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ORIGINAL RESEARCH

A retrospective study on the antibiotic sensitivity pattern of uropathogens in a tertiary care hospital

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ABSTRACT

Background: One of the most prevalent infections is urinary tract infections, or UTIs. Antimicrobial resistance is one of the most challenging issues a doctor has when treating urinary tract infections. These days, a lot of uropathogens can exhibit antibiotic resistance, which justifies the prudent use of drugs. **Objective:** The goal is to identify the particular medication for the uropathogens in this tertiary care hospital and investigate the antibiotic sensitivity pattern of uropathogens in that institution. **Methods:** Patients with suspected UTIs had their urine cultures and sensitivity reports analyzed for this study. **Results:** 168 of the 561 reports demonstrated increase. Fifty-two (30.95%) of the 168 UTI cases were linked to Escherichia coli, thirty (17.86%) to Klebsiellapneumoniae, twenty-nine (17.26%) to Enterococcus, eleven (6.55%) to Acinetobacter, eleven (6.55%) to Candida species, etc., and thirty-five (20.81%) to more than three. In our investigation, we discovered that Escherichia coli was resistant to ampicillin but sensitive to meropenem and nitrofurantoin. Enterococcus was discovered to be responsive to nitrofurantoin, while Klebsiellapneumoniae was shown to be susceptible to Meropenem but resistant to Ampicillin. It was discovered that Acinetobacter was resistant to Cotrimoxazole, Ciprofloxacin, and Meropenem. **Conclusion:** The most prevalent uropathogen in this area, Escherichia coli, is susceptible to nitrofurantoin and Meropenem, according to our findings. It has been discovered that Klebsiellapneumoniae is susceptible to Meropenem. Additionally, we can deduce that uropathogens are becoming more resistant to antibiotics. Therefore, taking proactive steps to stop antimicrobial resistance—a threat to global public health—is imperative.

INTRODUCTION

Urinary tract infections (UTIs) are among the most prevalent human illnesses [1, 8]. On average, 50 patients out of 2000 will seek medical attention each year for acute urinary tract infection, which is more common in women [5, 1, 7] due to a small urethra and in senior men due to obstruction in the urinary outflow caused by prostate hypertrophy [1]. UTI is uncommon in circumcised males, and any male UTI is considered difficult [2]. UTIs affect 40% of women in the United States, making them one of the most frequent infections among women.

Clinically, UTIs are classified as complicated (or) simple [2, 3]. Uncomplicated UTIs usually affect people who are generally healthy and have no anatomical (or neurological) urinary tract abnormalities [2,3]. Complicated UTIs are characterized as UTIs caused by factors that impair the urinary tract (or) host defence [3].

Microbial resistance to antimicrobial drugs is one of the most difficult difficulties that physicians face when treating urinary tract infections. Nowadays, uropathogens can show antibiotic resistance [1, 6]. Antibiotic resistance has spread widely, necessitating a reduction in irrational antibiotic use. [4]

This study was undertaken to determine the prevalence of antibiotic sensitivity patterns of uropathogens in a tertiary care hospital and to identify the particular medicine for the uropathogens in the area.

MATERIALS AND METHODS

Study Design: Retrospective study.

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Study area: Department of Microbiology, Government Medical College and Hospital, Pudukkottai.

Study population: Reports on urine culture and sensitivity for patients with suspected urinary tract infections.

Sample size: 561samples.

Study duration: 2 months from 01/ 01/2023 to 01/03/2023

Data collection: The study was examined the urine culture and sensitivity data of patients with probable urinary tract infections.

RESULTS

Antimicrobial susceptibility of isolates:

RESISTANCE PATTERN OF Escherichia coli:

Escherichia coli was found to be resistant (Table1) against Ampicillin (34.042%), Ciprofloxacin (31.91%), Cotrimoxazole (30.85%), Nitrofurantoin (3.191%)

B.SENSITIVITY PATTERN OF Escherichia coli:

Escherichia coli was found to be sensitive (Table1) to Meropenem (35.33%) and Nitrofurantoin (36.09%). Though E.coli was resistant to Nitrofurantoin (3.191%),Ciprofloxacin (31.81%), Cotrimoxazole (30.85%) report showed sensitivity 15.78% sensitive to Cotrimoxazole and 12.78% to Ciprofloxacin..

C.RESISTANCE PATTERN OF KLEBSIELLA PNEUMONIAE:

Klebsiella was found to be resistant (Table2) to Ampicillin (28.048%), Cotrimoxazole(25.6%), Ciprofloxacin (24.39%), Nitrofurantoin (18.29%), Meropenem (3.658%)

D.SENSITIVITY PATTERN OF Klebsiellapneumoniae:

Klebsiella was found to be sensitive (Table 2) to Meropenem (36.144%), Nitrofurantoin (26.5%). Even though Klebsiellapneumoniae showed resistance to Ciprofloxacin and Cotrimoxazole ,19.27%were sensitive to Ciprofloxacin and 18.07% to Cotrimoxazole.

E.RESISTANCE PATTERN OF Enterococcus:

Enterococcus was found to be resistant(Table3)to Ciprofloxacin (48.57%), Cotrimoxazole (45.714%), Nitrofurantoin(5.714%)

F.SENSITIVITY PATTERN OF Enterococcus:

Enterococcus was found to be sensitive (Table 3) to Nitrofurantoin (55.32%), Cotrimoxazole (23.4%), Ciprofloxacin (17.02%), Meropenem (4.26%)

G.RESISTANCE PATTERN OF Acinetobacter:

Acinetobacter was found to be resistant to Cotrimoxazole (31%), Ciprofloxacin (23%), Meropenem (23%), Nitrofurantoin (15%), and Ampicillin (8%). It was not sensitive to commonly used antibiotics.

Table 1: Collected culture and sensitivity pattern of Escherichia coli

SAMPLE	AMP	CIP	COT	E	MRP	NIT
	RIS	RIS	RIS	RIS	RIS	RIS
U1	6		6		20	17
U4	6	6	16		18	13
U16	9	10	6		22	25
U25	6	6	6		30	20
U35	6	23	6		34	22
U46	6	6	6		25	20
U69	7	24	24		20	16
U62	7	10	6		20	18
U92	6	7	29		35	25
U106	6	23	22		26	21
U124		29	29		28	20
U127		6	6		20	20
U133	7	6	6		20	25
U131		6	15		20	25
U137	6	6	30		25	25
U153		20	25		25	30
U155		6	19		30	27
U168	20	18	7			27
U181		6	6		25	22
U211	6	11	6			23
U215	22					22
U230		6	6		22	20
U231		18	25			20
U236		20	6		23	20
U239	7	25	22		26	21
U241		13	6		25	20
U248	6	6	15		17	20

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U256	6	6	6		29	20
U299		19	16		30	15
U300		22	22		23	6
U307		11	23		29	6
U319	6	6	8		27	20
U344			30		30	30
U335	6	15	6		30	22
U336	7	12	6		30	25
U357	6	8	16		30	18
U359	6	8	6		30	20
U373		19	22		24	19
U376	7	30	30		30	19
U389		25	23		28	20
U415		8	28		30	23
U433	6	20	6		30	20
U495	27	14	25		25	12
U522	6	6	6		30	21
U540		6	23		19	17
U562	7	6	24		30	25
U575		7	6		6	
U604	7	6	6		26	17
U608	6	6	6		22	20
U609	6	6	6			17
U619		6	25		17	20
U621	6	6	15			17

AMP-Ampicillin, CIP-Ciprofloxacin, COT-Cotrimoxazole, E-Erythromycin, MRP-Meropenem, NIT-Nitrofurantoin R-Resistance to the drug, I-Intermediate susceptibility to the drug, S-Susceptibility to the drug.

Table 2: Collected culture and Sensitivity Pattern of Klebsiellapneumoniae

SAMPLE	AMP	CIP	COT	E	MRP	NIT
	RIS	RIS	RIS	RIS	RIS	RIS
U143			6		30	
U169	13	6	6		22	16
U171	22	26	25			6
U208	13	22	25			17
U216	6	12	6			
U259		10	7		6	6
U260		25	22		25	19
U265			22		21	15
U277		12	6		25	21
U18	6	6	6			16
U19	6	12	6		30	22
U20	6	6	6		11	6
U49	13	25	23		26	20
U74	12	26	29		25	14
U75	6	7	6		26	20
U93	6	15	6		26	17
U112	6	18	6			16
U114		6	6		26	20
U132		7	6		20	20
U326	6	23	6		20	6
U332	10	6	6		30	22
U369		7	6		30	18
U371	6	6			12	14
U390		8	8		20	15
U400	6	6	6		20	6
U399		22	21		23	6
U422	6	25	30			15

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U416		24	24		30	12
U449	6	27	24		25	16
U460		22	22		24	20
U457	6	18	6		28	16
U461		21	19		24	17
U498	6	24	24		25	25
U514		24	22		18	18
U517		6	6		18	20
U534		12	12		30	16

AMP-Ampicillin, CIP-Ciprofloxacin, COT-Cotrimoxazole, E-Erythromycin, MRP-Meropenem, NIT-Nitrofurantoin, R-Resistance to the drug I-Intermediate susceptibility to the drug S-Susceptibility to the drug.

Table 3: Collected culture and sensitivity pattern of Enterococcus

SAMPLE	AMP	CIP	COT	E	MRP	NIT
	RIS	RIS	RIS	RIS	RIS	RIS
U39						16
U51		12	6			22
U82		6	6			25
U434		6	6			
U480		6	25			6
U488			24		21	20
U521		15	20			25
U519		8	15			21
U568			15			19
U581		22	30			30
U595		20	6			14
U596		6	6			21
U599		6	6			20
U618		6	25			20
U83		6	6			22
U91		25	25			22
U104		7	7			23
U105		20	20			20
U120		26	26			19
U144		15	15			20
U166		9	25			
U190		20	22			20
U197		7	6			18
U198		19	20			22
U200		6	6			20
U213		6	6			24
U214						22
U338		6	17			19
U383		6	30		30	19

AMP-Ampicillin, IP-Ciprofloxacin, COT-Cotrimoxazole, E-Erythromycin, MRP-Meropenem, NIT-Nitrofurantoin R-Resistance to the drug I-Intermediate susceptibility to the drug S-Susceptibility to the drug.

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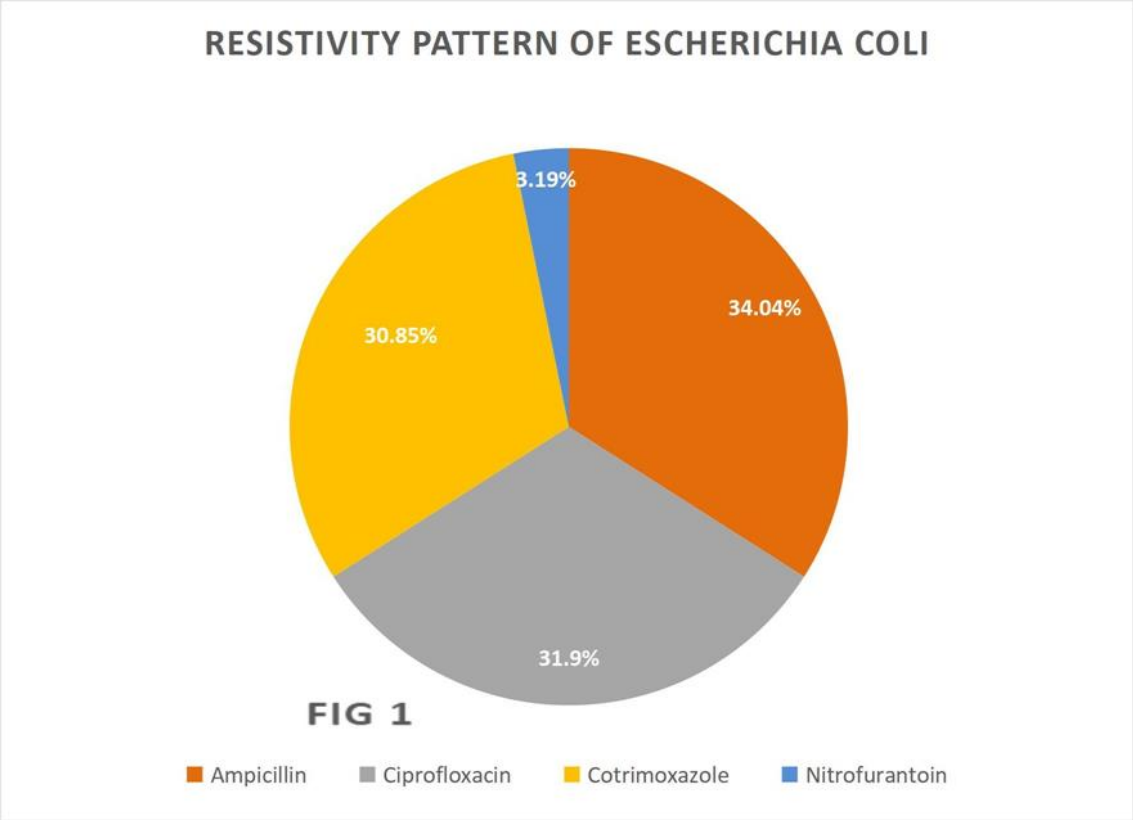

FIG 1

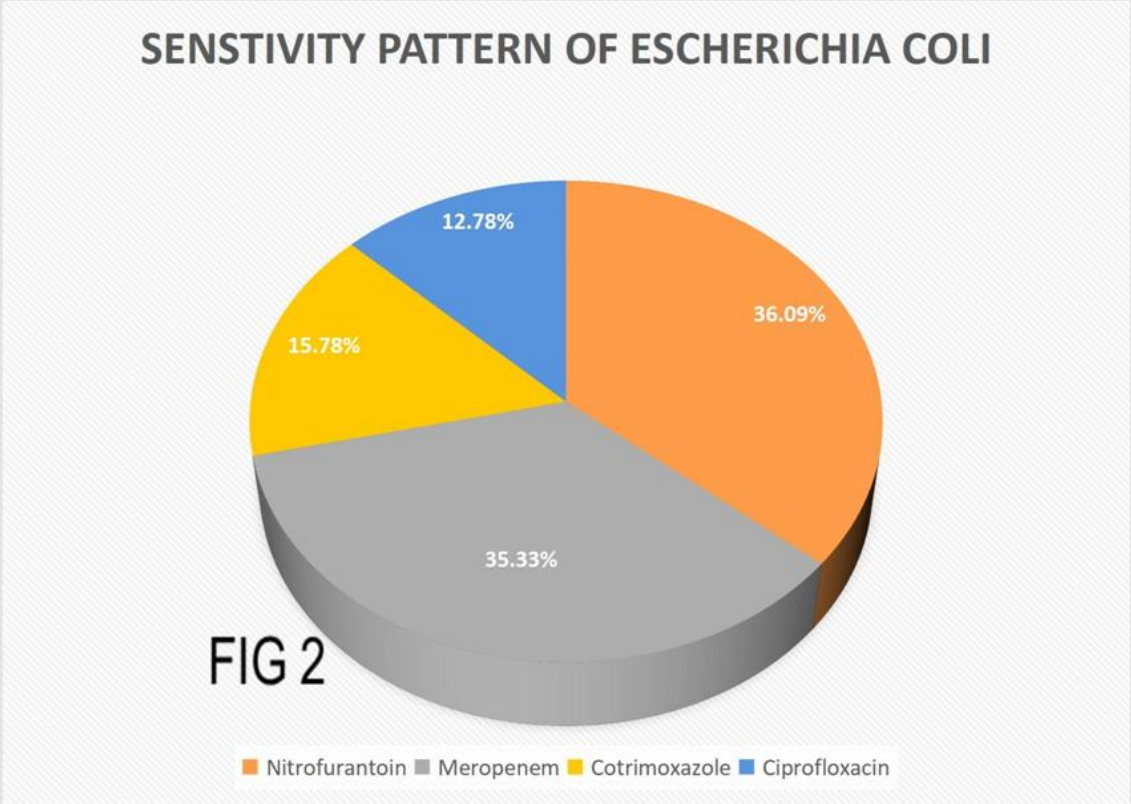

FIG 2

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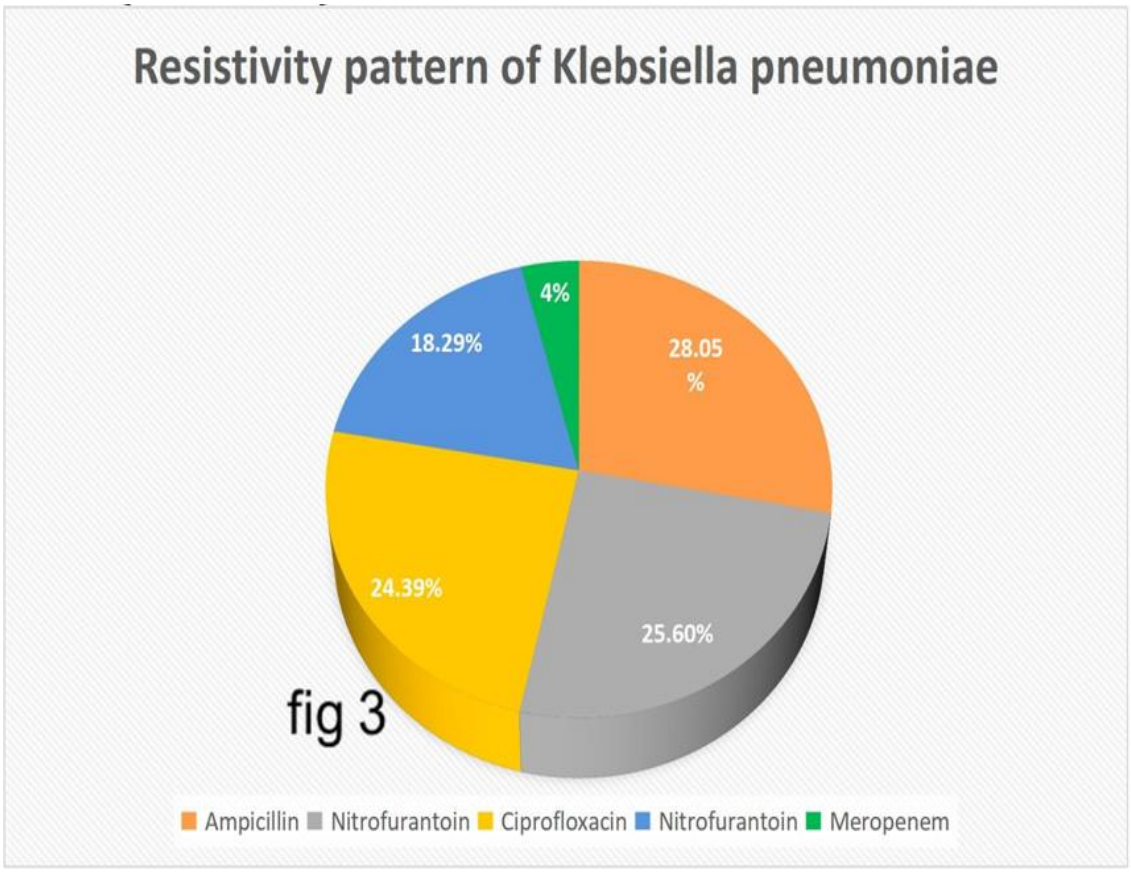
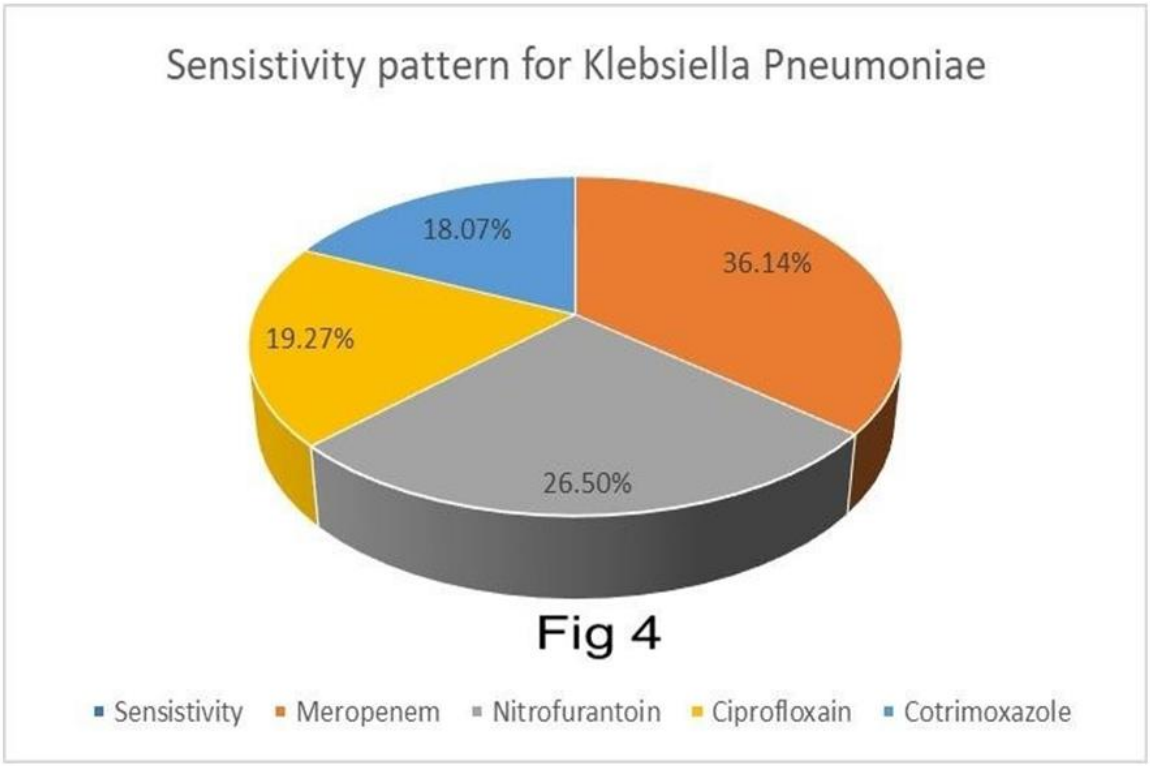


fig 3



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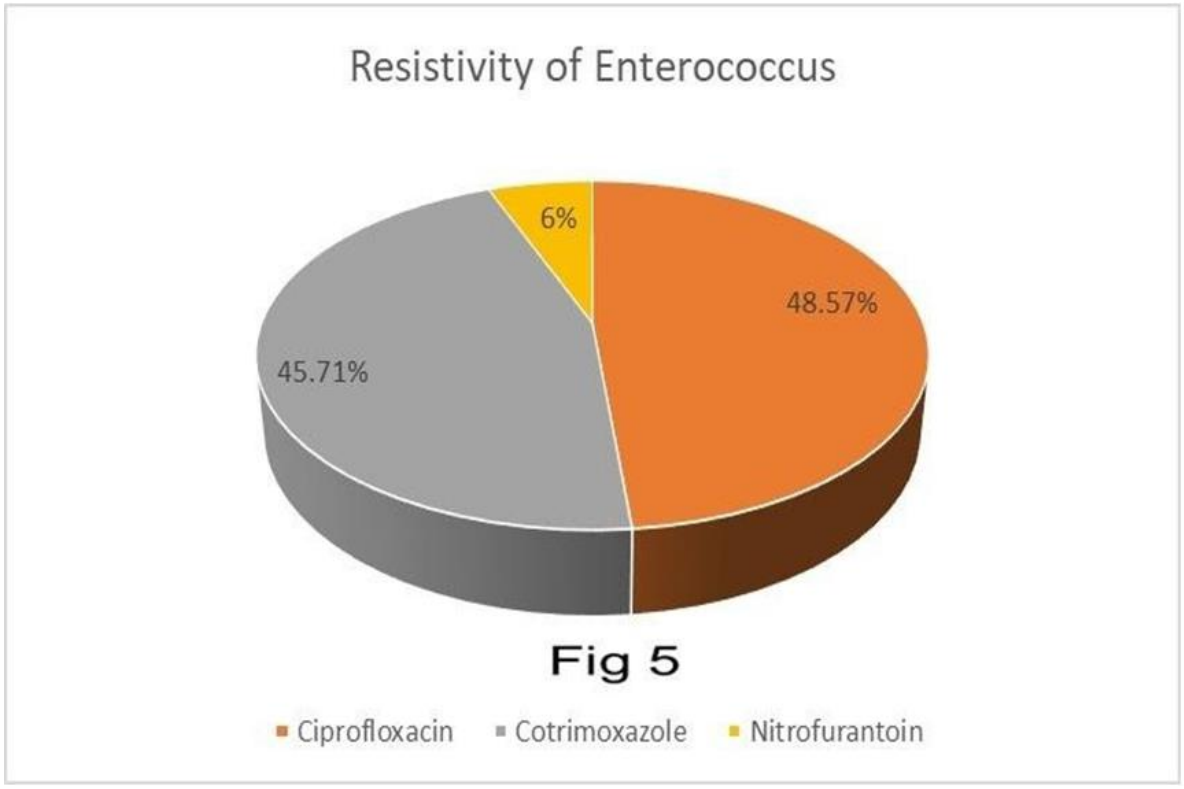

Fig 5

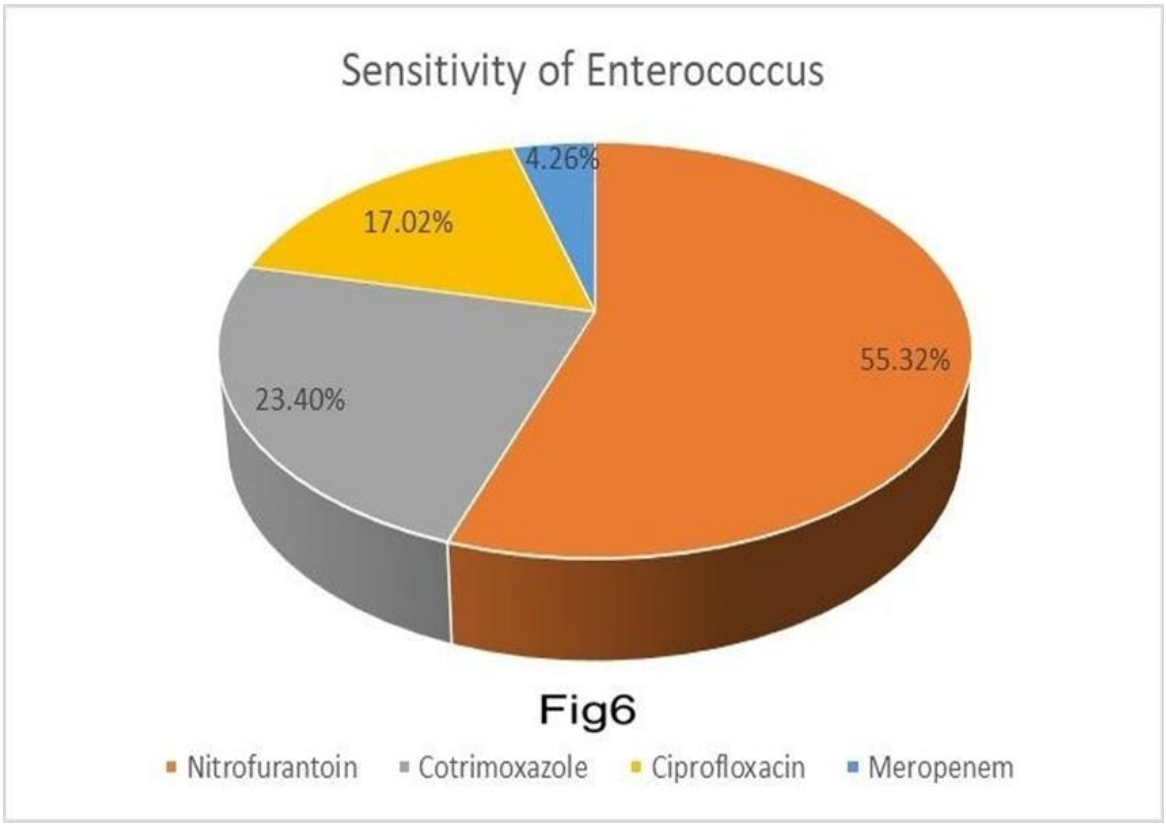

Fig6

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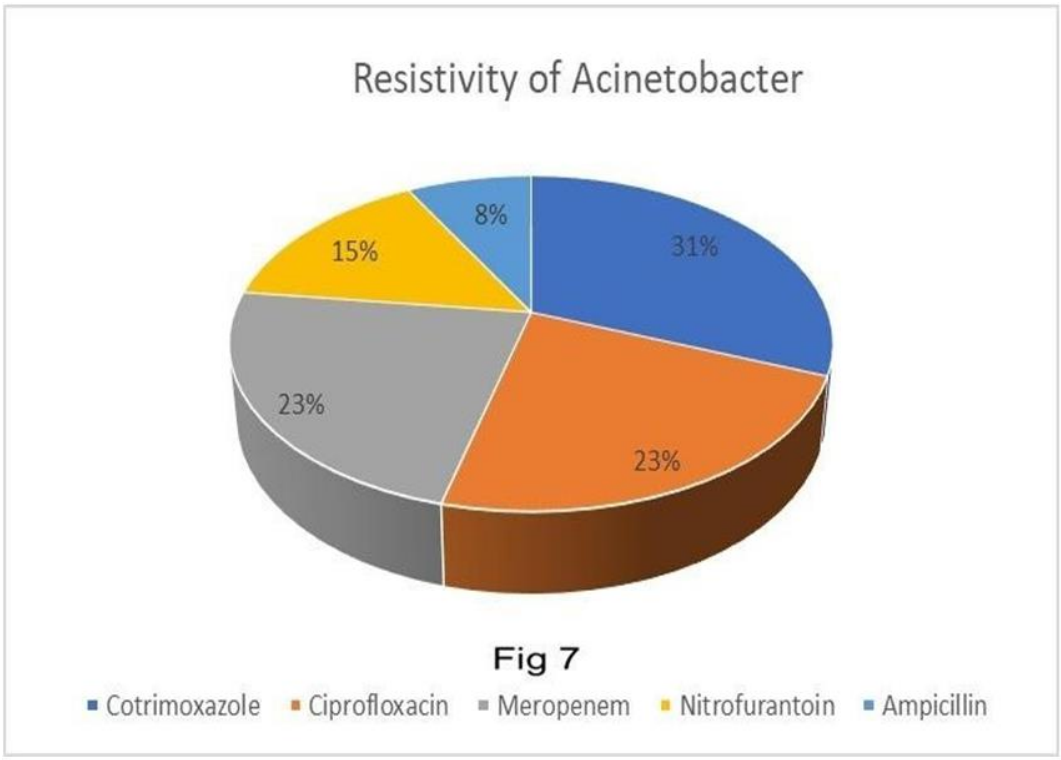

Fig 7

DISCUSSION

Out of 561 Urine Culture and sensitivity reports of suspected an infection in the Urinary Tract at a tertiary care hospital, 168 showed growths. Out of 168, fifty percent of the reports showed E.coli remaining report showed Klebsiella and Enterococcus .Very minimal report showed Acinetobacter and Candida, Also most of the other studies showed E.coli is the most common uropathogen and Klebsiella, Enterococcus, Staphylococcus aures , Streptococcus also responsible for causing UTI.

In this study Escherichia coli was discovered to be resistant to popular antibiotics like Ampicillin, Ciprofloxacin, and Cotrimoxazole, but responsive to Meropenem and Nitrofurantoin. Most Commonly used antibiotic for UTI is Ampicillin, but nowadays Ampicillin is becoming highly resistant to most of the uropathogens due to its wide use. Also, from other studies we can infer that, Escherichia coli is sensitive to Nitrofurantoin.

In this study KlebsiellaPneumoniae was discovered to be sensitive to Meropenem, Nitrofurantoin, resistant to Ampicillin, Cotrimoxazole, Ciprofloxacin. According to many studies, Klebsiellapneumoniae, a hospital acquired infection, is becoming resistant to Ciprofloxacin.

In most of the studies we can analyse that Klebsiella is resistant to both Nitrofurantoin and Meropenam. For simple UTIs, nitrofurantoin is a suitable option in most of the cases. Cotrimoxazole shows resistance to most of the bacteria causing UTI.

In this investigation, it was discovered that Acinetobacter was resistant to Meropenem, Ciprofloxacin, and Cotrimoxazole, whereas Enterococcus was sensitive to Nitrofurantoin and resistant to both.Acinetobacter was not found to be sensitive to any of the commonly used drugs considered for this study.

CONCLUSION

In our investigation, we discovered that Escherichia coli is resistant to popular antibiotics such as Ampicillin, Ciprofloxacin, and Cotrimoxazole, but responsive to Meropenem and Nitrofurantoin. It was discovered that Klebsiellapneumoniae was resistant to Ampicillin, Cotrimoxazole, and Ciprofloxacin, but sensitive to Meropenem and Nitrofurantoin. It was discovered that Enterococcus was resistant to Ciprofloxacin and Cotrimoxazole but sensitive to Nitrofurantoin. It was discovered that Acinetobacter was resistant to Cotrimoxazole, Ciprofloxacin, and Meropenem.

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