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Prevalence, drug susceptibility pattern of *Klebsiella pneumoniae* in women with urinary tract infection

Aarti Grover

Department of Medical Laboratory Technology, University Institute of Applied Health Sciences, Chandigarh University, Gharuan, Mohali, Punjab-140413

Shubham Koundal

Department of Medical Laboratory Technology, University Institute of Applied Health Sciences, Chandigarh University, Gharuan, Mohali, Punjab-140413

Shanoo Sharma

Department of Medical Laboratory Technology, University Institute of Applied Health Sciences, Chandigarh University, Gharuan, Mohali, Punjab-140413

Shweta

Department of Medical Laboratory Technology, University Institute of Applied Health Sciences, Chandigarh University, Gharuan, Mohali, Punjab-140413

Deepika Kapoor

Department of Medical Laboratory Technology, University Institute of Applied Health Sciences, Chandigarh University, Gharuan, Mohali, Punjab-140413

Dharambir Kashyap

Department of Histopathology, Postgraduate Institute of Medical Education & Research, Chandigarh, India,-160012

Hardeep Singh Tuli

Department of Biotechnology, Maharishi Markandeshwar (Deemed to be University), Mullana-Ambala - 133 207, Haryana, India

Vivek Kumar Garg

Department of Medical Laboratory Technology, University Institute of Applied Health Sciences, Chandigarh University, Gharuan, Mohali, Punjab-140413
Corresponding author email: garg.vivek85@gmail.com

Abstract---Background- Urinary tract infection (UTI) is an infection in which bacteria enters the tract and cultivate in the urinary tract i.e. the kidneys, ureters, bladder, and urethra. It is a common type of

infection affecting females. UTI in case of *K. Pneumoniae* (gram – bacteria) is symptomatic with signs of increase in urinary frequency, urgency, suprapubic discomfort, and dysuria are all common symptoms. **Materials and Methods-** We recruited 80 female patients diagnosed with UTI of different ages for the study. The study population was female patients aged 18-45yrs, n=50 (group 1) and 55-85yrs, n=30 (group 2) who were hospitalized for symptoms of urinary tract infections. Midstream urine is collected in sterile containers. Samples were treated within 2 hours of collection in cysteine-lactose electrolyte deficiency (CLED) medium. Colony count, morphology, Gram stain, and biochemical characteristics were used to identify UTI-positive isolates. The disc diffusion method was used to test antibiotic susceptibility in both age groups, and the results were compared. **Results:** Total 80 positive samples of *klebsiella pneumoniae* causing UTI in females, Cefixime (resistant drug) was seen more resistant i.e. 92% (n=50) in group 1 patients and 90% (n=30) in group 2 patients whereas Trimethoprim (resistant drug) was seen less resistant i.e. 80% (n=50) in group 1 patients and 90% (n=30) in group 2 patients. Tazobactam (sensitive drug) was seen significantly sensitive i.e. 100% in group 2 patients and 70% in group 1 patients, Ceftazidime (sensitive drug) was also seen significantly sensitive i.e. 100% in group 2 patients and 70% in group 1 patients. **Conclusion –** Study found that *klebsiella pneumoniae* in UTI was completely sensitive in tazobactam and ceftazidime drugs in group 2 patients i.e. 55-85yrs whereas in case of resistant drugs Cefixime was more resistant in group 1 patients than in group 2 patients whereas Trimethoprim (resistant drug) was seen less resistant in group 1 patients than in group 2 patients.

Keywords---UTI, *klebsiella pneumoniae*, sensitive, resistant drugs.

Introduction

Urinary tract infection (UTI) is an infection in which bacteria enters the tract and grow in the urinary tract i.e. the kidneys, ureters, bladder, and urethra. Many pathogens, including both Gram-positive and Gram-negative bacteria, as well as fungi, the most common of which are *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, and *Enterococcus faecalis*. Bacteriuria does not induce UTI without causing symptoms. (3) Urinary frequency, urgency, suprapubic discomfort, and dysuria are all common symptoms. UTI is a common type of bacterial infection of the urinary tract, particularly in women, as women have shorter urethra than men and are thus more prone to UTI. (1). Urine is an excellent bacterial growth medium. Hypertonicity, along with a low pH (averaging 6.0) and high urea contents and is naturally antibacterial.

Klebsiella pneumonia (also called as “*Friedlander’s bacillus*”) is an important Gram-negative, facultative anaerobic, encapsulated, non-motile, rod- shaped, catalase positive, and oxidase negative pathogen. They are about 1-2 μm x 0.5-0.8 μm , *Klebsiella* grows well on ordinary media to an optimal temperature of 37°C in

18-24 hours. (2) The colonies appear large, mucoid, and pink to red in color on Mackonkey agar. On nutrient agar colonies appear large, mucoid, and white in color. *Klebsiella pneumoniae* on CLED agar (Cystine Lactose Electrolyte Deficient agar). Cultivation 37°C, 24 hours. *K. pneumoniae* is becoming increasingly common as a nosocomial infection due to the emergence of new antibiotic-resistant strains. (3) However, frequent and unnecessary antibiotics use has resulted in an increase in antibiotic resistance, to the point that the prevalence of antimicrobial-resistant *K. Pneumoniae* has become a significant concern to public health.

Over last few decades there has been a rise in analysis activity designed to investigate the pathological process of *K. Pneumoniae* in UTI. Therefore, we will compare sensitivity and resistance in female patients on the basis of age group between 18-45 years and 55-85 years of age.

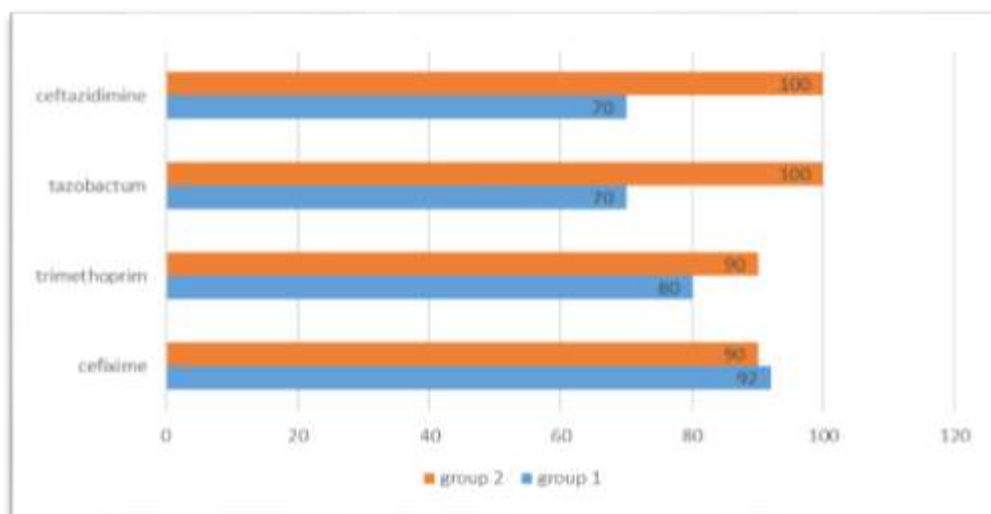
Material and Methods

This is a prospective observational study on female patients suffering from UTI attending the OPD/emergency services of department of microbiology. The study included patients with UTI symptoms in their urine cultures from medical wards. The demography profile of each patient with their clinical characteristics, predisposing variables, laboratory findings, urine culture reports, antimicrobial susceptibility patterns, and outcome are all recorded and surveyed. From Jan 2022 to March 2022 at Cloudnine Hospital, Faridabad under Metropolis healthcare ltd, New Delhi.

A gram stain test of the urine was carried out to look for pus cells and growth of bacteria. Antibiotic susceptibility testing was done on patients with severe bacteriuria. After that urine cultures of the study population having positive bacterial growth were included. Our study included all the patients who were diagnosed with UTI and had any indications or symptoms of UTI at the time of their check-up, as well as those who had a positive urine culture. The totals of 80 positive urine samples of patients, this study included women who went to the hospital with symptoms of tract infection. The study populations were female patients of 18-45 years 'age (n=50) were enrolled in group I and 55-85 years' age (n=30) were enrolled in group II.

Results

Total 80 positive samples of *klebsiella pneumoniae* causing UTI in females, Cefixime (resistant drug) was seen more resistant i.e.92% in group 1 patients (n=50) and 90% in group 2 patients (n=30) whereas Trimethoprim (resistant drug) was seen less resistant i.e.80% in group 1 patients (n=50) and 90% in group 2 patients (n=30). Tazobactam (sensitive drug) was seen more sensitive i.e. 100% in group 2 patients and 70% in group 1 patients, Ceftazidime (sensitive drug) was also seen more sensitive i.e. 100% in group 2 patients and 70% in group 1 patients.



Discussion

A total of 80 positive urine samples of *Klebsiella pneumoniae* were there in the study, out of which 50 patients i.e. group 1 were of 18-45 yrs.' age and other 30 patients i.e. group 2 were of 55-85 yrs.' age, sensitivity and resistant drug rates were compared according to the Age group by disk diffusion tests and by commercial bacterial identification system Vitek 2 Compact. In contrast to earlier research, we discovered a significant and substantial shift in the types of uropathogens responsible for uncomplicated UTI patients. Previously, in 2017, Miotla published a report *Escherichia coli* was the most prevalent uropathogen grown from urine samples (65.5%), followed by *Enterococcus faecalis* (12.2%), *Klebsiella pneumoniae* (4.7%), and *Proteus mirabilis* (4.7%). (4.2 percent). Regardless of menopausal state, ampicillin resistance exceeded 40%. Ciprofloxacin resistance was shown to be as high as 25% in postmenopausal patients. Ampicillin, ciprofloxacin, and the trimethoprim/sulfamethoxazole combination must be disregarded in treatment of postmenopausal women who seem to have UTI which is not indicated by an initial urine culture result due to the high resistance rate. Eventually, in postmenopausal women, cephalexin and cefuroxime are viable first-line treatments. (7) Also, In 2014, Manjula N G found that the isolation rate of *K. pneumoniae* in pregnant women was 19.9%, with an overall incidence rate of 9.8%. About 63.4 percent of the 41 *K. pneumoniae* isolates were ESBL producers, and all were confirmed to be Multi Drug Resistant (MDR). antimicrobial sensitivity tests found that more than half of *K. pneumoniae* isolates were resistant to ampicillin (75.6%), followed by nitrofurantoin and cefuroxime (73.1%), and chloramphenicol (12.1 percent). ESBL producers had high resistance to nitrofurantoin (69.2%) and cotrimonazole (65.2%), but lower resistance to amikacin (7.6%), according to the findings. In our study, we saw tazobactam and ceftazidime drugs in group 2 patients i.e. 55-85yrs were completely sensitive whereas in case of resistant drugs Cefixime was seen more resistant in group 1 patients than in group 2 patients whereas Trimethoprim was seen less resistant in group 1 patients than in group 2 patients.

Conclusion

Study found that *Klebsiella pneumoniae* in UTI was Completely sensitive in tazobactam and cefizidime drugs in group 2 patients i.e. 55-85yrs whereas in case of resistant drugs Cefixime was seen more resistant in group 1 patients than in group 2 patients whereas Trimethoprim (resistant drug) was seen less resistant in group 1 patients than in group 2 patients.

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Conflict of Interest

None

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