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Mdr Of Bacteria Related To Nosocomial Catheter Associated Urinary Tract Infection

Tenzin Tsephel[1], Karamjit kaur[2], Gurinder Singh[3]

[1,2,3] *Assistant Professor, Department of Clinical Microbiology, Lovely Professional University, Phagwara, Punjab.*
email ID: tenzin.25455@lpu.co.in

ABSTRACT

Nosocomial infection hospital has always acted as source of infection to patient admitted to them. The infection usually occurs after the patient admitted to hospital. The incidence of hospital infection has been reported to be 2 to 12 percent in advanced countries but it is much higher in crowded hospitals. Such infection is evident during their stay in hospitals or only after discharge [7]. 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* (MDR)

1. INTRODUCTION

Catheter related urinary tract infection is one of the common infection amongst the all [1]. Urinary catheter is most commonly used in health care areas nursing homes. The symptomatic infection to individual refers to catheter associated urinary tract infection[2]. Many patients are at risk just because of the unnecessary use of indwelling catheter during hospitalization or with such devices[3].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[4].

The major determination of bacteriuria is depend on the time or duration of catheterization. The women and older persons are at higher risk[5].Bacteriuria is must once a catheter remains attached for several weeks. Patient will be bacteriuric with chronic indwelling catheter[6].

Biofilm basically resist host immune responses and antibiotic treatment[22].

Klebsiella pneumoniae is an important cause of nosocomial infection because of multiple antibiotic resistance[23].
Material and methodology

In this present study, patients participating in 2 randomized trials of 2 novel urinary catheters one nitrofurazone-impregnated silicone catheterand the other, a silver-polyurethane hydrogel catheterformed the study population. Participants in both trials were hospitalized patients

scheduled to receive an indwelling urethral (Foley) catheter who were expected to be catheterized for more than 24 hours.

2. METHODS FOR THE DIAGNOSIS OF URINARY TRACT INFECTION

A **catheter tip** is the most common type of specimen received by the clinical microbiological laboratories.

Specimen collection:

Urinary Catheter tip is collected from the catheterized patient .

Transport of specimen:

- Once collected specimen must be transported to the laboratory without delay.
- Sterile disposable container are used to transport specimen.

Microscopy: Gram stained smear is prepared to observe relative number of polymorphs and bacteria, different morphological forms of gram positive and gram negative bacteria.

GRAM'S STAINING

Introduction:

Gram staining is one of the most important and widely used differential staining techniques in diagnostic microbiology.

Principle:

Gram staining is a differential staining technique by which bacteria are classified as "Gram positive" or "Gram negative" depending upon whether they retain or loose the primary stain crystal violet when subjected to treatment with a decolourising agent such as alcohol.

Reagents:

The gram stain has four different reagents:

1. Primary stain (Crystal violet): colours all cell a purple blue.
2. Mordant (Potassium iodine-Iodine solution): the bulkier iodine replaces chlorine in the crystal violet molecule; the complex formed becomes insoluble in water.

Decolouriser (Acetone or Alcohol): removes stain only from gram negative cells.

3. Counter stain (Saffaranine): stains the gram negative cells and makes them visible.

3. BIOCHEMICAL REACTION FOR IDENTIFICATION OF ISOLATES

A.OXIDASE TEST:

Purpose:

To determine the presence of an enzyme, cytochrome oxidase which catalyses the oxidation of reduced cytochrome by molecular oxygen

Principle:

When oxidase enzyme is present then substrate (1% Tetramethyl Paraphenylene Diamine Hydrochloride) is oxidized to give colour compound indophenol blue.

Method

1. **Plate method:** Freshly prepared oxidase reagent is directly poured on the surface of culture plate.
   Observation: Oxidase positive organism rapidly produce purple colour.

   NOTE: It should be performed only in Nutrient Agar plate.

Wet filter paper method: A sterile strip of filter paper is wet with oxidase reagent

and test organism is smeared on surface of filter paper.

Observation: Oxidase positive organism gives purple colour.

B.CATALASE TEST

Principle:

Certain bacteria have an enzyme catalase which acts on hydrogen peroxide to release hydrogen.

$$H_2O_2 \xrightarrow{\text{Catalase}} H_2O + O \text{ (Nascent oxygen)}.$$

Procedure (Method)

1. **Slide method:**

- Using a sterile glass rod/capillary tube transfer small amount of colony of test organism on a slide.
- Place a drop of 3% of H_2O_2 (hydrogen peroxide) into the colony and observe for immediate effervescence.

2. **Tube method:**

- Take 2-3 ml of H_2O_2 in a clean slide using a sterile glass rod.
- Pick up a colony and inoculated into the solution.
- Observe the immediate effervescence.

Interpretation

Positive test : Immediate bubbling, easily observed (O_2 formed).

Negative test : No bubbling (no O_2 formed).

The methods most commonly used in clinical laboratories are **disc diffusion**, **agar diffusion**, **macrobroth dilution**. Additionally, automated methods are becoming widely recognized.

4. STOKES DISC DIFFUSION METHOD

Alternatively, a loopful of inoculum may be placed on both sides of the plate and spread with a dry sterile swab. The test organism is inoculated onto the central area of the e plate in a

similar manner. An uninoculated gap, 2-3mm wide, should separate the test and control areas. Antibiotics discs are placed.

5. ANTIBIOTIC SUSCEPTIBILITY TESTING

The Kirby Bauer disc diffusion test was used to assess the antibiotic sensitivity pattern shown by the *klebsiella spp* isolated from the clinical specimen.

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 samples including male and female =100

Positive sample: 86

E. coli: 45

Klebsiella: 22

Pseudomonas: 19

Negative: 14

Total number of samples	100
Positive sample	86
Negative sample	14
Pseudomonas spp.	19

Klebsiella spp.	22
E.coli	45

Antibiotics used:

Name	Strength (mcg)
Amikacin	30
Ciprofloxacin	5
Gentamicin	10
Cefotaxime	30
Imipenem	10
Meropenem	10
Cefoperazone	75
Tobramycin	10
Piperacillin- Tazobactam	100/10
Cefepime	30
Ceftazidime	30
Norfloxacin	10

6. RESULTS AND ANALYSIS

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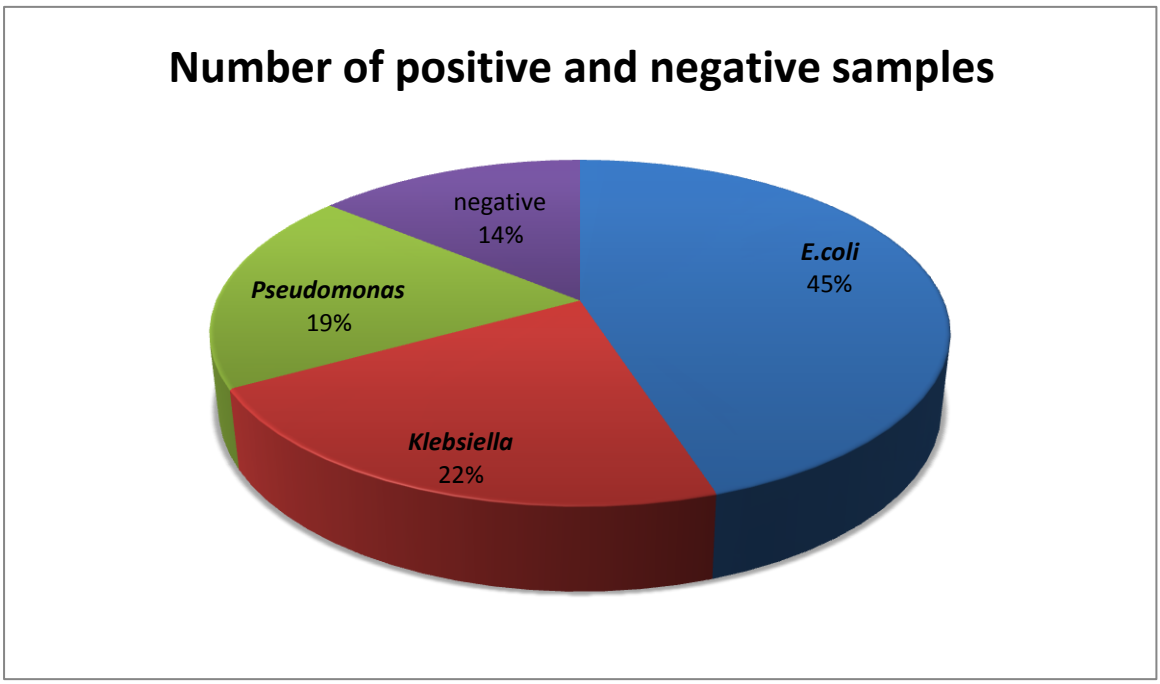


POSITIVE SAMPLE OF *E.COLI* SPP.

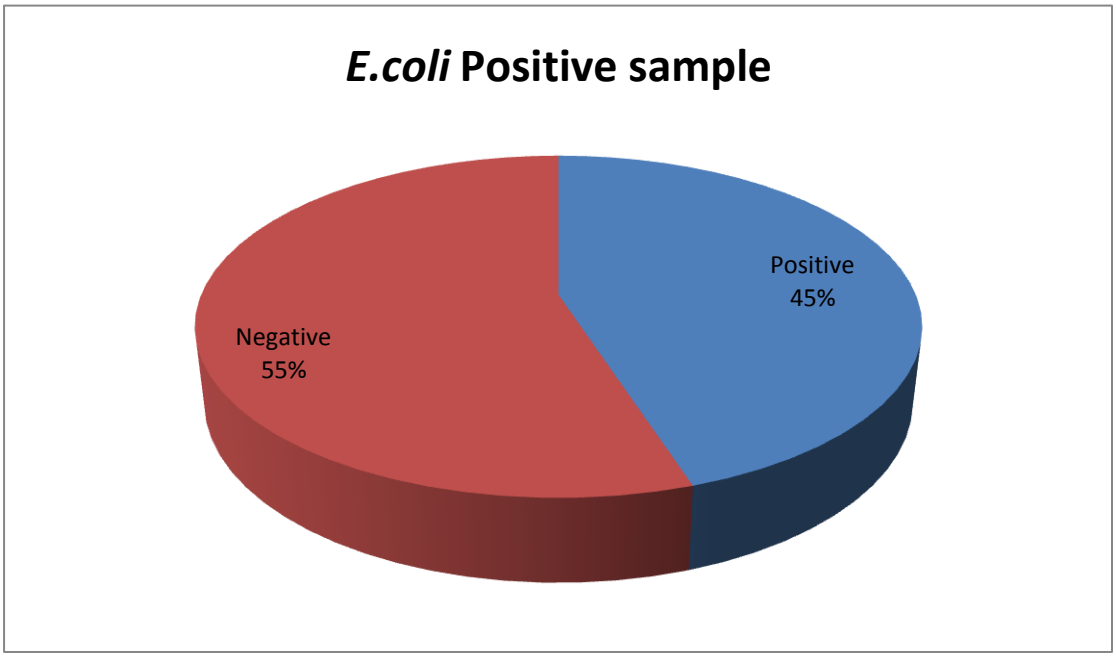
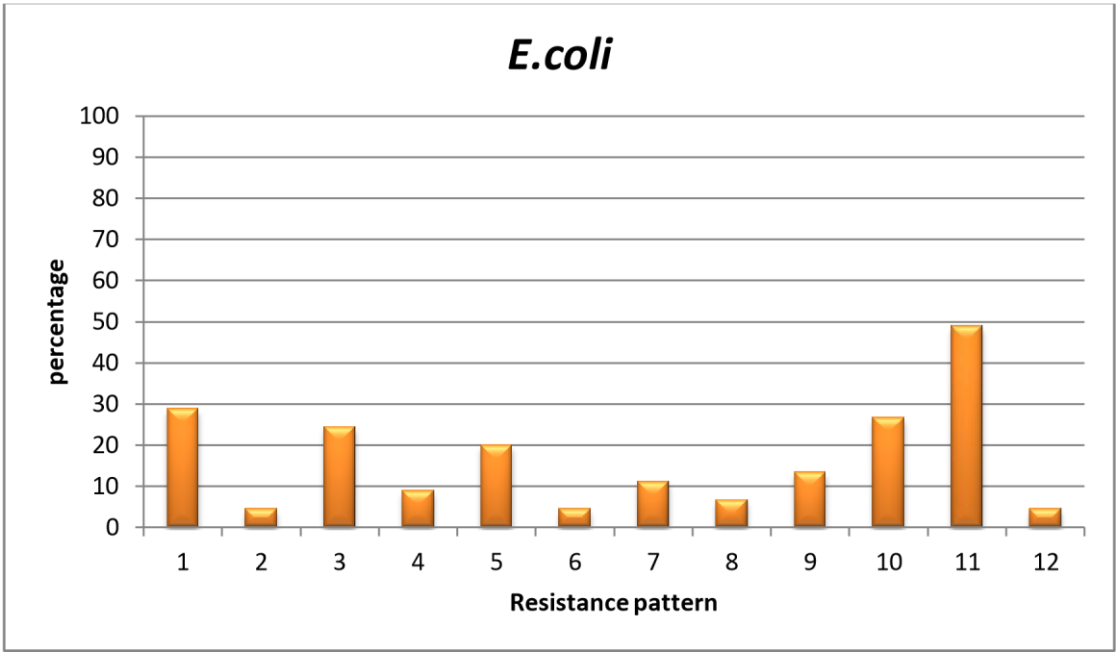


Table:1 Resistance pattern of *E.coli* positive samples studied

Resistance pattern	**Number of samples (n=45)**	**%**	**95%CI**
1.Amikacin	13	28.8	17.7-43.37

2.Ciprofloxacin	2	4.44	12.30-14.82
3.Gentamicin	11	24.44	14.23-38.67
4.Cefotaxime	4	8.88	35.10-20.73
5.Imipenem	9	20	10.90-33.82
6.Meropenem	2	4.44	12.30-14.82
7.Cefoperazone	5	11.11	48.40-23.50
8.Tobramycin	3	6.66	22.90-17.86
9.Piperacillin-tazobactam	6	13.33	62.50-26.17
10.Cefapime	12	26.66	15.97-41.04
11.Cefatazidime	22	48.8	34.96-63.00
12.Norfloxacin	2	4.44	12.30-14.82



Bar chart showing resistance of *E.coli*

POSITIVE SAMPLE OF *PSEUDOMONAS SPP.*

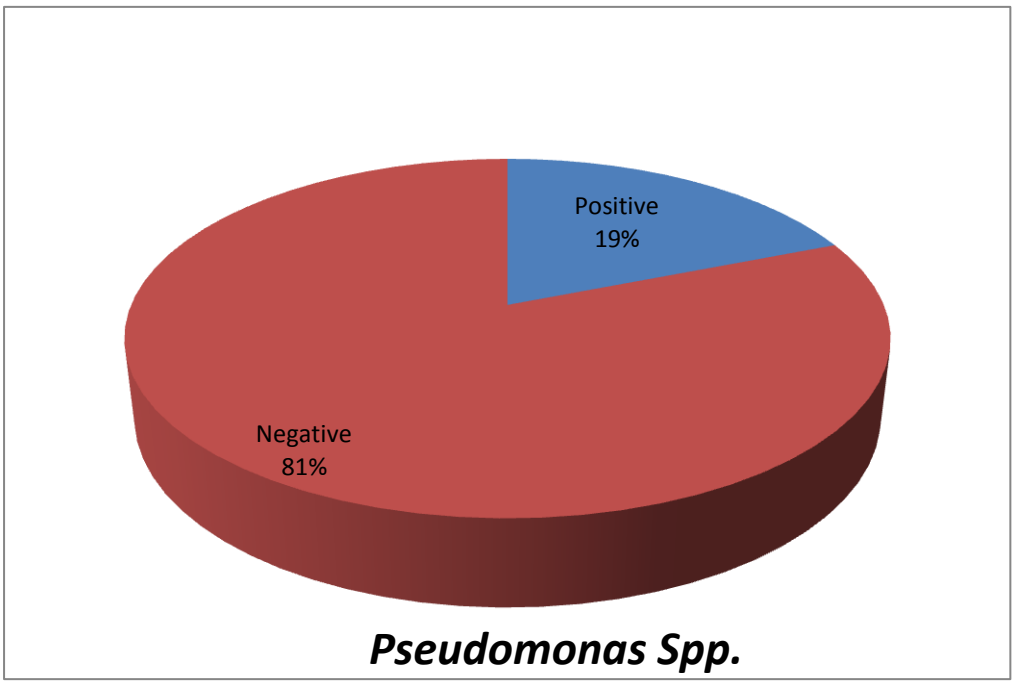
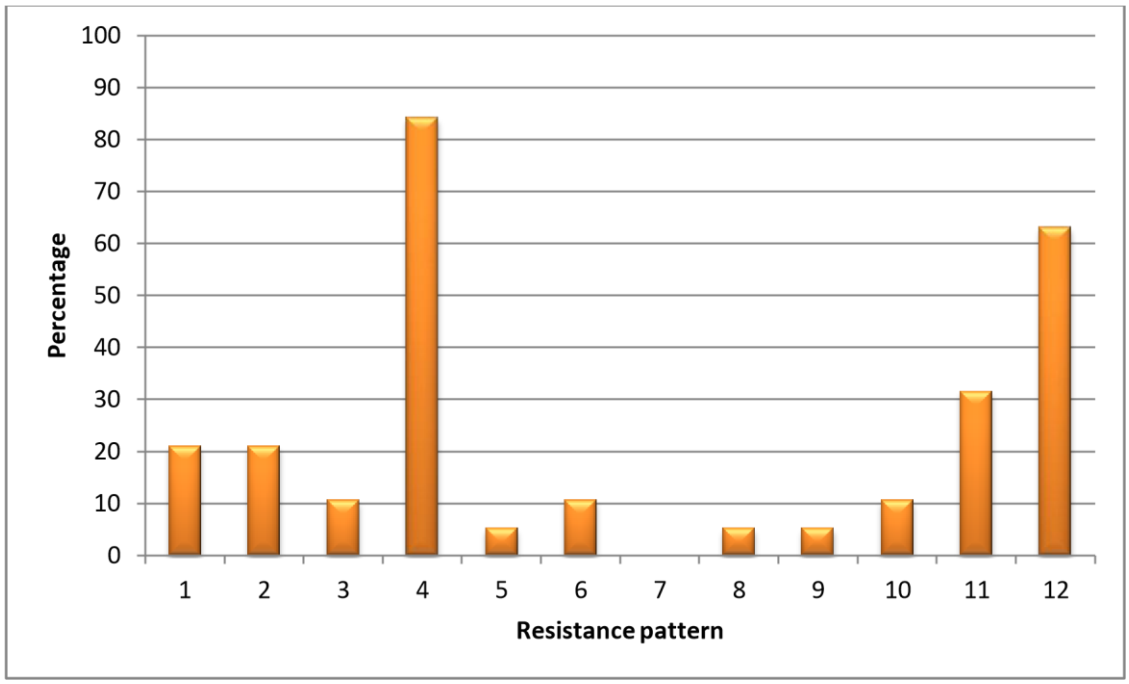


Table: 2

Resistance pattern of *Pseudomonasspp.* positive samples studied.

Resistance pattern	**Number of samples (n=19)**	**%**	**95%CI**
1.Amikacin	4	21.0	85.10-43.33
2.Ciprofloxacin	4	21.0	85.10-43.33
3.Gentamicin	2	10.5	29.40-31.40
4.Cefotaxime	16	84.2	62.43-94.48
5.Imipenem	1	5.2	09.30-24.63
6.Meropenem	2	10.5	29.40-31.40
7.Cefoperazone	0	0.0	0-16.82
8.Tobramycin	1	5.2	09.30-24.63
9.Piperacillin-tazobactam	1	5.2	09.30-24.63
10.Cefapime	2	10.5	29.40-31.40
11.Cefatazidime	6	31.5	15.37-53.99
12.Norfloxacin	12	63.1	41.04-80.85



Bar chart showing resistance of *Pseudomonas spp.*

POSITIVE SAMPLE OF *KLEBSIELLA SPP*.

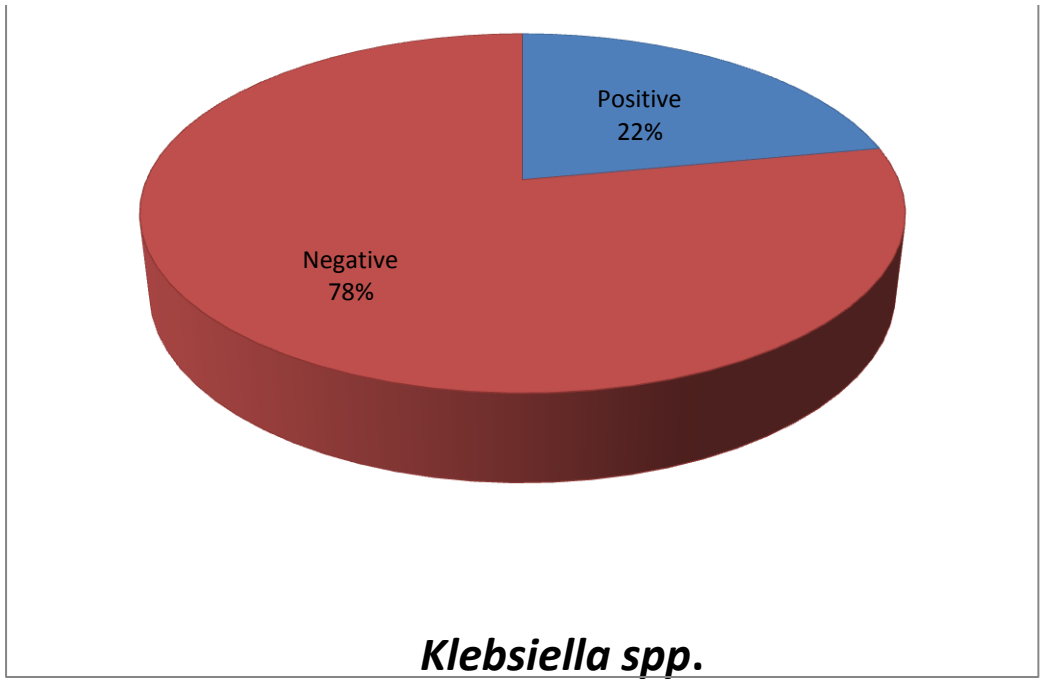


Table 3:

Resistance pattern of *Klebsiella spp.* positive samples studied.

Resistance pattern	**Number of samples (n=22)**	**%**	**95%CI**
1.Amikacin	6	27.2	13.15-48.15
2.Ciprofloxacin	4	18.1	73.10-38.51
3.Gentamicin	2	9.0	25.30-27.81
4.Cefotaxime	4	18.1	73.10-38.51
5.Imipenem	4	18.1	73.10-38.51
6.Meropenem	4	18.1	73.10-38.51
7.Cefoperazone	4	18.1	73.10-38.51
8.Tobramycin	2	9.0	25.30-27.81
9.Piperacillin-tazobactam	2	9.0	25.30-27.81
10.Cefapime	3	13.6	47.50-33.34
11.Cefatazidime	3	13.6	47.50-33.34
12.Norfloxacin	22	100.0	85.13-100.0

7. DISCUSSION

Indwelling catheter are basically use in hospitals widely and also across the united states as well. It is basically a necessary intervention, but along with this this urinary catheter unfortunately are the leading cause of UTIs in hospitalized patients.This may lead to major incidence of bacteriuria. In addition, economic burdens associated withcatheterrelated infection.

Person who is already catheterized from last 2 to 10 days, in that patient catheter-related bacteriuria is common. Symptoms of local infection develop in approximately 1 in 5 whereas most patients with catheter associated bacteriuria remain free of symptoms. In addition, bacteremia (presence of bacteria in the blood) from the same urinary tract organism will develop in 1 of 27 patients with bacteriuria.

The use of aseptic technique in catheter insertion and maintenance Infection control professionals and hospital epidemiologists play an important role in reducing the incidence of this important complication and by advocating for methods with demonstrated effectiveness in preventing this complication. In the future, it is hoped that new technologies will be developed that will reduce the significant health care burden of urinary catheter-related infection[30].

Various types of nosocomial infections are being studied and substantial informations have been gathered for the betterment of human health[31-34].

8. CONCLUSION

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*47. The percentage of resistance by antibiotics: Amikacin (21.05%), Ciprofloxacin(21.05%),Gentamicin(10.52%),Cefotaxime(84.21%),Imipenem(5.2%),Meropenem(10.52%),Cefoperazone (0%), Tobramycin (5.26%), Piperacillin-tazobactam (5.26%), Cefepime (10.52%), Ceftazidime (31.57%), Norfloxacin (63.15%) and *Klebsiella* and *E.coli* have also.

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