CA-UTI. Literature shows that there are more cases of asymptomatic bacteruria than symptomatic bacteruria which are studied. Generally the rate of CA-UTI per 1000 devices days is the index of rate of CA-UTI in hospital. In the present study this rate is not calculated as number of total device days was not accurately known.Workers in many National and International studies on CA-UTI have used different parameters.

The definition of CA-UTI with regard to bacteriuria accepted by some workers is 10^3 CFU/ml as the cut off for significant bacteriuria (Karina *et al*., 1999; Susan *et al*., 2006) and some have considered 10^5 CFU/ml. (Dr. Indranil Bagchi *et al*., 2013). Similarly, the duration of catheterization is also ranging from > 24 hours to > 30 days and studies are carried out using different time frames. The calculation of incidence varies as some workers have used infections / 1000 device days, infections per 100 person days etc. In our study out of 150 cases, 100 were symptomatic and 50 were asymptomatic, but catheterized for more than 48 hours. Table no 13 shows symptomatic CA-UTI and CA-ASB in various studies. In present study 66.6% cases were symptomatic.The microbiological profile observed in present study showed highest isolation of *E.coli* followed by *klebseilla spp*. Other organisms were *Pseudomonas, Enterococcus, Acinetobacter, Candida albicans, Citrobacter freundii, Proteus* and *Staphylococcus aureus.* This is consistant with Manish Tankhiwala *et al*. (2013) and Dr. Indranil Bagchi *et al*. (2013) and others. Table no 14 and 15 show comparison of Microbiological profile of CA-UTI. Of special importance is our observation of 11.58% isolation rate of *Enterococcus spp*. in symptomatic CA-UTI. *Enterococci* are normal commensal organisms that can act as opportunistic agents, particularly in elderly patients, those with serious underlying condition, prolonged hospitalization and those patients who have received treatment with invasive devices. *Enterococci* were recognized with increasing frequency as a common cause of Hospital acquired infection (of which 80% are CA-UTI) in late 1970s.

Since, *enterococci* have emerged as a leading challenge to therapeutic management. They parallel the increasing resistance to most commonly used antimicrobial agents. Our study shows sensitivity to Lenezolid (81.82%) and vancomycin. Poor sensitivity to Penicillin, Co- Trimoxazole, Erythromycin etc (refer table no 8). This observation prompt us to undertake future projects of species identification of *Enterococci* and their antibiotic susceptibility. (Karina Billote-Domingo *et al*., 1999). In our study it was also observed that from cases of asymptomatic patients with indwelling urinary catheters (CA-ASB) 2 strains of *Enterococcus* were isolated. Ubiquitous presence of *enterococci*, however requires caution in establishing the clinical significance of particular isolate. *Enterococcus* has become second or third leading cause of Hospital acquired infection (HA-UTI). UTI s are the most common of enterococcal infection (approximately 16% of nosocomial UTI s). Such bacteruria occurs in patients with structural anomalies and those who have undergone urological manipulations eg indwelling catheterization (Patrick *et al*., 2007). In this study, ESBL production was determined by Phenotypic confirmatory disc diffusion method in *E.coli* and *Klebseilla* isolates. 28.57% *E.coli* and 23.73% were *klebseilla spp*. showed ESBL production. There is ample literature against use of antimicrobial impregnated catheters. Study by Toshie Tsuchidaa *et al*. (2008) concludes that use of silver alloy catheters infact have highest CA-UTI rates. Similarly study by Robert Pickard *et al*. (2012) interprets that silver alloy coated catheters were not effective for reduction of symptomatic CA-UTI. They also observed that the reduction of CA-UTI with Nitrofural impregnated catheters were less than that regarded as clinically important. Use of antimicrobial impregnated catheters may even cause laxity in aseptic care. The guidelines for Diagnosis, Prevention and Management of patient s with CA-UTI by infectious disease society of America, 2009 does not recommend the use of Antimicrobial impregnated catheters (Martin and Bookrajian, 1962). In the present study Antimicrobial impregnated catheters were not used. Reducing the frequency of use of indwelling catheters, avoiding inappropriate insertions, aseptic precautions while inserting the indwelling catheters and reducing the duration of catheterization are some of the recommendations to reduce CA-UTI.

Conclusion and Summary

Present study was carried out during year 2012 on 150 patients admitted to Dhiraj General Hospital who had indwelling urinary catheter in place for > 48 hours. It was observed that 79 out of 100 symptomatic cases showed bacteriuria≥10^3 cfu/ml. Out of 50 asymptomatic cases 28 showed bacteriuria ≤10^3cfu/ml. They were not followed after identification of colonizing organisms. *E.coli* was most common organism isolated followed by *Klebsiella spp.* Eleven point five percent isolates were *enterococci*. Gram negative bacteria showed maximum sensitivity to Imipenem and Amikacin. Out of 28 isolates of *E.coli*, 8 were ESBL producers, while 5 out of 22 *Klebsiella spp*. were ESBL producer. Associated risk factors were identified as Age > 50 years, diabetes, post- surgical patients and spinal injury. Duration of catheterization directly affects incidence of CA-UTI. In this study the incidence increases proportionately with duration of catheterization. Appropriateuse of indwelling catheters, aseptic precautions while inserting the indwelling catheters. Intermittent catheterization and reduction of duration of catheterization are recommended to reduce the incidence CA-UTI. We also suggest use of closed catheter drainage system for short term indwelling catheterization.

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REFERENCES

Clinical Laboratory Standard Institutes. Performance Standards for antimicrobial susceptibility testing, XVI International Supplement (M100-S16). Wayne, Pennsylvania, USA : National Committee for Clinical Laboratory Standard 2006.

Clinical Microbiology Reviews, January 2008, p.26-59, Vol.21 0893-8512/08/$08.00+0doi:10.1128/CMR.00019-0

Collee, J.G., A.G.Fraser, B.P.Marmion, A.Simmons Mackie & McCartney Practical Medical Microbiology, 14th Edition, 2008.

Curr Opin Infect Dis. 2010. Author manuscript; available in PMC 2011 February published in final edited form as: *CurrOpin Infect Dis*., February; 23(1): 76–82.

Diagnosis, Prevention, and Treatment of Catheter – associated Urinary Tract Infection in adults: 2009 International Clinical Practice Guidelines from the Infectious Disease Society of America- IDSA 2009

Dr. IndranilBagchi 1, Dr. Neelam K Jaitly 2, Dr. V.R. Thombare Microbiological evaluation of Catheter associated Urinary tract infection in a Tertiary care hospital *International Journal of Biological and Health Science*, Vol.1 Issue II Jan. 2013(01-10) BagchiIndranil *et al.*

Jean F Mac Faddin, 2000. Biochemical Tests for Identification of Medical Bacteria, Third Edition, Lippincott Williams and Wilkins, Philadelphia.

Karina Billote-Domingo, Myrna T. Mendoza, M.D, Tessa Tan Torres, 1999. Catheter-related Urinary Tract Infections: Incidence, Risk Factors and Microbiologic Profile Phil *J Microbiol Infect Dis*., 28(4):133-138.

Kass EH. 1956. Asymptomatic infections of the urinary tract. Trans Assoc Am Physicians, 69:56-63.

Luzzaro, F., J. D. Docquier, C. Colinon, A. Endimiani, G. Lombardi, G. Amicosante, G. M. Rossolini, and A. Toniolo. 2004. Emergence in Klebsiellapneumoniae and Enterobacter cloacae clinical isolates of the VIM-4 metallo-lactamase encoded by a conjugative plasmid. *Antimicrob. Agents Chemother*., 48:648–650.

Martin CM, Bookrajian EN, 1962. Bacteriuria prevention after indwelling urinary catheterization. *Arch Intern Med*., 110:703-11.

N. M, S. tn. Study of microbial flora in patients with indwelling catheter. *IJCRR*, 2013; 5(12): 57-60.

Patrick R Murray, Ellen jo Barren *et al*, Manual of Clinical Microbiology, volume 1, 9th edition, 2007

Popham DL, Young KD, 2003. Role of penicillin-binding proteins in bacterial cell morphogenesis, Current opinion in Microbiology, 6:594-9.

Robert Pickard, Thomas Lam, Graeme MacLennan, Kath Starr, Mary Kilonzo *et al*. 2012. Antimicrobial catheters for reduction of symptomatic urinary tract infection in adults requiring short-term catheterisation in hospital: a multicentrerandomised controlled trial, Lancet, 380: 1927–35.

Rohan Chaudhari, Anjali Deshpande, Subhash A Angadi, Geeta V Koppikar A Preliminary Study of Catheter Associated Bacteriuria

Stammwe, catheter-associated urinary tract infections: epidemiology, pathogenesis, and prevention. *American J of Med*, 1991, 91(3b) 65s-71s.

Susan E Hazelett, Margaret Tsai, Michele Gareri and Kyle Allen, 2006. The association between indwelling urinary catheter use in the elderly and urinary tract infection in acute care *BMC Geriatrics*, 6:15 doi:10.1186/1471-2318-6-1.

ToshieTsuchidaa, Kiyoko Makimotoa,, ShinobuOhsakob, MiyokoFujinoc, Midori Kanedad, TaekoMiyazakie, FusaeFujiwaraf, TomoyukiSugimotog, 2008. Relationship between catheter care and catheter-associated urinary tract infection at Japanese general hospitals *International Journal of Nursing Studies*, 45, 352–361.

Tullu, MS Deshmukh, CT Baveja SM. 1998. Bacterial profile and antimicrobial susceptibility pattern in catheter related nosocomial infections. PMID, Year: Volume: 44 | Issue : 1| Page : 7-13.

Turck M, Goffe B, Petersdorf RG. 1962. The urethral catheters and urinary tract infection. *J Urol*., 88:834-7.

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