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# Antimicrobial Susceptibility Pattern of Uropathogenic Bacteria in RMMC Hospital of Chidambaram

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## ABSTRACT

**Background**: In every year millions of people were affected by the Urinary Tract Infection. It was creating a serious health issue.

**Aim**: The present study was to analysis of the uropathogenic bacteria in patients were attended RMMC Hospital and their antibiotic resistance pattern, in vitro detection of haemolysis virulent factor of uropathogenic.

**Material and Methods:** All urine samples were tested by the standard microbiological procedure. Kirby-Bauer method used for the Antibiotic Susceptibility Test according to the CLSI guidelines. Commercially available antibiotics were used. Blood Agar used for the detection of haemolysis.

**Results**: A total of 261 urine samples were included in this study. We isolated a total of 103 positive cultures. 12% of Gram-positive, 83% of Gram-negative bacteria and 3% of *Candida* fungi. *Escherichia coli* was the most predominant bacteria (54%) followed by *Klebsiella* sp (15%), *Staphylococcus aureus* (12%), *Pseudomonas aeruginosa* (12%), *Proteus* (1%) and fungi *Candida* (3%). Mostly female patients' sample were analysed and the inpatient higher majority than the outpatients.

**Conclusion**: *Escherichia coli* are the common bacteria to cause of UTI. Nowadays most of the uropathogens are to resistance to the overall antibiotics. This kind of reactions creating the life-threatening of humans.

**Keywords:** Antibiotic, Antibiotic Susceptibility Test, Uropathogens, Resistance, Haemolysis

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## INTRODUCTION

UTI is the most common bacterial infection. It is the prevalent complication of pregnancy that can worsen maternal and prenatal prognosis. Untreated asymptomatic forms can progress to pyelonephritis, appropriate therapy to need the current knowledge of the organism that causes UTIs and their antibiotic susceptibility pattern[1].

Treatment of infectious diseases, depend upon repeated administration of an antibiotic, most of the microbial pathogens generate the resistance to antibiotics. Multiple drug resistance is also a widespread problem[2]. The prevalence and antimicrobial resistance pattern may differ between different places, different environmental factors the local data about the antimicrobial resistance of uropathogens data used for proper therapeutic treatment of UTI.

The present study was undertaken to assess the antimicrobial resistance pattern among uropathogens to determine the virulence factor for UTI in Rajah Muthaiah Medical College & Hospital (RMMCH), Annamalai University, Chidambaram.

## MATERIALS AND METHODS:

### Design & Study:

The study was carried out in the Department of Microbiology, Faculty of Science, Annamalai University, RMMCH Chidambaram, Tamil Nadu from July 2018 to December 2018. The analysed data generated from the register records of urine samples received in the Medical Microbiology laboratory from the hospital's indoor and outdoor patients during the study period. Only one sample from each individual.

Analysis of antibiotic susceptibility test of all isolates was reviewed. Mostly midstream clean-catch urine samples were collected and processed [3]. The isolates were identified according to the microbiological standard guidelines [4,5]. All urine samples were inoculation done by using the calibrated loop technique. It delivered 0.005ml of urine onto HiCrome UTI Agar containing Petri plates (M1353R Himedia) and were incubated for 24 hours at 37°C. HiCrome UTI Agar is a differential medium recommended for presumptive identification of microorganisms mainly causing urinary tract infections.

The common symptoms of urinary tract infection are urge to urine and frequency of micturition and discomfort or pain [3, 6, 7]. The urine cultures were interpreted depending upon the number of growth of colonies. Below 50 colonies (insignificant), above 50 to below 500 colonies (doubtful significance), above or equal 500 colonies (significant) with the clinical correlation as per recommendation. *Escherichia coli* ATCC 25922, *Enterococcus faecalis* ATCC 29212 were used as control [8,9].

Blood Agar Base, modified (M1989-Himedia) is a nutritious basal medium used for preparing blood agar with blood. It also helps to detect the haemolytic reactions [10, 11].

## RESULTS:

A total of 261 urine samples were included in this study. 36% of Male Patients (n=94), 64% of Female patients shown in Fig.1(a). [12]Similarly some author isolated 102 *E. coli* UTI isolates were obtained from urine samples of patients at the Princess Alexandra Hospital (Brisbane, Australia).

Among the 261 samples, 191 samples were Inpatients including 79 male, 112 females; 70 samples were Outpatients including 15 male, 55 females shown in Fig.1(b). Age wise categories labelled as 1-5 (A), 6-10 (B), 11-15 (C), 16-20 (D), 21-25 (E), 26-30 (F), 31-35 (G), 36-40 (H), 41-45 (I), 46-50 (J), 51-55 (K), 56-60 (L), 61-65 (M), 66-70 (N), 71-75 (O), 76-80 (P), 81-85 (Q) were shown in Fig. 1 (c). Out of these, 85 (32.56%) were sterile, 32 (12.26%) showed contaminated, 41 (15.70%) showed insignificant growth, 103 (39.46%) showed significant growth Fig.1 (d).

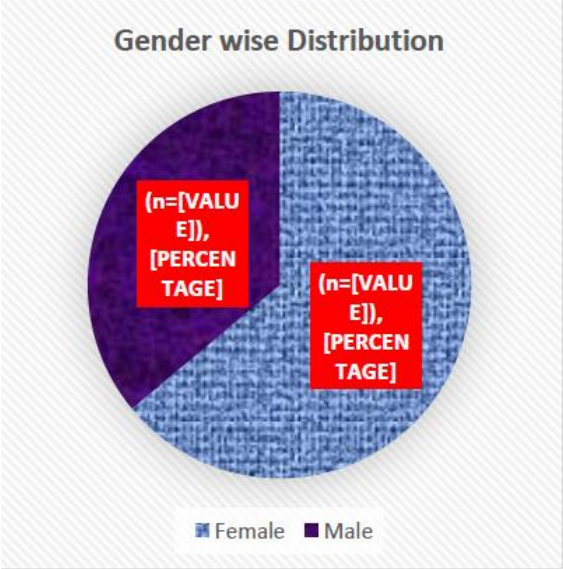


Figure 1(a) (Male n= 94, 36%), (Female n=167, 64%)

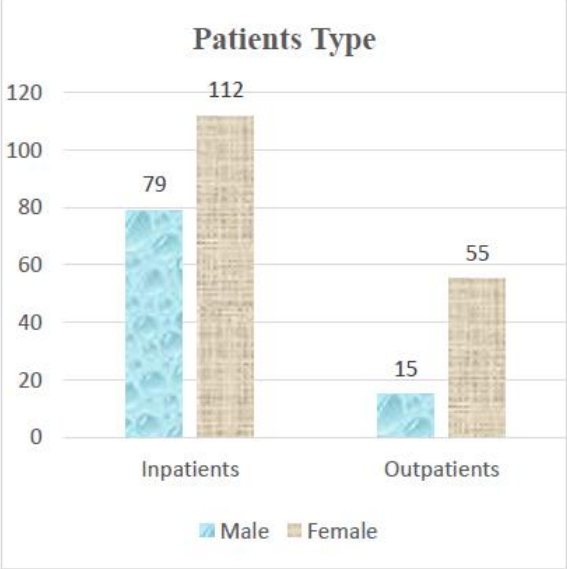


Figure 1(b)

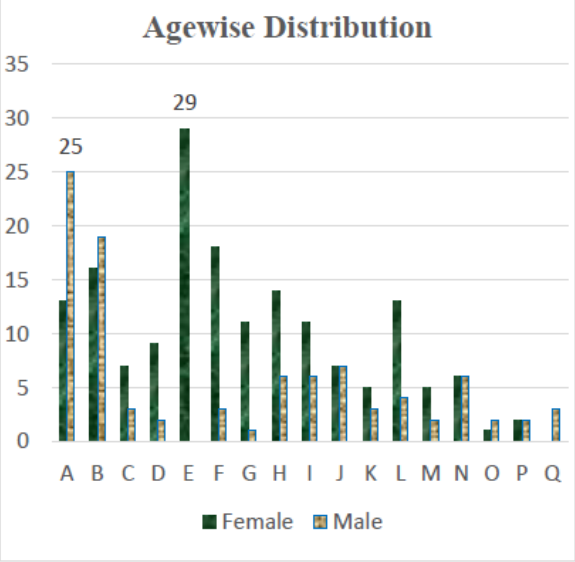


Figure 1(c)

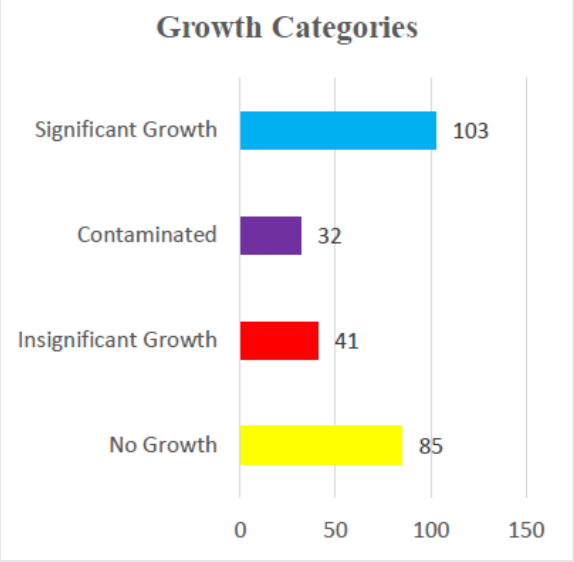


Figure 1(d)

Out of these, 85 (32.56%) were sterile that means no growth detected, Inpatients male was majority Fig.2(a). 32 (12.26%) showed contaminated that means unwanted growth detected due to the sample collection and transport error,

Inpatients female majority Fig.2(b). 41 (15.70%) showed insignificant growth reason for below 50 colonies on the plate, the high majority was female inpatients Fig.2(c). 103 (39.46%) showed significant growth, mostly isolated from the female samples Fig.2(d).

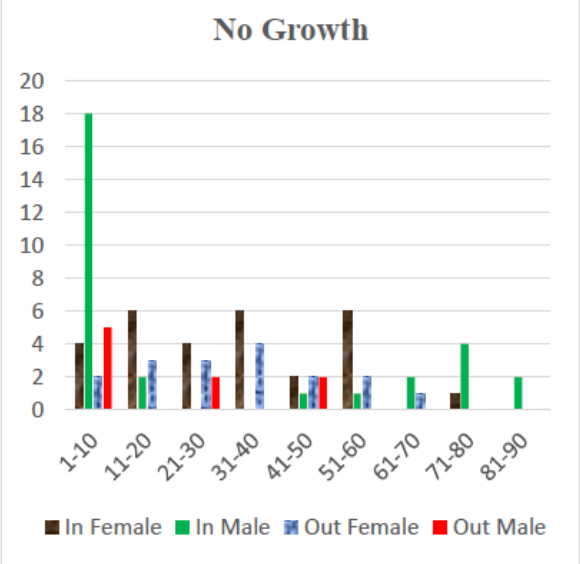


Figure 2 (a)

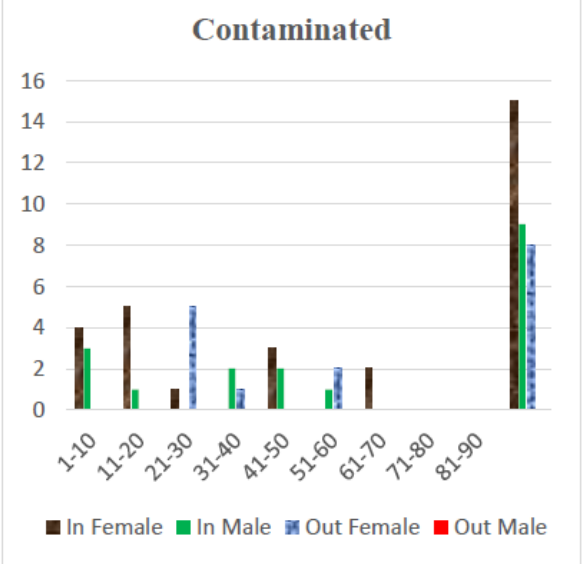


Figure 2(b)

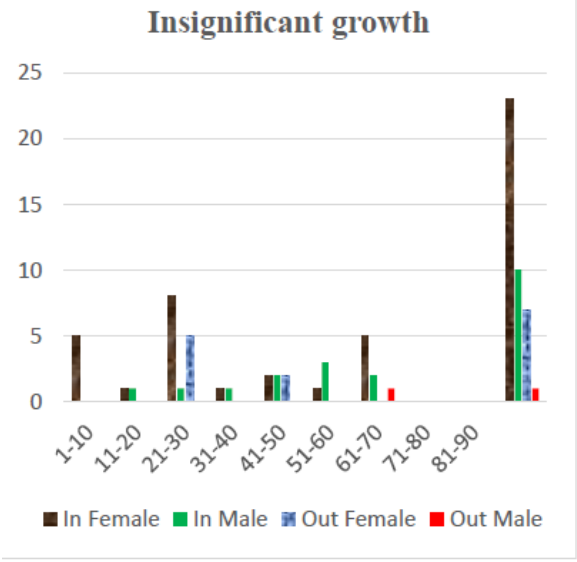


Figure 2 (c)

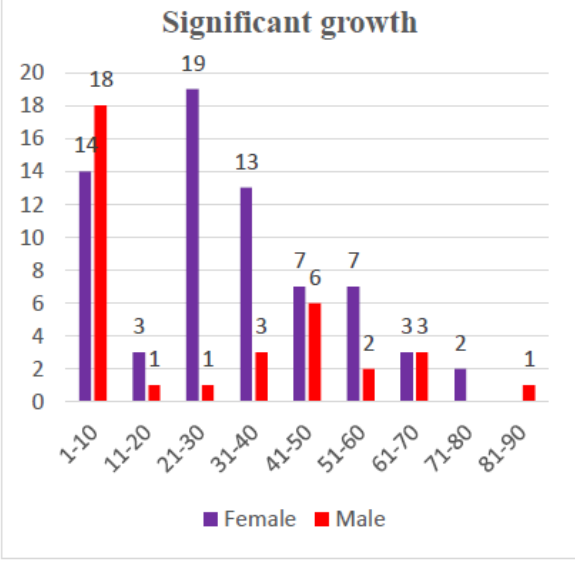


Figure 2 (d)

We isolated a total of 103 positive cultures. 12.62% of Gram-positive (n=13), 83.49% of Gram-negative (n=86) bacteria and 3.83% of Candida (n=4) fungi Fig.3(a). *Escherichia coli* was the most predominant bacteria (54.36%) Fig.3(b) followed by *Klebsiella* sp (15.53%) Fig.3(c), *Pseudomonas aeruginosa* (12.62%) Fig.3(d), *Staphylococcus aureus* (12.62%) Fig.3(e), *Proteus* (0.97%) Fig.3(f) and additionally detected fungi *Candida* (3.88%).

Mostly female patients' sample were analysed and the inpatient higher majority than the outpatients. The uropathogenic bacterium, which most frequently is *Escherichia coli*, but sometimes *Staphylococcus saprophyticus* or especially in hospital-acquired infections, *Klebsiella* species, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Enterococcus faecalis*. HiCrome UTI Agar is formulated for detection of uropathogens [3, 6, 7, 13, 14].

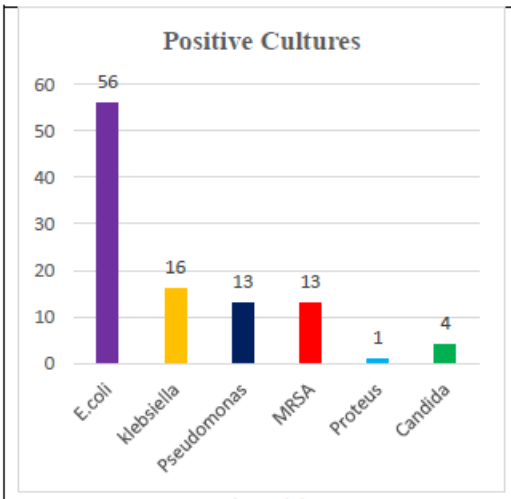


Fig.3 (a)

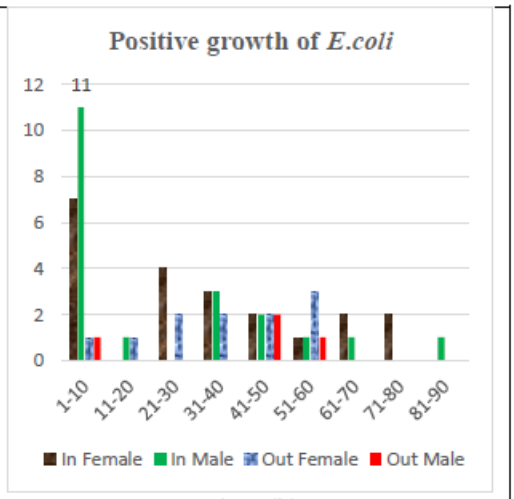


Fig.3 (b)

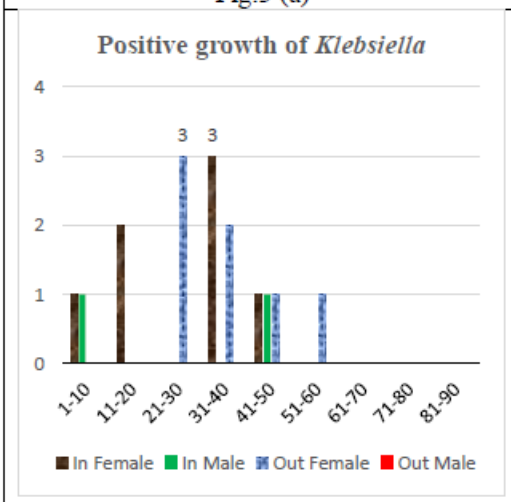


Fig.3 (c)

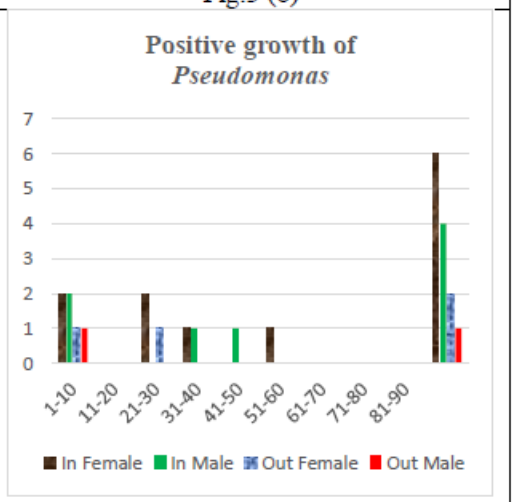


Fig.3 (d)

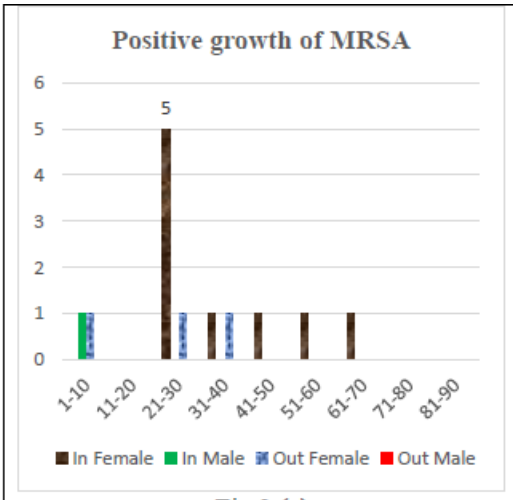


Fig.3 (e)

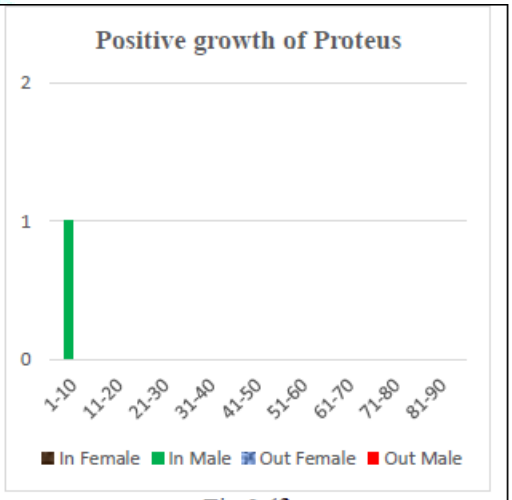


Fig.3 (f)

Different antibiotics were used for the AST based on the identification of the isolates. Amikacin (AK-30mcg), Amoxyclav (AMC-30mcg), Ampicillin/Sulbactam (A/S-10/10mcg), Aztreonam (AT-30mcg), Cefaclor (CF-30mcg), Cefazolin (CZ-30mcg), Cefoperazone (CPZ-75mcg), Cefotaxime (CTX-30mcg), Ceftazidime (CAZ-30mcg), Ceftriaxone (CTR-30mcg), Cefuroxime (CXM-30mcg, Chloramphenicol (C-30mcg), Ciprofloxacin (CIP-5mcg), Clindamycin (CD-2mcg), Co-Trimoxazole (Trimethoprim/Sulphamethoxazole) (COT-25(1.25/23.75) mcg), Erythromycin (E-15mcg), Gentamicin (GEN-10mcg), Imipenem (IMP-10mcg), Linezolid (LZ-15mcg), Meropenem (MRP-10mcg), Nalidixic acid (NA-30mcg), Nitrofurantoin (NIT-300mcg), Nitrofurazone (NR-100mcg), Norfloxacin (NX-10mcg), Ofloxacin (OF-5mcg), Oxacillin (OX-1mcg), Piperacillin/Tazobactam (PIT-100/10mcg), Tetracycline (TE-30mcg), Tobramycin (TOB-10mcg) (Himedia).

*E.coli* resistance to 19% Ampicillin/Sulbactam, 14% Co-Trimoxazole, 14% Nalidixic acid, 12% Cefuroxime, 11% Cefoperazone, 10% Cefotaxime, 8% Gentamicin, 7% Ciprofloxacin, 2% Cefaclor, 2% Nitrofurantoin, 1% Amikacin Fig.4(a). *Klebsiella* resistance to 18% Ampicillin/Sulbactam, 14% Cefoperazone, 13% Cefuroxime, 12% Cefotaxime, 12% Co-Trimoxazole, 10% Nalidixic acid, 9% Nitrofurantoin, 6%

Ciprofloxacin, 6% Gentamicin Fig.4(b). *Staphylococcus aureus* resistance to24% Oxacillin, 15% Erythromycin, 11% Ciprofloxacin, 9% Chloramphenicol, 8% Clindamycin, 8% Nitrofurantoin, 6% Linezolid, 4% Amikacin, 4% Gentamicin Fig.4(c). *Pseudomonas aeruginosa* resistance to 17% Ofloxacin, 14% Nalidixic acid, 14% Ceftriaxone, 10% Ampicillin/Sulbactam, 10% Gentamicin, 8% Ciprofloxacin, 6% Amoxyclav, 6% Tobramycin, 4% Amikacin, 4% Cefaclor, 4% Piperacillin/Tazobactam, 2% Meropenem Fig.4(d). *Proteus* sp resistance to 33% Meropenem, 33% Nalidixic acid, 33% Ofloxacin.

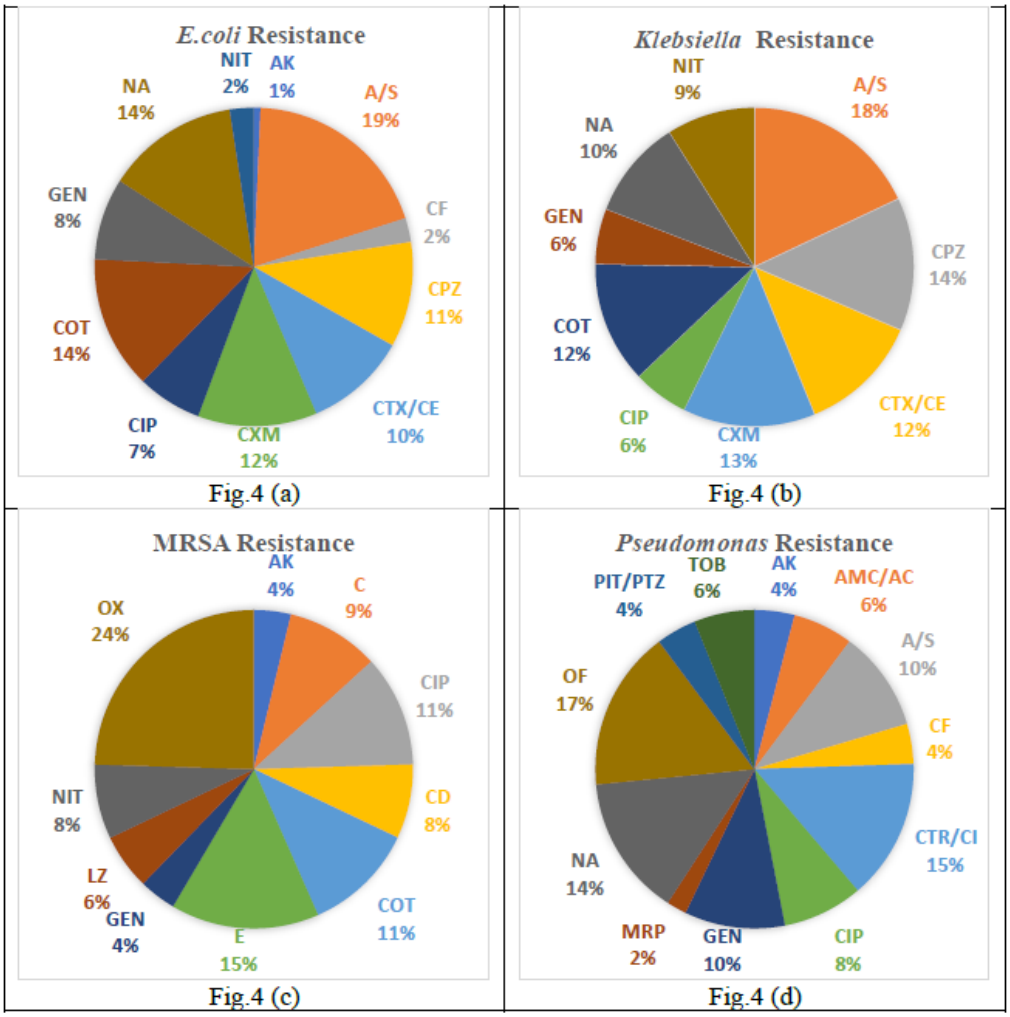


Fig.4 (a) Fig.4 (b)

Fig.4 (c) Fig.4 (d)

[15]The mean susceptibility of uropathogens was for amikacin (AK-81%), nitrofurantoin (Nf-60%), cefotaxime (52%), ceftriaxone (Ci-47%), ciprofloxacin (Cf-45%), norfloxacin (Nx-33%), cotrimoxazole (Co-18%) and nalidixic acid (Na-17%). 52% isolates were hemagglutinating, 34% were alpha-hemolytic, 31% were beta-hemolytic and 68% were motile reported. We isolated out of 103 isolates only 16.50% was the ability to produce hemolysis activity (Fig. 5).

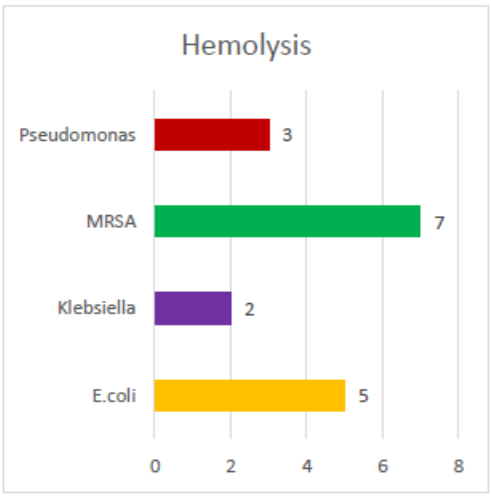


Fig.5

## CONCLUSION:

HiCrome UTI Agar (M1353) chromogenic mixture to improve the colour characteristic of media. It recommended for the detection of urinary tract pathogens. It is used to identification of gram-negative and gram-positive bacteria on the basis of different colony colours produced by reactions of specific enzymes with two chromogenic substrates. This medium can be made selective by supplementation with antibiotics for detecting microorganisms associated with hospital-borne infections.[6] our finding concluded the *Escherichia coli* was the commonest cause of UTI. Most of the uropathogens are susceptible to amikacin (81%) and nitrofurantoin (60%)[15]. We studied the AST pattern of patients with UTI attending RMMCH, The study strongly recommends the need of each patient must analyze the antibiotic sensitivity test before taking off any treatment not only urine sample. The globalization was a very favorable condition for the super knowledge bacteria.

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## CONFLICTS OF INTEREST

The authors declare no conflicts of interest in the study.

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