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Decoding Resistance: A Review of *Escherichia coli* Antimicrobial Susceptibility Patterns in Urinary Tract Infections in North India

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ABSTRACT

Objective: The present study was undertaken to resolve antimicrobial susceptibility patterns of Escherichia-coli in urinary tract infection in tertiary care hospital and to study the common organisms involved in urinary tract infection and their antibiotic susceptibility pattern.

Design: Cross –Sectional Study

Subjects: Urine sample will be collected from 100 patients.

Methods: A total of 100 patients who were aged between18 to 45 were selected for the study. Mid-stream urine was collected following the usual laboratory protocol and immediately processed in the laboratory. Routine urinary microscopy and urine culture was done in all cases.

Result: In the present study, overall prevalence of urinary tract infection was 26%. Most common organism isolated in urine cultures was *S.aureus* (50%) & *E.coli* (37.7%), followed by *Klebsiella spp.*(8%) and *Proteus spp.* (4.16%). Antibiotic susceptibility testing of the isolated organisms showed that Amikacin was the most effective antibiotic followed by Ceftriaxone while Ampicillin was the most resistant antibiotic.

Key Words: Escherichia coli in Urinary tract infection

INTRODUCTION

Urinary tract infection are often caused by Gram-negative microorganism like *Escherichia*, enteric bacteria species, *Enterobacter species*.[1] E. coli is that the commonest organism inflicting each community in addition as hospital-acquired UTI[1]. *Escherichia coli*. the foremost current facultative gram –negative Eubacterium within the human feculent flora typically inhabits the colon as An harmless commensal.[1] urinary tract infection (UTI) is that the second commonest microorganism infection managed in primary [4,5] care and *E. coli* is that the the foremost common microorganism inflicting UTI. [6,7] UTI caused by multidrug- resistant *E. coli* will increase the price of treatment, morbidity, and mortality, particularly in developing countries like Asian country.[5,6] Urinary tract infections area unit the extra-intestinal *Escherichia coli* infections and

Escherichia coli is that the most typical explanation for UTI at some purpose of their lives, a minimum of twelve-tone system men associated 10%-20% ladies expertise an acute symptomatic UTI.[2,3,4] UTI represent one amongst the fore most common malady encountered in practice these days with associate degree calculable one hundred fifty million UTI each year world wide[7,8,9] .over five hundredth of ladies aged 20– important and useful in rising the efficaciousness of empirical treatment.[13] tract infection, the foremost common infection, is caused by the presence and growth of un healthful organism inside the human genitourinary system into lower and higher sex organ tract[14,15,16] normally prescribed oral antibiotics used for UTI square meassure amoxicillin clavulanate, antibacterial, cephalosporins, fluoroquinolones and trimethoprim-sulfamethoxazole[17] Most common anorexigenic bacterium is *E. coli* and additional vulnerable to play a job in inflicting 80-90% of lower UTI, whereas in concerning ninety fifth of patients affected by pyelonephritis, commonly the infecting organisms square measure Gram negative isolates, *Proteus spp.* caryophylloid dicot genus and Enterobacteria pneumonia [10,11,12]and some Gram positive organisms found square measure eubacterium agalacticus and enzyme negative *Staphylococci* [18,19,20]. The sign and symptoms related to the bladder and kidney infections are contrasting which consists of painful and frequent urination in case of cystitis as aresult of bladder infection whereas conditions like high fever and flank ache are commonly experienced in case of kidney contagion which is referred to as pyelonephritis. However, the incidence of UTI as a result of viral or fungal infection is viewed to be an uncommon phenomenon.[21,22,23] Though the infection look to be harmless in the initial stages, the patient indicates 12 a variety of signs as the stage progresses and can lead to death in extreme circumstances. *E. coli* tend to have an effect on the viscus and also the tract however virtually.[24,25]

MATERIAL AND METHODS

prospective and observational study was conducted in the department of Microbiology ; 100 Urine sample with common age group . Suitable statistical analysis was carried out according to the study. For those patients eligible for participating in the study , the urine specimen were collected following the briefly , prior to therapeutic measures , fresh and Mid stream urine sample were collected using sterilized urine container and immediately plated on to culture medium, the subsequent testing and phenotyping was performed by standardized procedure, briefly, urine specimen were inoculated onto Cled agar were used to isolates the pathogens and incubated for 24 hours at 37 C suspicious colonies with *E. coli* morphology (including lac+ or -) were selected from cled agar plates and all of them were identified by the biochemical tests which supplements *f*or *E. coli* identification**.**

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Inclusion criteria

All Urine samples received at department of Microbiology laboratory,GSVM Medical college, Kanpur for routine culture and antimicrobial susceptibilitytesting during study period will be included in the study.

Exclusion criteria

Patients who are taking antibiotic treatment within 7 days are excludedfrom the study.
Those patients who have not given their consent for the study.

Antimicrobial Sensitivity Test

Antimicrobial susceptibilities were determined by the agar dilution method according to the clinical and laboratory standard Institute (CLSI) Guidelines . Isolated *E.coli* were tested for their minimum inhibitory concentrations (MICs) of Ampicillin , cefazolin, cefuroxime, cefotaxime, ceftazimine, cefepime, azetronam, cefoxitin, ciprofloxacin, levofloxacin, gentamicin, amikacin, co-trimoxazole ,piperacillin/tazobactum, imipenem, and meropenem. MDR was defined as resistant to 3 antimicrobial categories. ATCC were chosen as quality control strains.

Statistical Analysis

Statistics results were analysed by using chi-squre ($x^{2)}$ test confidence interval (CI) , odds ratio (OR) analysis and *p* value by Graph Pad softwere, Inc. 2236 Avenida de la playa la jolla, CA 92037 USA , In stat statistically softwere .A p-value <0.05 were considered statistically significant, and a p- value <0.01 was considered highly significant.

RESULTS

A total of 100urine samples were sent for microscopic examination and culture. In 50 cases the urine culture was positive, giving an incidence of 7.3% inthisstudy.

Distribution of patients according to incidence of UTI. Prevalenceof UTI is about 21%
Table No1-Showing prevalence of UTI.

Total patients	Patients with UTI (*E.coli)*	**Percentage**
100	**26**	**26%**

Chart no.1 Showing prevalence of UTI

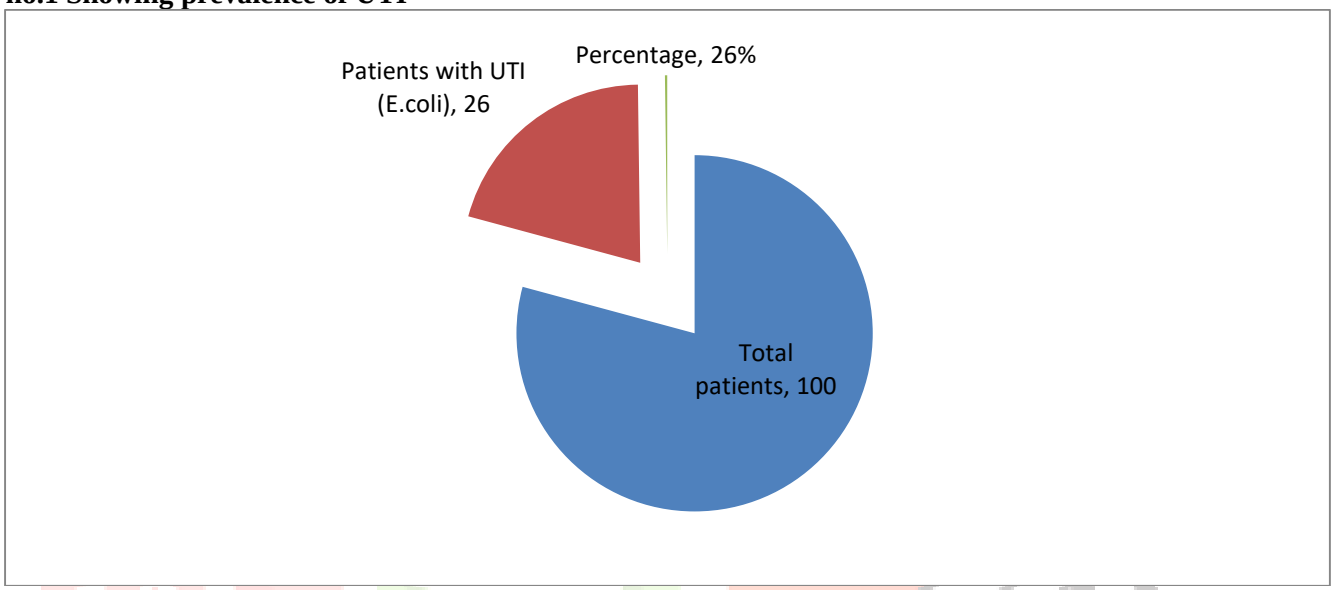
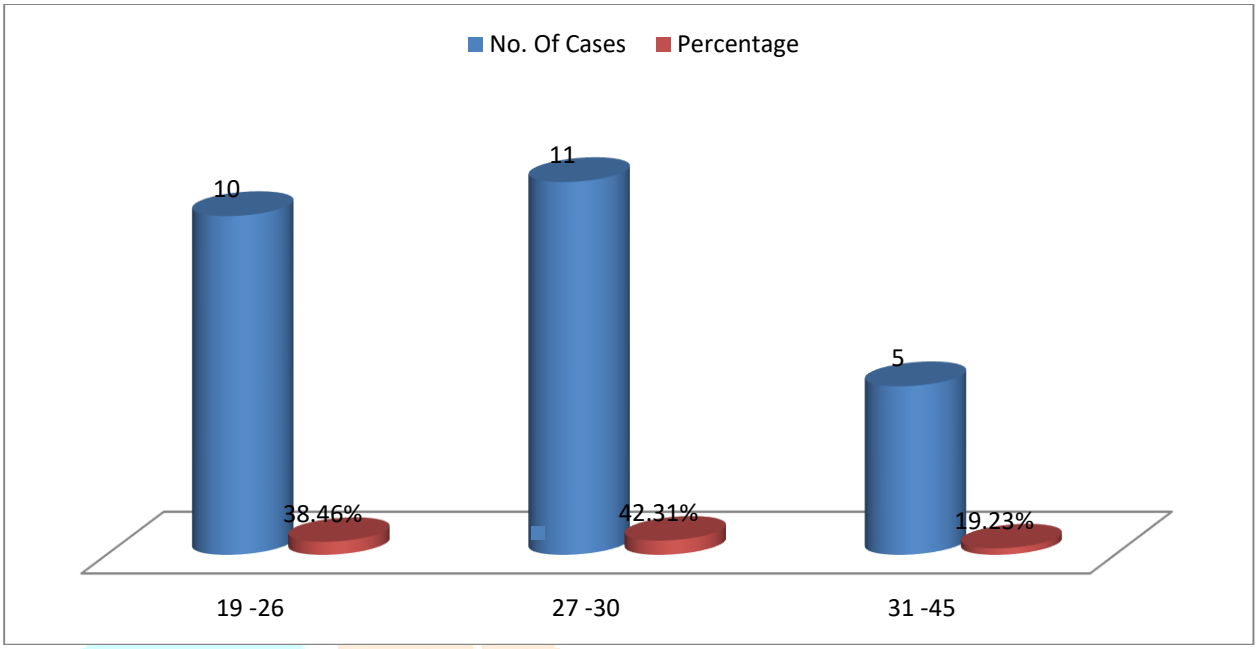


Table No2 - Showing incidence of UTI in relation to age.

Age group	**No. Of cases**	**Percentage**
19 -26	**10**	**38.46%**
27 -30	**11**	**42.31%**
31 -45	**5**	**19.23%**

Chart no.2 **Showing incidence of UTI in relation to age**

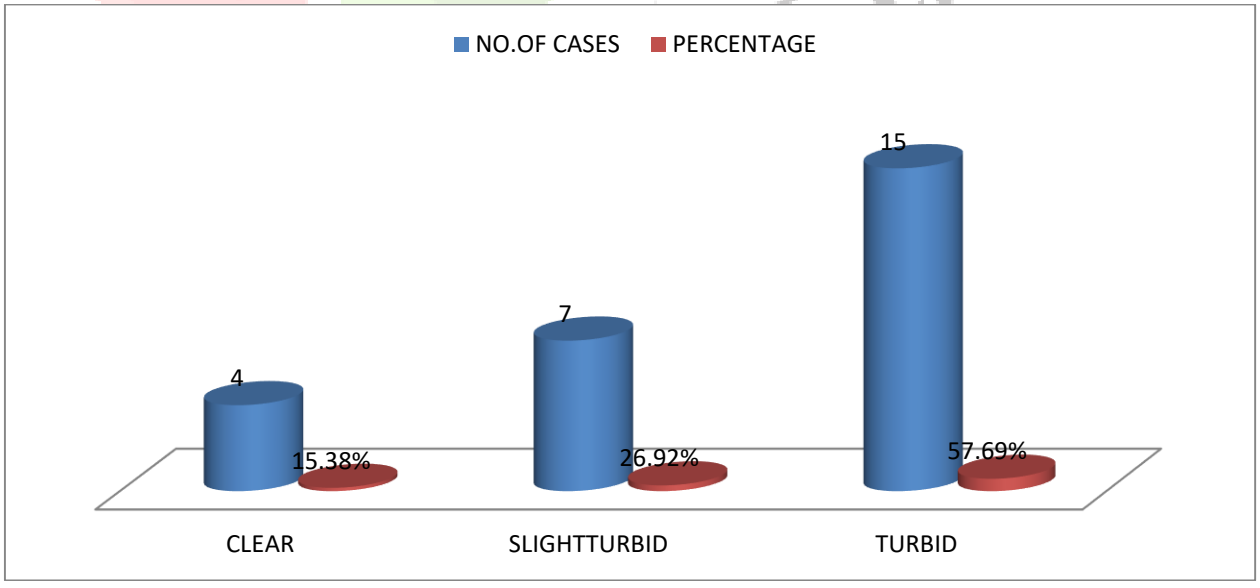


Distribution no of 50 patients according to appearance of urine

TableNo3-Showing appearance of urine

Appearance	No.of cases	Percentage
Clear	4	15.38%
Slightturbid	7	26.92%
Turbid	15	57.69%

Chart no.3 Showing appearance of urine

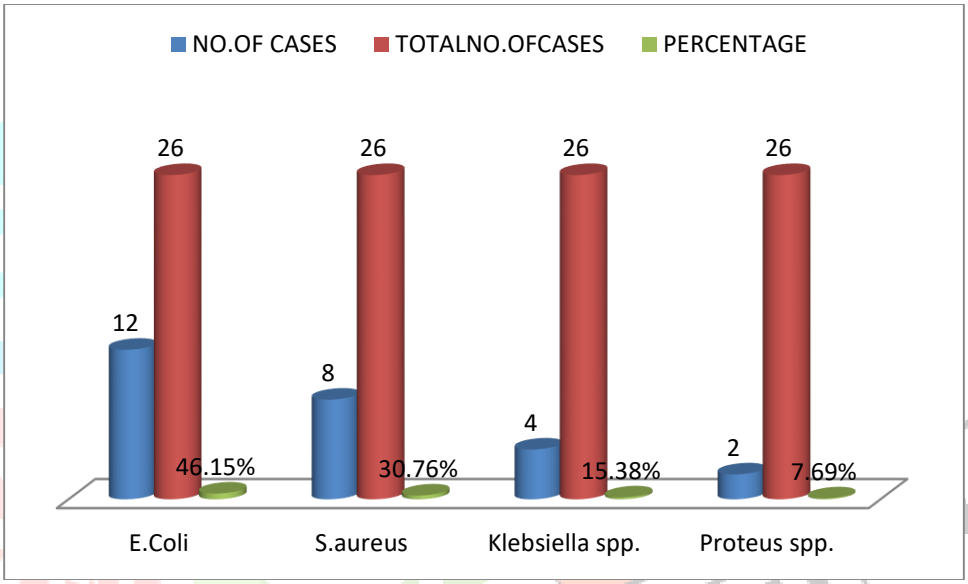


Distribution of isolated organisms in 26 patients.

TableNo4-Showing the percentage of isolated organisms in UTI .

ORGANISM	NO.OF CASES	TOTALNO.OF CASES	PERCENTAGE
E.Coli	**12**	**26**	**46.15%**
S.aureus	**8**	**26**	**30.76%**
Klebsiella spp.	**4**	**26**	**15.38%**
Proteus spp.	**2**	**26**	**7.69%**

Chart no.4 Showing the percentage of isolated organisms in UTI.



Tableno.5:-Showing percentage of antibiotics susceptibility in Gram-negative bacteria

Antibiotics Used	Percentage of Susceptibility
Ampicillin	68%
Cotrimoxazole	72%
Norfloxacin	80%
Nitrofuranation	88%
Amikacin	100%
Gentamycin	86%
Amoxicillin	96%
Ciprofloxcin	70%

Chart no.5:-Showing percentage of antibiotics susceptibility in Gram-negative bacteria

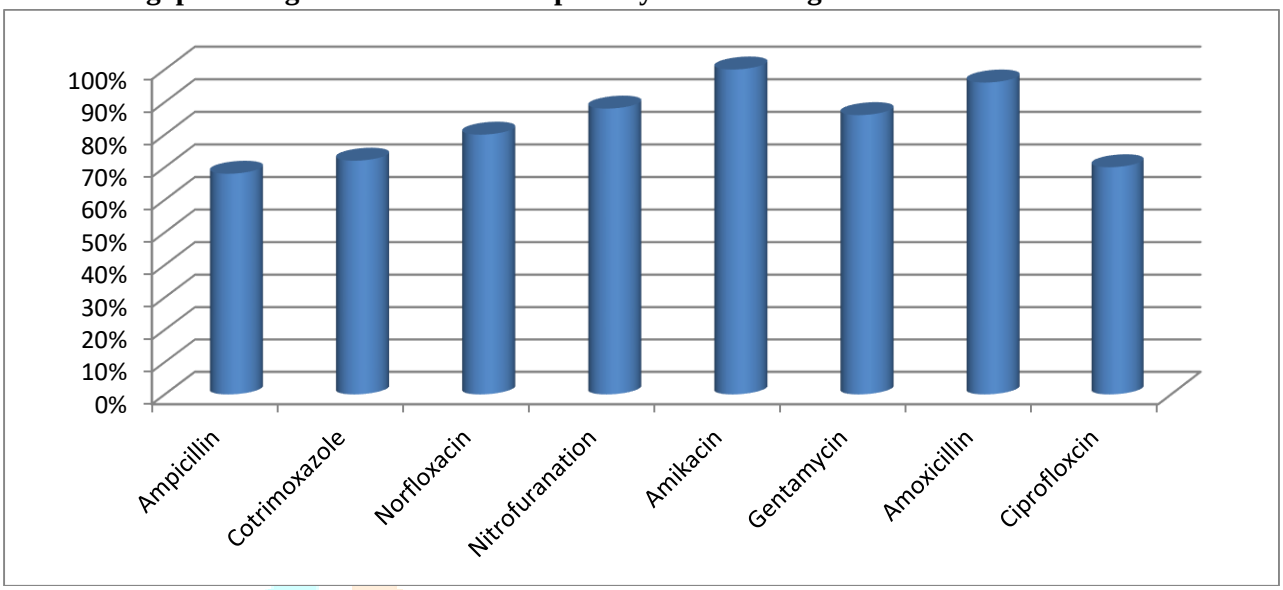


Table No 6-Showing percentage of antibiotics susceptibility in Gram-positive bacteria

Antibiotic Used	Percentage of Susceptibility
Penicillin	68%
Ampicillin	78%
Amoxicillin	80%
Vancomycin	88%
Ciprofloxacin	100%
Cotrimoxazole	82%
Gentamycin	72%
Nitrofurantoin	96%
Norflaxacine	89%

Chart No 6-Showing percentage of antibiotics susceptibility in Gram-positive bacteria

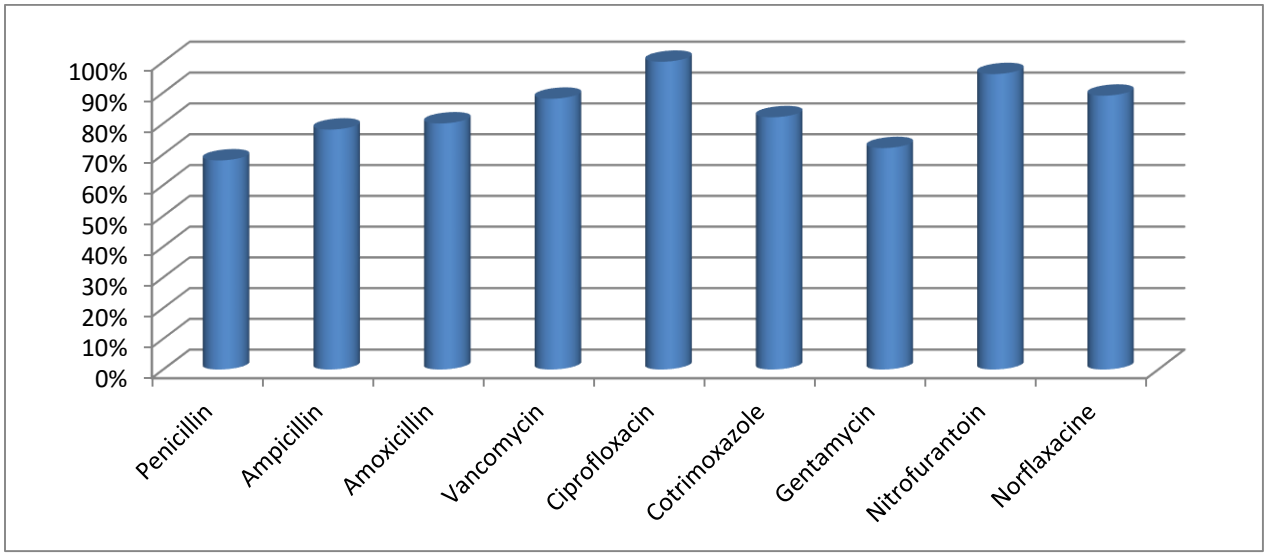


Table No7-Antibiotic sensitivity pattern of 24 isolates

Organism	Total no.	Sensitive to all antibiotics	Resistant to 1 or 2 antibiotics	Resistant to 3 or more antibiotics
S.aureus	12	1	7	4
E.coli	8	1	5	2
Klebsiella spp.	4	1	2	-
Proteus spp.	2	1	1	-

Total No 8–Showing antibiotic sensitivity pattern of *S.aureus* Total no. 12

Antibiotics	Resistant %	Senstivity%
Penicillin	35%	75%
Ampicillin	55%	88.3%
Amoxicillin	68%	66.66%
Vancomycin	45%	88.3%
Ciprofloxacin	100%	91.66%
Cotrimoxazole	75%	75%
Gentamycin	75%	66.6%
Nitrofurantoin	50%	83.3%
Norflaxacine	90%	91.66%

Total no8–Showing antibiotic sensitivity pattern of *S.aureus* (Total no.of cases 12)

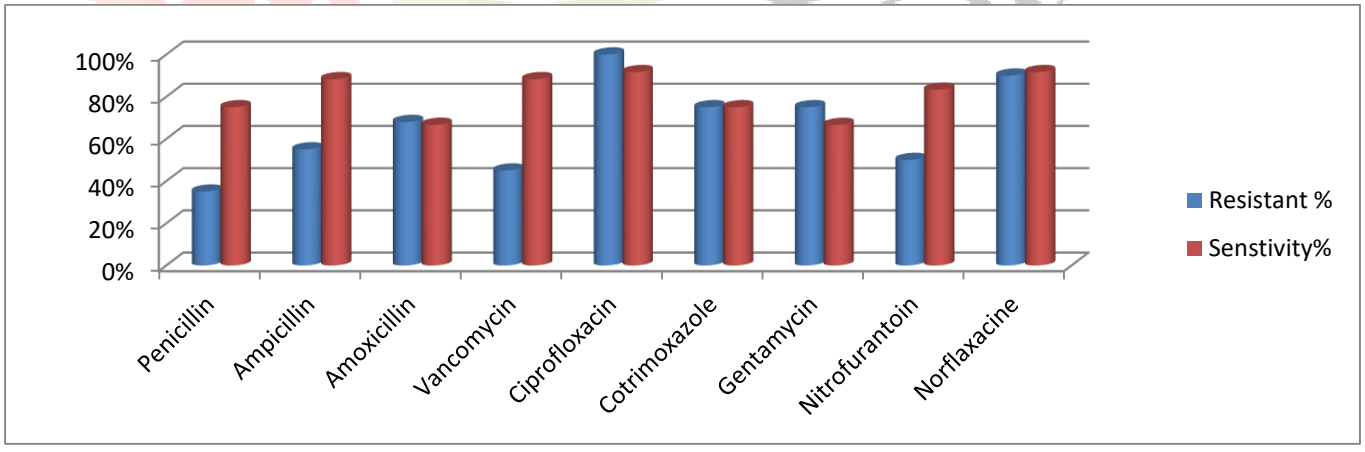


Table No9-Showing antibiotic sensitivity pattern of *E.coli* (Total no.of cases=8)

Antibiotics	Resistant %	Senstivity%
Ampicillin	25%	75%
Cotrimoxazole	12.5%	87.5%
Norfloxacin	37.5%	62.5%
Nitrofurantoin	25%	75%
Amikacin	62.5%	37.5%
Gentamycin	0%	100%
Ciprofloxacin	25%	75%
Ceftriaxone	12.5%	87.5%
Amoxicillin	37.5%	62.5%

Chart No9-Showing antibiotic sensitivity pattern of *E.coli* (Total no.of cases =8)

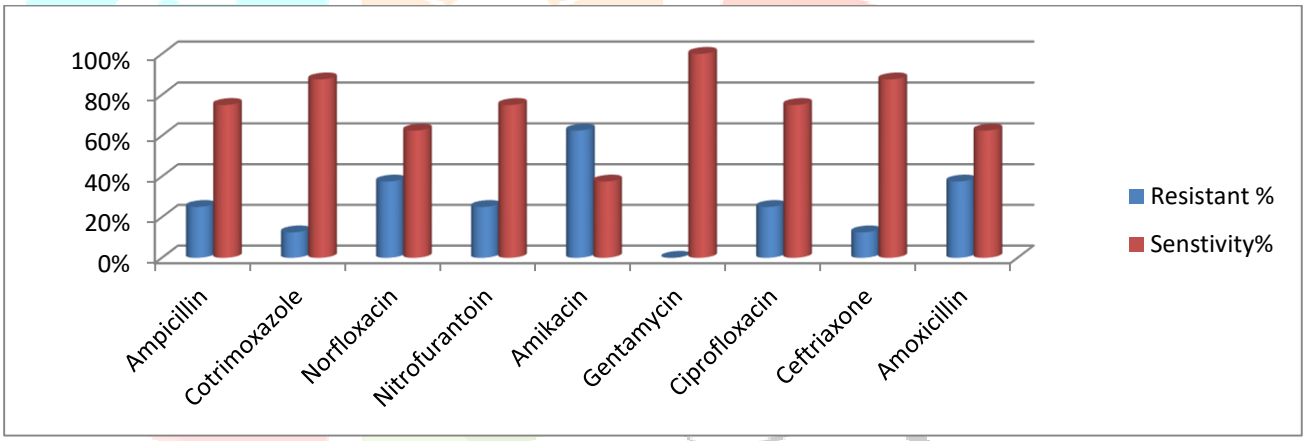


Table No10-Showing antibiotic sensitivity pattern of *Klebsiella spp.* (Total no.of cases =4)

ANTIBIOTICS	RESISTANT%	SENSTIVITY%
Ampicillin	0%	100%
Cotrimoxazole	25%	75%
Norfloxacin	25%	75%
Nitrofurantoin	50%	50%
Amikacin	75%	25%
Gentamycin	0%	100%
Ciprofloxacin	25%	75%
Ceftriaxone	50%	50%
Amoxicillin	0%	100%

Chat No10-Showing antibiotic sensitivity pattern of *Klebsiella spp.*(Totalno.of cases =4)

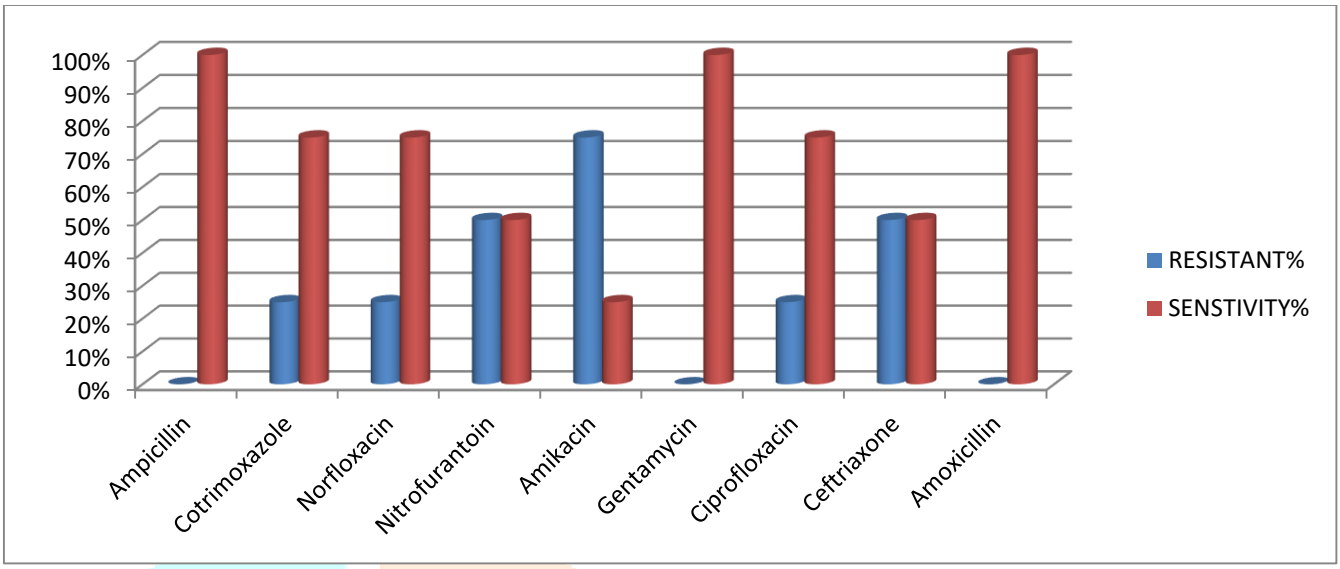
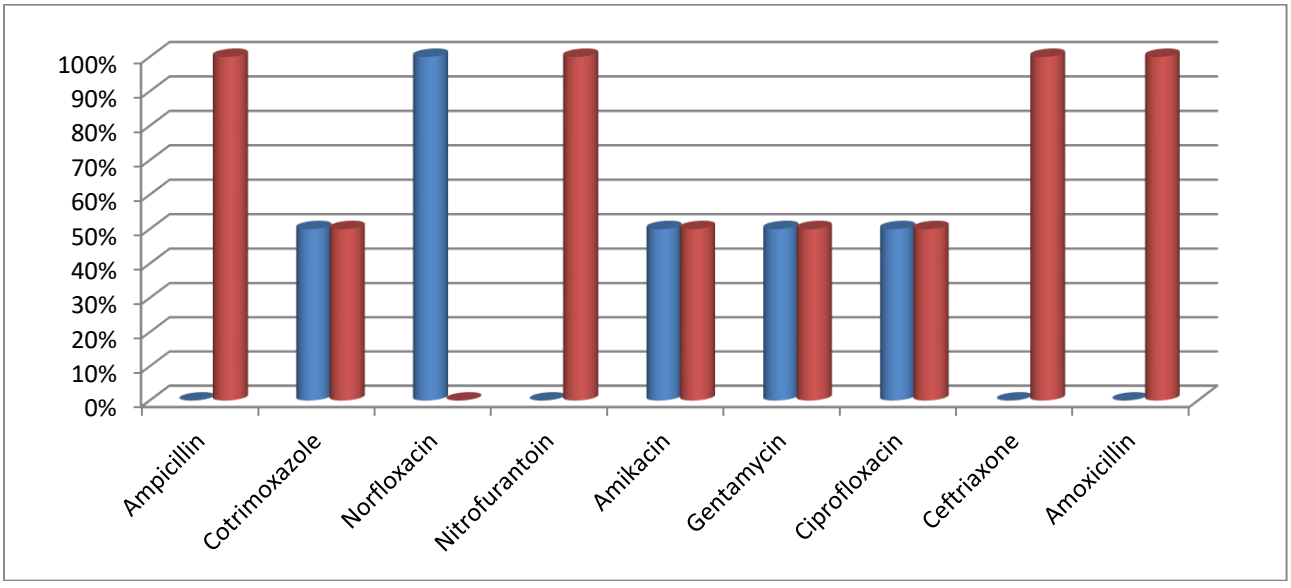


Table No–11 Showing antibiotic sensitivity pattern of *Proteus spp.*

ANTIBIOTICS	RESISTANT%	SENSTIVITY%
Ampicillin	0%	100%
Cotrimoxazole	50%	50%
Norfloxacin	100%	0%
Nitrofurantoin	0%	100%
Amikacin	50%	50%
Gentamycin	50%	50%
Ciprofloxacin	50%	50%
Ceftriaxone	0%	100%
Amoxicillin	0%	100%

Chart No–11 Showing antibiotic sensitivity pattern of *Proteus spp.*



DISCUSSION

Ancient and modern methodologies of scientific research bring fruit ful findings after creative and critical discussion based on the observation sandanalysis.Discussion is the important tpartinany scientificre search.The present work comprise santi microbial susceptibility patterns of *Escherichia-coli* I urinary tract infection,where the findings derived from the data analysis are subjected to discussion.The interpretation of the facts observed will throw more light into the subject and there by help in gin formulating the solutions.Urinary tract infections are one of the common infections occurring during pregnancy.The intent of present study is to determine the antimicrobial susceptibility patterns of *Escherichia-coli* in urinary tract infection,and to study the common organisms involved in urinary tract infection and their antibiotic susceptibility pattern.The incidence of urinary tract infection is varies among different age groups. The present study shows that the incidence rate of urinary tract infection is **26%.**

Conclusion

This present study observed the prevalence of Escherichia coli pathogen associated in patients with uti and shows that drinking water might be a sources of Dec transmission in human . our finding indicated common age. Overcome is that which should be free of pathogens in a potential sources DEC contamination in human with the greatest effect in children. Therefore , more effect must bemade by the public health participants ivolved is one health approach to reduce food and water borne disease the rising secondary of drug resistances among E.coli was observed including the relatively efficient drugs imipenem and meropenem.

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