THINK INDIA Journal

ISSN:0971-1260
Vol-22-Issue-16-August-2019

Multi-Drug Impervious Bacteria Associated With Urinary Tract Infection In Nosocomial Catheter.

KARAMJIT KAUR,
Department of Medical Laboratory Sciences,
Lovely Professional University

Corresponding Author
Ms.Karamjit Kaur,
Assistant Professor
Department of Medical Laboratory Sciences
Lovely Professional University
karamjit.24934@lpu.co.in

ABSTRACT

Infection of urinary tract and high risk of Nosocomial infection is most of the big medical issue in many areas of the world. The catheter represents a site susceptible to colonization of opportunistic pathogens, e.g. *E.coli, Klebsiella,* and *Pseudomonas.* Catheter treatment has significantly reduced the incidence of infections in patients with UTIs, but chronically indwelling patients may still develop lifethreatening infections and tend to be a general risk of morbidity and mortality worldwide of urinary tract infection. 100 samples were taken from the Catheterized patients for the study from which 45 E.coli and 22 *Klebsiella spp.* and 19 Pseudomonas spp. were isolated. The pattern of antibiotic susceptibility suggested that 100% of the isolates were resistant to Norfloxacin and 27.2% Amikacin, 18.1% Ciprofloxacin, Imipenem, Meropenem and the least resistance was shown by Gentamicin, Tobramycin- Piperacillin 9.0%. Antibiotic resistance pattern shows that all of the 22 isolates were Multidrug resistance *Klebsiella* (MDRK).Urinary region infections can be characterized like uropathogen with associated clinical signs (> 105 adult CFU / mL; > 104 child CFU / mL).Catheter treatment has significantly reduced the incidence of infections in UTI patients, but chronically resident patients may still develop life threatening infections and tend to be a general risk of worldwide urinary tract infection morbidity and mortality**.**

Key words – Uropathogen, dysuria,bacteuria,Bacteremia

ISSN:0971-1260
Vol-22-Issue-16-August-2019

Introduction

Infections of UTI may be characterized as bacteriuria (> 105 CFU /mL in adults; > 104 CFU / mL in children) as mentioned by uropathologist with medical symbols such as dysuria and constraint. Urinary tract infection (UTI) is also refers to invasion of bacteria[1].Klebsiella is in second place to E. coli for diseases of the urinary tract. For patients with chronic pulmonary disease, enteric pathogenicity, atrophy of nasal mucosa, and rhinoscleroma, it is also an opportunistic pathogen. UTI is the second most frequent infectious appearance inside world creature involve in urinary tract infection is*E.coli (60.4%), Klebsiella (11.6%), Pseudomonas (8.3%) Proteus (2.9%),Serriatia*,coagulase negative *Staphylococci (2.2%), Enterococci (2.3%)* and *Candida Albicans.*E.coli is the most frequent cause intended for the UTI and *Klebsiella* is the second most organisms which cause the hospital acquired urinary tract infection [2, 3].

The most important reason of bacteriuria is the creation of biofilm on the surfaceof the catheter. Biofilm is essentially a complex of microorganisms that grow within colonies and the extra-cellular polysaccharide muco substance that they produce. The most abundant protein in urine is TammHorsfall Protein (THP), which is known to bind to uropathogenic bacteria.When we insert catheter, then biofilm immediately forms, when organisms close to conditioning film of host proteins which form alongside the catheter shell.The catheter's inner and outer layer was implicated. Bacteria usually initiate in the periurethral region or go up the drainage tube after the drainage bag has been colonized[4, 5].In medicine, bacterial biofilms play a major role.

According to the NIH, biofilm,forming bacteria accounted for up to 80% of all urological inf ections as one of the main area where biofilm can turn into a severe trouble. [6].CAUTI's pathogenesis is linked to inert catheter material's vulnerability to microbial colo nization. Bacteria binds on the surface of healthy bladder mainly on mucosal layer resulting in an inflammatory reaction which leads to neutrophils and the sloughing of bacterial epithelial cells.[7].

BIOFILM INCLUDES 3 COMPONENETS FORMAL DEFINATION

(1) Microorganism adherence, either to a substrate or to one another.
(2) Changes in gene expression resulting in a phenotype other than the planctonic state. (3) An extracellular medium composed of host components and bacterial.

ISSN:0971-1260
Vol-22-Issue-16-August-2019

Escherichia coli are the most common infectious organism. Other *Enterobacteriaceae and Enterococci spp. Staphylococcus, Pseudomonas.* Organisms that are resistant to antimicrobials are frequent. Urine in patients with occupied catheters is the primary isolation source for Gram negative species in both acute and long term care facilities [8].
Both *Enterobacteriaceae and Enterococci spp. Pseudomonas aeruginosa, Staphylococcus* organisms that are resistant to antimicrobials are common.

Nosocomial infections

Nosocomial infections problem is as previous as the hospitalization. However this problem is current and depicts an everlasting hazard even to hospitalized patient in the majority modern hospitals. All organisms can be the causative agents of nosocomial infection but most often there is involvement of bacteria. Depending on the use of antibiotics and introduction of new diagnostic and therapeutic procedures, the type of microbes change that cause hospital infection [9]. Biofilm formation is associated with *Pseudomonas aeruginosa* in cystic fibrosis pneumonia, *Staphylococcus aureus* in chronic rhinosinusitis. Biofilms are usually defined as microbial communities associated with the substrate, surrounded by an extracellular polymeric material (EPS) layer. Biofilms, found in chronic diseases, protect inflammatory responses and antibiotic treatment against the host [10]. *Klebsiella pneumoniae* is an important core of nosocomial infection because of multiple antibiotic resistances. Patients who are taking too much antibiotics for longer period of time target for strict infection [11].

Urinary tract infections, one of common hospital acquire infection in United States, mainly caused by catheter. It accounts for 40% of Nosocomial infections and are common in hospitals with sensitive care (including ICUs); long-term care facilities; and in people with spinal cord injured. Majorly present bacteuria in symptomatic catheterized patients and most frequent isolate is *E.coli.* Diabetes is also a most common factor that may lead to UTIs in the catheterized patients the ratio is 44% [12].

E.coli was the first and usual common pathogen causing urinary tract infection. According to sex bacteria also vary that may lead to UTI. Majorly E.coli is the one who cause half of the infection of urinary tract. This is just because of their resistance to antibiotics was little when it is evaluate with another pathogens like *Klebsiella and Pseudomonas spp*. which was implicated in UTI, along with this it have the lowest percentage of multidrug resistant (MDR)

ISSN:0971-1260
Vol-22-Issue-16-August-2019

isolates. Bacteria isolated from females were less immune than males, and this difference increased as the patient grows older. [13].

Urinary tract is the most often acquired infections by the bacteria for an estimated 25-40%. Microbial biofilms possess a health problem for people in the home who need medical devices because they are hard to treat with antimicrobial agents. Bacteuria was the mainly common isolate within all suggestive *E.coli* and catheterized patients. Diabetes (44%) was the most common factor in catheterized patients diagnosed with UTI [14]. Knowledge of these factors and simple preventive measures, such as proper hygiene, can restrict disease occurrence. Our nosocomial infection management relies on adequate antibiotic therapy [15].

METHODOLOGY AND METHODS

Work was performed in oxford hospital with different bacteria. 100 samples was performed out of that 14 samples was negative and 86 samples have positive results. Gram staining, Biochemical test performed and Antibiotic Susceptibility testing with different bacteria on Muller-Hinton plates were tested. A catheter tip type of specimen received by the clinical microbiological laboratories. Based on their growth on routine Mac-Conkey medium, the samples were selected showing lactose Non-fermenting pale colonies that were positive oxidase testing and pigmented on nutrient agar and no pigmented colonies with positive oxidase. [16]

Antibiotics used and their zone size in millimetres:

Antibiotics	Resistant	Intermediate	Sensitive
1.Amikacin	14	15-16	17
2.Ciprofloxacin	15	16-20	21
3.Gentamicin	12	13-14	15
4.Cefotaxime	14	15-17	23
5.Imipenem	13	14-15	16
6.Meropenem	13	14-15	16
7.Cefoperazone	15	16-20	21
8.Tobramycin	12	13-14	15
9.Piperacillin-tazobactam	17	18-20	21
10.Cefapime	14	15-17	18
11.Cefatazidime	14	15-17	18
12.Norfloxacin	14	15-16	17

ISSN:0971-1260
Vol-22-Issue-16-August-2019

Table no-1 Different antibiotics used to check resistance pattern

RESULTS AND ANALYSIS

An observational study with 100 samples screened to estimate the prevalence of E.coli and Sensitivity and Resistance pattern for antibiotics. Out of which there is a lot percentage of *Klebsiella* and third one leads to the *Pseudomonas spp*. and many more *candida albicans* as well including *Streptococcus* also. But as result concluded that the *E.coli* leads more at the peak.

Total number of sample including male and female =100

Positive sample: 86

E.coli: 45

Klebsiella pneumoniae: 22

Pseudomonas aeruginosa: 19

Negative: 14

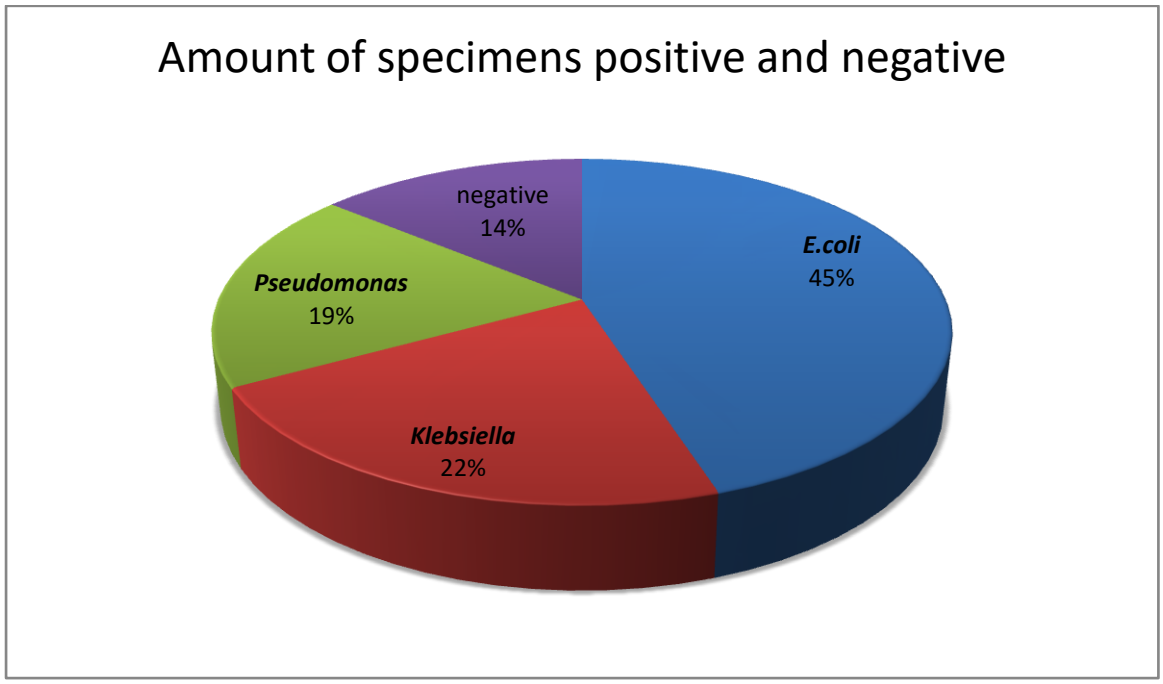

Fig no- 2 the number of positive and negative specimens

E.coli causes 80-85 percent of urinary tract infections acquired by the population. Because of catheterization, urinary tract infections involve a much wider range of pathogens including E.coli, *Pseudomonas*, *Klebsiella*, the fungal pathogen *Candida albicans*. Because E.coli has a property to grow in continuous margins in round form.When *Pseudomonas* gives colonies that are odorous. [17]

ISSN:0971-1260
Vol-22-Issue-16-August-2019

	E.coli		*Pseudomonas aeruginosa*		*Klebsiella pneumoniae*	
Resistance pattern	**Number of samples45**	**%**	**Number of samples (19)**	**%**	**Number of samples 22**	**%**
1.Amikacin	6	13.3	3	15.7	6	27.2
2.Ciprofloxacin	2	4.44	1	5.26	4	18.1
3.Gentamicin	6	13.3	1	5.26	1	4.5
4.Cefotaxime	5	11.1	4	21.05	3	13.63
5.Imipenem	9	20	1	5.26	2	9.09
6.Meropenem	3	6.6	0	0	3	13.63
7.Cefoperazone	5	11.11	0	0	0	0
8.Tobramycin	0	0	1	5.26	1	4.5
9.Piperacillin-tazobactam	0	0	1	5.26	1	4.5
10.Cefapime	6	13.3	1	5.26	0	0
11.Cefatazidime	2	4.4	0	10.52	0	0
12.Norfloxacin	1	2.2	0	21.05	1	4.5

Table no-1 Showing *Klebsiella*, *Ecoli*, *Pseudomona's* resistance sequence.

ISSN:0971-1260
Vol-22-Issue-16-August-2019

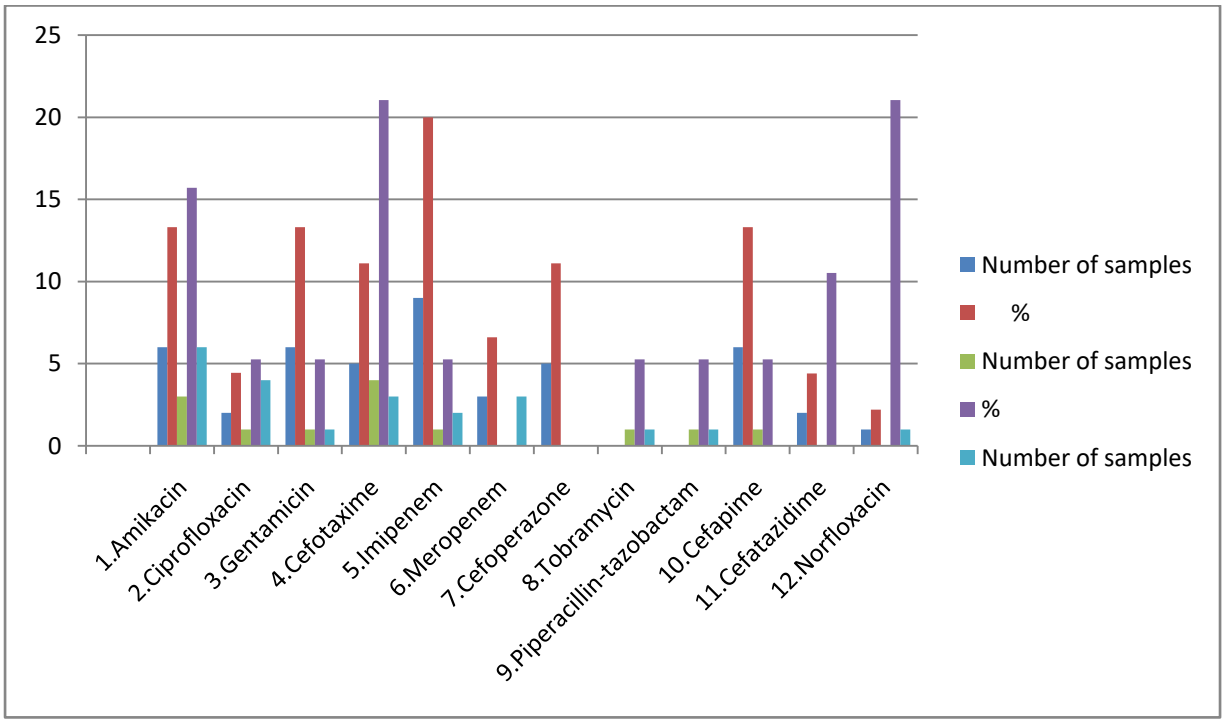

Fig no-3 Graph showing resistance pattern of *Klebsiella, Ecoli.,Pseudomona.*

E.coli shows highly resistance with Amikacin, Gentamicin and Cefapime .Whereas pseudomonas shows most resistance with antibiotics i.e. Norfloxacin and Cefotaxime (21.05%). And *Klesiella* with Amikacin drug.

The present study was to describe the isolation and identification of *Pseudomonas spp. Klebsiella spp.* and *E.coli* in urinary tract infection patients and to study antibiotic susceptibility patterning of these as well. As *E.coli* is first major pathogen that may lead to UTI after its *Klebsiella* and *Pseudomonas* play role.

Out of 100 samples, 19 samples were isolated as *Pseudomonas spp.* and 22 *Klebsiella* and *E.coli*45. The percentage of resistance by antibiotics: Amikacin (13.3), Ciprofloxacin(4.44%),Gentamicin(13.3%),Cefotaxime (11.1),Imipenem (20%), Meropenem (6.6%) Cefoperazone (11.11%) Tobramycin (0%), Piperacillin-tazobactam (0%), Cefepime (13.3%), Ceftazidime (4.4%), Norfloxacin (2.2%).

Specifically when the bladder is catheterized, urinary tract is the commonest source of such infection. Patient's own normal flora is major cause of catheter-associated UTIs and other factor is catheter predisposes. The major risk factor for the development of catheter-associated bacteriuria is totally depending on the time of catheterization; this is the major risk because more duration may leads to infection. So if the duration will be short-term the

ISSN:0971-1260
Vol-22-Issue-16-August-2019

infection will be less and also caused by single organism mostly it will become asymptomatic.

Two goals should be known to the clinician: first, the catheter system should stay closed and the length of catheterization should be minimum or negligible. Thus asymptomatic bacteriuria associated with the catheter does not require or cannot be prescribed for any antimicrobial therapy, except in some special cases. It is recommended to treat antibiotics in cases of higher or symptomatic infection or chronic cases. There is no effective long-term antibiotic suppressive therapy. Use of the non-return (flip) valve catheter to prevent the closed drainage container. Indwelling urethral catheters that are less causing symptomatic infection should be preferable.

CONCLUSION

The present study was to describe the isolation and identification of *Pseudomonas spp.*, *Klebsiella spp.* and *E.coli* in urinary tract infection patients furthermore to study antibiotic susceptibility patterning of these as well. As *E.coli* is first major pathogen that may lead to UTI after its *Klebsiella* and *Pseudomonas* play role.

REFERENCES

[1]Podschun, Rainer, and U. Ullmann. "Klebsiella spp. as nosocomial pathogens: epidemiology, taxonomy, typing methods, and pathogenicity factors." *Clinical microbiology reviews* 11, no. 4 589-603. 1998

[2]TEST, WHAT IS A. RAPID DIAGNOSTIC. "RAPID DIAGNOSTIC TESTS." *Microbiology Practical Manual, -E-Book* 195.2018

[3]Custovic, Amer, Jasmina Smajlovic, Nijaz Tihic, Sadeta Hadzic, Sead Ahmetagic, and Haris Hadzagic. "Epidemiological monitoring of nosocomial infections caused by Acinetobacter baumannii." *Medical Archives* 68, no. 6: 402 2014

[4]Smith, Philip W., and Lindsay E. Nicolle. "The chronic indwelling catheter and urinary infection in long-term–care facility residents." *Infection Control & Hospital Epidemiology* 22, no. 5 : 316-321.2001

[5]Stowe, Sean D., Justin J. Richards, Ashley T. Tucker, Richele Thompson, Christian Melander, and John Cavanagh. "Anti-biofilm compounds derived from marine sponges." *Marine Drugs* 9, no. 10 (2011)

ISSN:0971-1260
Vol-22-Issue-16-August-2019

[6]Klumpp, David J., Adam C. Weiser, Shomit Sengupta, Sarah G. Forrestal, Robert A. Batler, and Anthony J. Schaeffer. "Uropathogenic Escherichia colipotentiates type 1 pilus-induced apoptosis by suppressing NF-κB." *Infection and immunity* 69, no. 11 : 6689-6695: 2001.

[7]Gristina, Anthony G. "Biomaterial-centered infection: microbial adhesion versus tissue integration." *Science* 237, no. 4822 1588-1595. (1987):

[8]Custovic, Amer, Jasmina Smajlovic, Nijaz Tihic, Sadeta Hadzic, Sead Ahmetagic, and Haris Hadzagic. "Epidemiological monitoring of nosocomial infections caused by Acinetobacter baumannii." *Medical Archives* 68, no. 6 402. (2014):

[9]Hall-Stoodley, Luanne, and Paul Stoodley. "Evolving concepts in biofilm infections." *Cellular microbiology* 11, no. 7 1034-1043.2009

[10]Filozov, Alina, Paul Visintainer, Carol Carbonaro, Maria Aguero-Rosenfeld, Gary P. Wormser, and Marisa A. Montecalvo. "Epidemiology of an outbreak of antibiotic-resistant Klebsiella pneumoniae at a tertiary care medical center." *American journal of infection control* 37, no. 9 723-728. (2009).

[11]Niveditha, S., S. Pramodhini, S. Umadevi, Shailesh Kumar, and Selvaraj Stephen. "The isolation and the biofilm formation of uropathogens in the patients with catheter associated urinary tract infections (UTIs)." *Journal of clinical and diagnostic research: JCDR* 6, no. 9 1478. (2012).

[12]Linhares, Inês, Teresa Raposo, António Rodrigues, and Adelaide Almeida. "Frequency and antimicrobial resistance patterns of bacteria implicated in community urinary tract infections: a ten-year surveillance study *BMC infectious diseases* 13, no. 1 (2013): 19. (2000–2009)."

[13]Niveditha, S., S. Pramodhini, S. Umadevi, Shailesh Kumar, and Selvaraj Stephen. "The isolation and the biofilm formation of uropathogens in the patients with catheter associated urinary tract infections (UTIs)." *Journal of clinical and diagnostic research: JCDR* 6, no. 9 1478. (2012).

[14]Vincent, Jean-Louis. "Nosocomial infections in adult intensive-care units." *The lancet* 361, no. 9374 2068-2077.2003

[15]Custovic, Amer, Jasmina Smajlovic, Nijaz Tihic, Sadeta Hadzic, Sead Ahmetagic, and Haris Hadzagic. "Epidemiological monitoring of nosocomial infections caused by Acinetobacter baumannii." *Medical Archives* 68, no. 6 402. 2014

[16]Filozov, Alina, Paul Visintainer, Carol Carbonaro, Maria Aguero-Rosenfeld, Gary P. Wormser, and Marisa A. Montecalvo. "Epidemiology of an outbreak of antibiotic-resistant Klebsiella pneumoniae at a tertiary care medical center." *American journal of infection control* 37, no. 9 723-728.2009

[17]Anupurba, Shampa, Amitabha Bhattacharjee, Atul Garg, and Malay Ranjan Sen. "Antimicrobial susceptibility of Pseudomonas aeruginosa isolated from wound infections." *Indian journal of dermatology* 51, no. 4: 286.2006