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Emerging Drug Resistance in Community Acquired Urinary Tract Infection in A Tertiary Care Hospital in Odisha

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Abstract:

Background: Urinary tract infection (UTI) is among furthermost spreaded contagion in entire world. Organisms responsible for the infection are varying in their susceptibility pattern in different places and becoming resistant to commonly used antibiotics.

Aim: Objective of study was to determine the etiology of community acquired UTI and to determine their antimicrobial susceptibility pattern.

Methods and materials: Samples of urine were collected from 120 patients having a clinical diagnosis of UTI. Isolates were recognized by standard biochemical reactions and the antimicrobial susceptibility testing took place by using Kirby Bauer's disc diffusion method.

Results: Out of the total sample 65% patients had a positive urine culture. Escherichia coli (42.3%) was most general Gram-negative microorganism & Staphylococcus spp. (15.38%) was most common Gram-positive microorganism. In gram-negative bacilli greater resistance was detected against Amoxyclav and Cephalosporins.

Discussion and Conclusion: Study establish that E. coli was the major bacteria causing community acquired UTI in eastern part of Odisha, India. This study verified on growing resistance to Cephalosporins and Amoxyclav among UTI pathogens in the community.

Keywords: Antibiotic resistance, UTI, Escherichia coli.

Keywords: About four key words or phrases in alphabetical order, separated by commas. Keywords are used to retrieve documents in an information system such as an online journal or a search engine. (Mention 4-5 keywords)

1. INTRODUCTION:

Urinary tract infection (UTI) among most general community-acquired bacterial infections. *Escherichia coli* is common bacteria causing UTI (community-acquired). Other bacteria commonly isolated from UTI patients are *Klebsiella* spp., other *Enterobacteriaceae, Staphylococcus saprophyticus,* and *Enterococci*[1][2][3].

Antimicrobial Resistance (AMR) has become a major challenge in treatment. UTI is commonly treated empirically leading to development of resistant strains. Community acquired urinary tract infections because of multidrug-resistant organisms are increasing. Isolated studies from India show the prevalence of ESBL producing uropathogens in between 24% to 47.5%. This has emerged as a major therapeutic challenge in different places[4].

Aim of this research is to control the bacteria causing community acquired UTI and to define their antimicrobial susceptibility pattern[5][6].

2. MATERIAL AND METHODS

Place of study**:** This research was supported at the Subdivision of Microbiology, IMS and SUM Hospital, Bhubaneswar, Odisha.

Duration of study: Samples were taken during the period between 5 months from February 2019- June 2019.

Type of study - Prospective Cross-sectional learning

A total sample of 120urine remained collected. The research population included all the male, female and pediatric patients attending the Out Patients department (OPD) or developing any symptoms within 48 hours of hospital admission.

20-30 ml of clean midstream urine sample was collected among sterile wide mouth container & immediately transported to the Microbiology Laboratory. In case of delay the sample was refrigerated at 4^0C.

Both urine samples were inoculated with over 5% Blood Agar, the agar of MacConkey and Cysteine Lactose Electrolyte Deficient (CLED) agar plates using standard calibrated loop and incubated aerobically at 37^0C. After incubating overnight, the plates were observed for bacterial growth[7][8].

Pure growth of $\geq 10^5$ CFU/ml of one organism was considered as significant bacteriruria. A repeat urine culture of all samples was done at >24 hours interval.

Pure growth of $1x10^3$ CFU/ml was taken as insignificant bacteriruria. Mixed growth of two or more organisms was considered to be contamination.

Normal bacteriological procedures have recognized the major bacterial isolates, and Kirby Bauer's discomfort process has recognized the vulnerability to antimicrobials.

The antibiotics utilized for GRAM NEGATIVE organisms were Amikacin (AK) 30 µg, Amoxclav (AMC) 20/10 µg, Cefixime (CFM) 5µg, Nitrofurantoin (NIT) 300µg, Piperacillin / Tazobactum (PIT) 100/10µg, Norfloxacin (NX) 10 µg, Levofloxacin (LE) 5 µg. The antibiotics used for GRAM POSITIVE organisms were Amikacin (AK) 30 µg, Amoxclav (AMC) 20/10 µg, Cefoxitin (CX) 30 µg, Cefixime (CFM) 5 µg, Ceftriaxone (CTR) 30 µg, Cotrimoxazole (COT) 25 µg, Cefoperazone-sulbactum (CFS) 30 µg, High level Gentamycin (HLG) 5 µg, Levofloxacin (LE) 5 µg, , Teicoplanin(TEI) 30 µg, Vancomycin(VA) 30 µg, Nitrofurantoin (NIT) 300 µg, Piperacillin/Tazobactum (PIT) 100/10 µg, Norfloxacin (NX) 10 µg

In accordance with the CLSI (2019) guidelines the inhibition zone diameter was measured and interpreted.

3. OBSERVATION

A total 120 patients were included. Of these 78 patients had significant bacterial growth giving a prevalence of 65%. Of these 42 were female while 36 were male. Higher number of positivity found in age group 20 to 40 years[9].

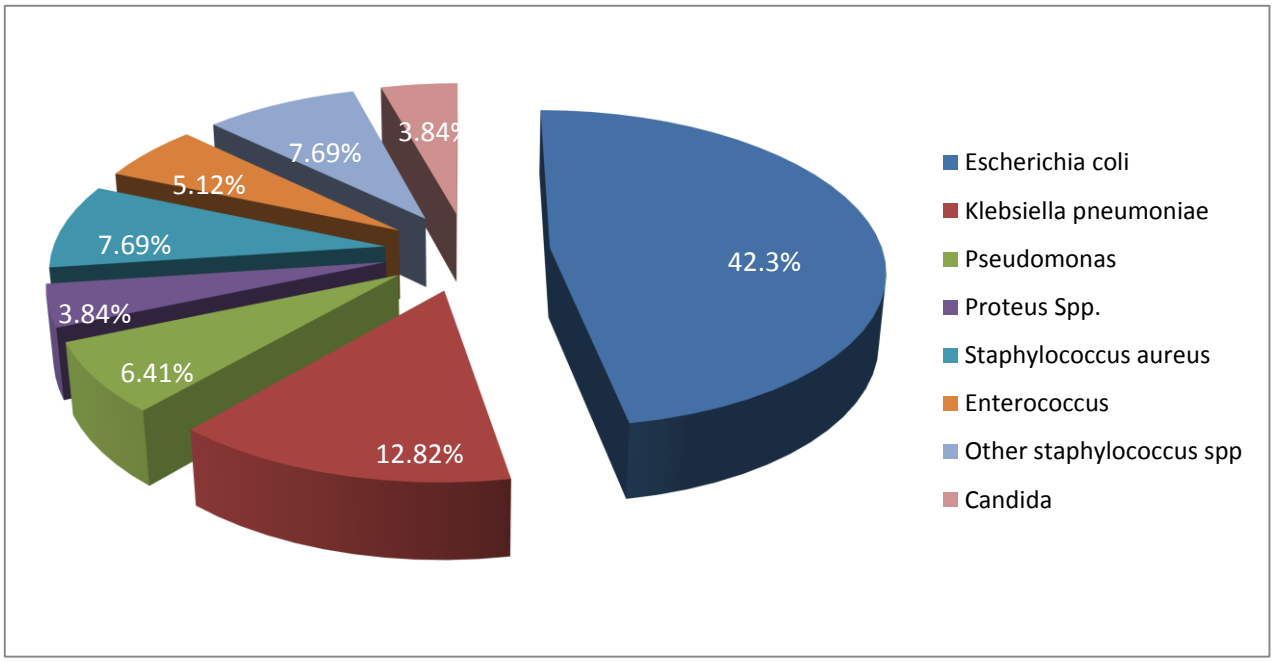

CHART -1 Distribution of bacterial etiologies

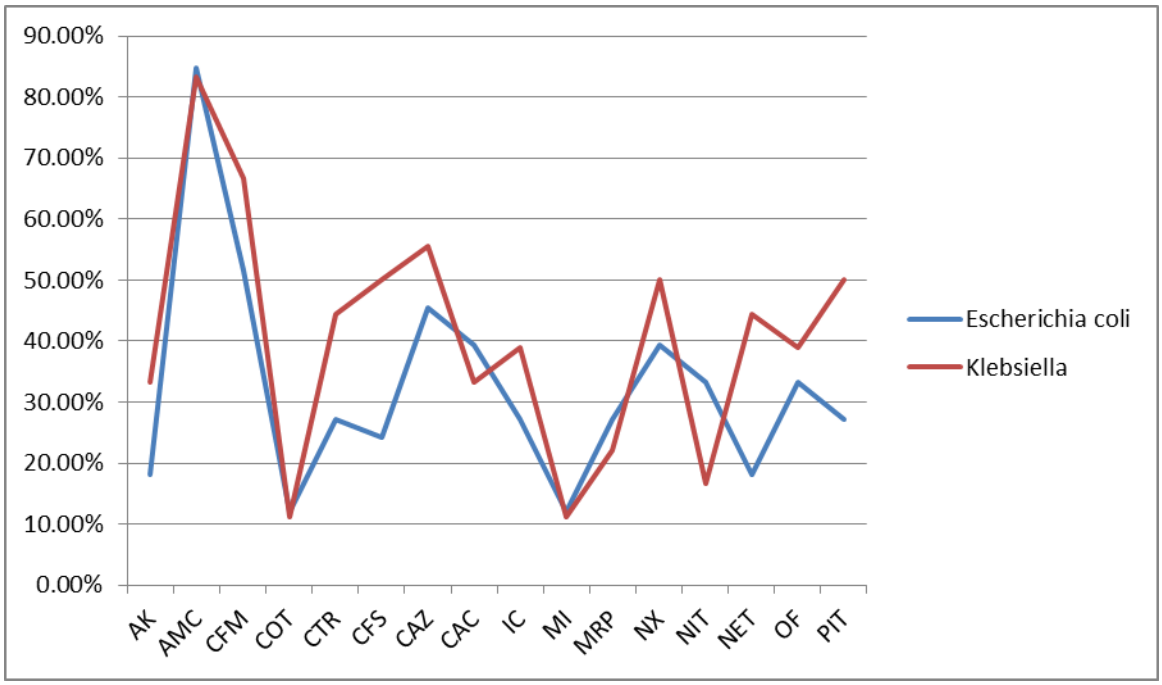

CHART 2 -Antimicrobial susceptibility pattern of Gram negative bacteria

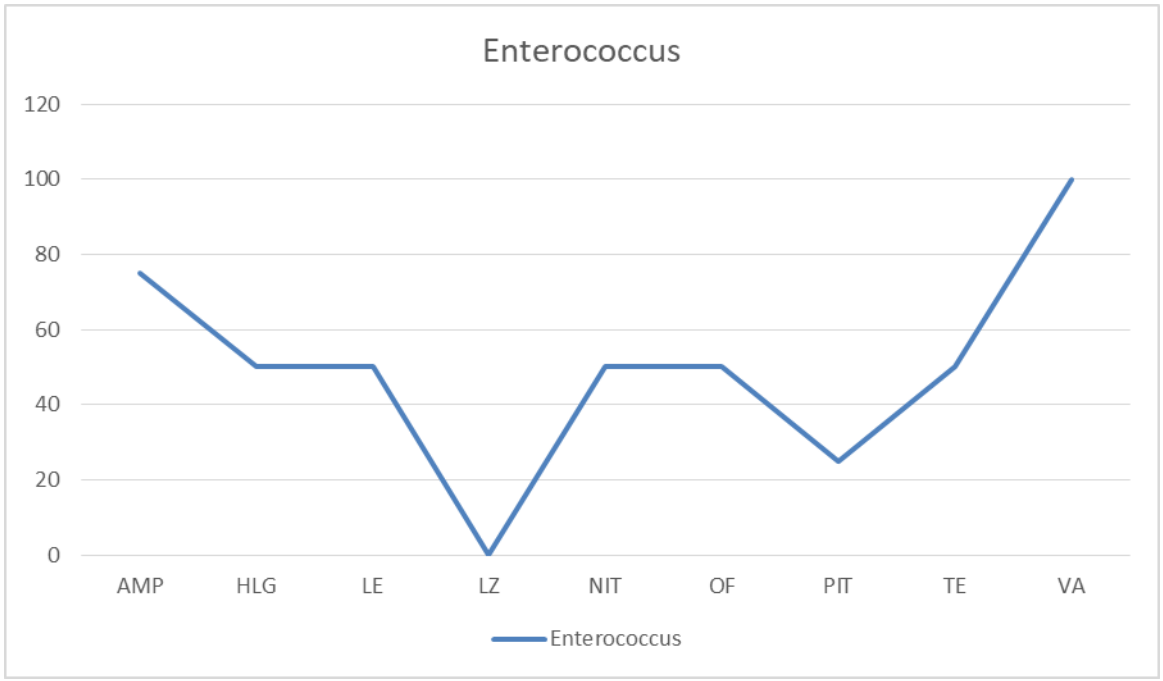

CHART 3 Antimicrobial susceptibility pattern of *Enterococcus spp.*

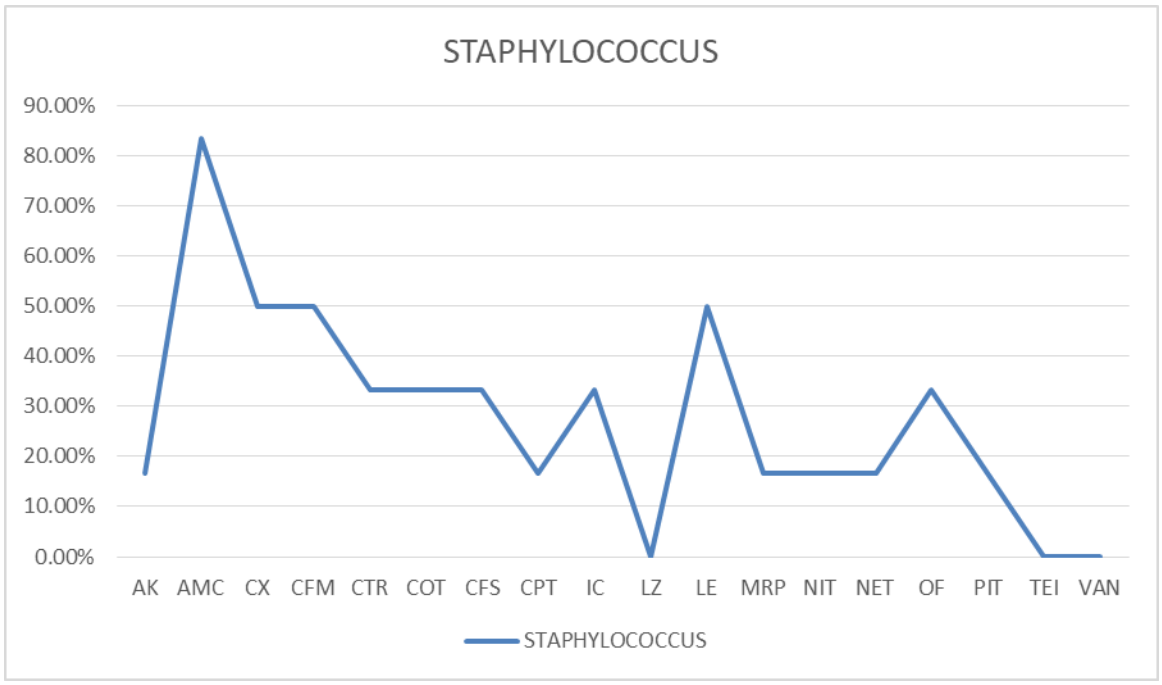

CHART -4 Antimicrobial susceptibility pattern of *Staphylococcus spp.*

4. DISCUSSION

One major clinical issue in the treatment of infections is antibiotic resistance. In recent years the resistance to antibiotics has increased. The levels of resistance differ from country to country geographically.

In this study, 65% of urine samples showed microbial growth. The majority were *E.coli* (42%) followed by *Klebsiella spp.*(12%).

In India, prevalence of UTI among the patients attending OPD is ranging from17-34%.The prevalence of ESBLs among the *E. coli* uro-pathogens ranges from 24-47.5% and of *K. pneumoniae* isolates was found to be 20-40%.

The incidence of UTI were common in the male population during the age of 61-70 reason being commonest obstructive urinary problems like BPH and in females the sexually active age group are more prone for urinary tract infection.

The commonly used antibiotics like amoxyclav, cefixime and ofloxacin were resistant against the common gram-negative pathogens because of rampant antibiotic misuse.

In this study The Gram-negative isolates are showing resistance to Amoxyclav, Cephalosporins, Aminoglycosides & Quinolones. The results correspond towards the other group research.

In this research *E. coli* and *Klebsiella* isolates are showing low resistance against nitrofurantoin (33.34 and 16.67%). Resistance to nitrofurantoin is 0-5.4 percent in most part of the world (0–5.4%) despite of its use for many years. *S. aureus* isolates susceptible to Vancomycin, Teicoplanin and Linezolid

5. CONCLUSION

A major public health concern is antibiotic resistance. It increases morbidity and mortality of hospitalized individual & adds to health care rate.

The aforementioned is necessary to follow a strict antibiotic stewardship program to prevent misuse of antibiotics. This study concludes that *E.* Aureus is the most common bacteria in this region that cause UTIs acquired by the population.

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