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Original Research Article

Comparison of bacterial urinary tract infection in catheterised and non catheterised patients

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ABSTRACT

Background: The most frequent bacterial illness is urinary tract infection (UTI). If Immune system fails to eliminate the bacteria that has bypass the first line of defence it results in urinary tract infection or a more severe illness furthermore. Females are usually more distressed than males. Catheter- associated urinary tract infection develops when an indwelling urinary catheter causes an infection within 48 hours.

Aim: Compare the bacterial infection in urinary tract in non catheterized and catheterized patients.

Objectives: To know different pathogenic bacteria causing UTI in catheterized and non catheterized patients.

Materials and Methods: The present study was conducted on CAUTI & NON CAUTI patients including both male & female attending general medicine of teerthankar Mahaveer University.

Results: Infection occurred more in CAUTI patients than NON CAUTI. Ratio of females was higher than males.

Conclusion: As our study shows higher percentage of UTI in CAUTI so unnecessary catheterization should be avoided.

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1. Introduction

The most frequent bacterial illness is urinary tract infection. If Immune system fails to eliminate the bacteria that has bypass the first line of defence it results in urinary tract infection or a more severe illness furthermore.¹ Females are usually more distressed than males.² Catheter- associated urinary tract infection develops when an indwelling urinary catheter causes an infection within 48 hours.^{1,3} Fever, urinary urgency, stomach discomfort, difficulty in urination, pyuria, WBCs in urine are all signs of UTI.⁴ Most common uropathogens are *E.coli*, *Klebsiella*, pneumoniae, Enterobacter species etc. They are the most commonly

faced nosocomial infection. It develops in patients using catheter for more than 7 days in almost 25% patients.¹ The catheter lumen becomes clogged with crystalline deposits causing urine to be held outside the catheter and if these blocked catheters⁵ are not changed that can lead to various complications like encrustation in catheter, formation of stones in bladder, sepsis, endotoxic shock and inflammation in kidney.⁶ It is always advisable to treat only symptomatic CAUTI¹ And periodic surveys should be implemented.⁷

2. Materials and Methods

Study was done in microbiology department of teerthankar mahaveer hospital. 85 samples of urine were taken from catheterized patients and 85 from NON CAUTI patients attending OPD & IPD department of general medicine

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teerthankar Mahaveer university from Nov 2019 to Feb 2021

2.1. Sample collection

It was collected from catheter tube that to from distal edge making use of sterile syringe and needle in a universal container and should be transported immediately to the laboratory. Collection from the catheter bag was avoided.⁸

2.1.1. In non-catheterised patients

To minimize the contamination of periurethral flora clean catch midstream urine sample was taken. It was processed within one hour of collection and in case of delay it was refrigerated at 4⁰c for 12-14 hours

2.1.2. In catheterised patients

2.2. Methodology

Urine sample was processed in 2 ways

1. Microscopy
2. Culture

Detection of RBC, WBC, YEAST and EPITHELIAL cells was done through wet mount microscopy using uncentrifuged sample. Gram staining was done followed by biochemicals test to find out the bacteria responsible for infection

CLED (cysteine lactose electrolyte deficient agar) media was used for inoculating the urine samples that come to our laboratory by semiquantitative culture technique through nichrome calibrated loop.^{9,10}

3. Observation & Result

Table 1: Occurrence of positive CAUTI and NON CAUTI cases

Positive cases of CAUTI	34/85	40%
Positive cases of NON CAUTI	27/85	31%

This table shows that 40% micro organisms were isolated in CAUTI cases and 31% microorganisms were isolated in NON-CAUTI cases.

Table 2: Gender wise criteria in CAUTI & NON-CAUTI patients

	Gender	No.	Percentage
CAUTI	Male	10	29.41%
	Female	24	70.58%
NON-CAUTI	Male	6	22.22%
	female	21	77.77%

In our study rate of infection was higher in females in both CAUTI (70.58%) & NON CAUTI (77.77%) patients.

In this study, *E.coli* (58.82%) was the most commonly isolated bacteria from CAUTI patients, followed by

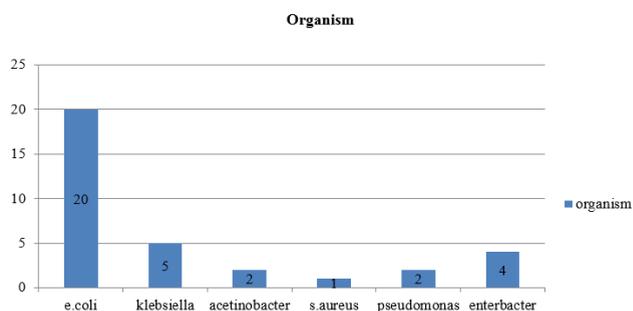


Fig. 1: Organisms isolated in CAUTI patients

klebsiella (14.70 %), *enterobacter* (11.76%), *aceitobacter* (5.88%), *pseudomonas* (5.88%) and *S.aureus* (2.94%).

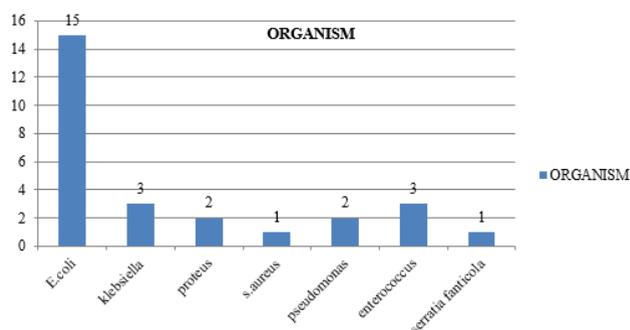


Fig. 2: Organisms isolated in NON-CAUTI patients

This column graph shows that in our study of NON CAUTI patients *E.coli* (55.55%) was the highest isolated bacteria, followed by *klebsiella* (11.11%), *enterococcus* (11.11%), *proteus* (7.40%), *pseudomonas* (7.40%), *S.aureus* (3.70%) and *serrotia fanticola* (3.70%)

4. Discussion

During the period from November 2019 to jaunary 2021, 170 urine samples were processed to determine occurrence of infection in urinry tract and catheter- associated urinary tract infection.

In our study done at microbiology department in teerthankar mahaveer medical college and research centre, occurrence of CAUTI was 40% that is 34 /85 samples tested positive for bacterial infection which was equivalent to research conducted by karthak R et al¹¹ and chatterjee N¹² et.al who reported CAUTI occurrence of 42% And 35.9% respectively. A research was carried out in New delhi by Bhatia N et al¹³ concluded occurrence of CAUTI 22.4%. Rate of UTI infection in NON-CAUTI is 31% in our study here which co relates with the study done by Khan R et al⁷ and Acharya V N et.al¹⁴ who reported 33.4% and 36.3% occurrence of NON-CAUTI respectively.

It was found that in our study both in CAUTI & NON-CAUTI females were more owing to many physical and anatomic factors. In CAUTI our study concluded that 70.58% females and 29.41% males were having bacterial infection and in NON-CAUTI the percentage was 77.77% in females and 22.22% in males. A study done by patil H V et al¹⁵ in CAUTI got similar percentage i.e males 36.60% and females 63.69%. Also a study done on NON-CAUTI by Kumar H et al¹⁶ had infections in females 65% and in males 35%. Some dissimilar results were also seen in some studies where males were more affected than females. Study done by Sangamithra V et al¹⁷ in CAUTI had more no of males affected 65% where as in females were 35%. It could be due to numerous factors as in males mild prostate enlargement causes an obstructive urinary lesion from benign prostate hypertrophy.

In the present study on CAUTI maximum no. of isolated organism was *E.coli* as high as 58.82% then *klebsiella* 14.70%, *enterobacter* 11.76%, *pseudomonas* 5.88%, *aceitobacter* 5.88% and *s.aureus* 2.94%. A resembling study was done by Eshwarappa M et al¹⁷ percentage of *E.coli* as high as 66.9%, *klebsiella* 15.5%, *enterobacter* 4% and *pseudomonas* 10.2%. Bhatia N et al¹³ also did a study on CAUTI in which *E.coli* isolated was 59.1%, *klebsiella* 19.69% and *klebsiella* 6%. Similar Study done by Vyawahare CR et al¹⁸ isolated 57% *E.coli*, 20% *klebsiella* and 7% *pseudomonas*. *E.coli* remains the predominating organism as it's attachment to uroepithelium is influenced by number of variables. Also in our study on NON-CAUTI patients *E.coli* again was the commonst isolated bacteria 55.55% following *klebsiella* 11.11%, *klebsiella* 11.11%, *proteus* 7.40%, *Pseudomonas* 7.40%, *s.aureus* 3.70% and *serratia fanticola* 3.70% correlating with a study done by Karishetti M S et al, *E.coli* leading the list with 56.40%, *klebsiella* 9.60%, *klebsiella* 13%. Sood S et al¹⁹ in his study isolated 61% *E.coli*, 9.24% *enterococcus* and 6.64% *klebsiella*.

5. Conclusion

The present study on comparison of bacterial urinary tract infection in catheterized patients and non catheterised patients was carried out on 170 samples, 85 catheterised and 85 non catheterized. The most frequent bacterial illness is urinary tract infection in human population. Sometimes this could also lead to complications like cystitis, biofilm formation, polynephritis and many more.

Infection occurred more in catheterized patients. Percentage of CAUTI was 40% where as in NON CAUTI it was 31%. Ratio of women was high in both CAUTI and NON CAUTI that is 70.58% and 81.48% respectively. *E.coli* was the predominately isolated organism in both CAUTI & NON CAUTI and the pace of infection of *E.coli* was higher in CAUTI (58.82%) than NON CAUTI (55.55%), in *klebsiella* rate was 14.70% in CAUTI and

11.76% in NON CAUTI.

Our study concluded that Infection occurred more in CAUTI patients. Females were affected more than males. *E.coli* was the commonst isolated bacteria followed by *klebsiella*, and many more. As our study shows higher percentage of UTI in CAUTI so unnecessary catheterization should be avoided.

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7. Conflicts of Interest

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References

1. Feneley RC, Hopley IB, Wells PN. Urinary catheters: history, current status, adverse events and research agenda. *J Med Eng Technol.* 2015;39(8):459–70.
2. Kolawole AS, Kolawole OM, Kandaki-Olukemi YT, Babatunde SK, Durowade KA, Kolawole CF, et al. Prevalence of urinary tract infections (UTI) among patients attending Dalhatu Araf Specialist Hospital. *Int J Med Med Sci.* 2009;1(5):163–70.
3. Chapple C. "Overview on the lower urinary tract," in *Urinary tract. Handbook of experimental pharmacology.* Berlin ,Germany: Heidelberg; Springer; 2011.
4. Sabra S, Abdel-Fattah M. Epidemiology and microbiological profile of nosocomial infection in tariff hospital, KSA. *World J Med Sci.* 2012;7(1):1–9.
5. Stickler DJ, Feneley RC. The encrustation and blockage of long-term indwelling bladder catheters: a way forward in prevention and control. *Spinal Cord.* 2010;48(11):784–90.
6. Jordan RP, Malic S, Waters MG, Stickler DJ, Williams DW. Development of an antimicrobial urinary catheter to inhibit urinary catheter encrustation. *Microbiol Discov.* 2015;3(1):1–7.
7. Khan R, Saif Q, Fatima K, Meher R, Shahzad HF, Anwar KS, et al. Clinical and bacteriological profile of Uti patients attending a north Indian tertiary care center. *J Integr Nephrol Androl.* 2015;2(1):29–34.
8. Sangamithra V, Sneha, Praveen S, Manonmoney. Incidence of Catheter Associated Urinary Tract Infection in Medical ICU in a Tertiary Care Hospital. *Int J Curr Microbiol App Sci.* 2017;6(4):662–9.
9. Jenkins RD, Fenn JP, Masten JM. Review of urine microscopy for bacteriuria. *JAMA.* 1986;255(24):3397–403.
10. APC Text Book of Microbiology. In: and others, editor. 5th Edn. Arya Publication Usefull for Medical Students; p. 577–80.
11. Karthik R. Study of risk factors for catheter associated urinary tract infections. Last modified 18 Feb ; 2014.
12. Chatterjee N, Chatterjee C, Ghosh S, Mukhopadhyay M, Brahmachari R, Patar K, et al. Pattern of Urinary Antibigrams in a Tertiary Care Hospital of Eastern India. *J Assoc Physicians India.* 2016;64(4):26–30.
13. Bhatia N, Daga MK, Garg S, Prakash SK. Urinary catheterization in medical wards. *J Glob Infect Dis.* 2010;2(2):83–90.
14. Acharya VN. Urinary tract infection—a dangerous and unrecognised forerunner of systemic sepsis. *J Postgrad Med.* 1992;38(2):52–4.
15. Patil HV, Patil VC. Clinical, bacteriology profile, and antibiotic sensitivity pattern of Catheter associated Urinary tract infection at tertiary care hospital. *Int J Health Sci Res.* 2018;8(1):25–35.

16. Kumar H, Singh VA, Nagpal S, Biswas D. Isolation of uropathogens and their antibiotic susceptibility pattern at a tertiary care hospital in Northern India. *Asian J Pharm Clin Res.* 2019;12(12):84–6.
17. Eshwarappa M, Dosegowda R, Aprameya IV, Khan MW, Kumar PS, Kempegowda P, et al. Clinico-microbiological profile of urinary tract infection in south India. *Indian J Nephrol.* 2011;21(1):30–6.
18. Vyawahare CR, Gandham NR, Misra RN, Jadhav SV, Gupta NS, Angadi KM, et al. Occurrence of catheter-associated urinary tract infection in critical care units. *Med J DY Patil Univ.* 2015;8(5):585–9.
19. Sood S, Gupta R. Antibiotic resistance pattern of community acquired uropathogens at a tertiary care hospital in jaipur, rajasthan. *Indian J Community Med.* 2012;37(1):39–44.

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