Original Research Article

Bacteriological Profile & Antibiogram of Urinary Tract Infections in a Tertiary Care Hospital

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ABSTRACT

Background: UTI is the second most common clinical indication for empirical antimicrobial treatment in primary and secondary care setting. ESBL producing bacteria are typically associated with MDR. Hence, the present study was done to isolate and identify the pathogenic agents of UTI, their antibiotic susceptibility pattern and detection of ESBLs and MRSA of the isolated organisms in a tertiary care hospital.

Materials & Methods: A total of 175 urine samples of patients suffering from UTI were included in the study. Isolation and identification of organisms was done as per standard protocols in the laboratory. Antibiotic sensitivity test was done by Kirby-Bauer disc diffusion method and interpretation done as per CLSI guidelines.

Results: In the present study, out of 175 samples, 48 (27.4%) were culture positive and 127 (72.6%) sterile. Out of the 48 positive cultures, E.Coli were isolated predominantly (54.1%) followed by Klebsiella species (27%), Pseudomonas aeruginosa (8.3%), Staphylococcus aureus (6.2%) and Enterococci (4.1%). Most of the gram positive cocci were sensitive to vancomycin (94%) followed by amikacin and linezolid (90% each) and imipenem (88%) while gram negative bacilli were sensitive to colistin (96%), amikacin (92.5%) and imipenem(90%). MRSA were 33.3% and ESBLs 24.4%.

Conclusion: Resistance to beta lactam antibiotics has increased significantly in the last two decades and current updated knowledge of the susceptibility pattern of bacteria is vital for the appropriate assortment and utilization of antimicrobial drugs and for prescribing suitable guidelines.

INTRODUCTION

Urinary tract is the second most common site of bacterial infection in humans[1]. Urinary tract infection (UTI) is the second most common clinical indication for empirical antimicrobial treatment in primary and secondary healthcare settings[2]. The prevalence of UTI depends on age, sex, race and pre- disposing factors like anatomical, physiological, infective, social and environmental[3,4]. UTI occurs in any age and is more common in women than men[5,6].

More than 85% of UTIs are caused by bacteria[1]. Bacteria responsible for UTI often originate from fecal and perineal flora[7,8]. Escherichia coli is the commonest cause of UTI followed by Klebsiella species, proteus species, Enterococcus fecalis, Coagulase negative Staphylococcus, Staphylococcus aureus and Pseudomonas species[9,10,11]. Micro organisms belonging to enterobacteriaceae have been documented as elementary reason of nosocomial and community acquired UTIs[12]. Escherichia coli accounts for as much as 90% of the community acquired and 50% of the nosocomial UTIs[13].

The emergence of multidrug resistant (MDR) variant of E.Coli has been accounted[14,15]. Nowadays extended spectrum beta lactamase (ESBL) producing bacteria are typically associated with MDR

and antibacterial choice is often complicated by multidrug resistance[16-18]. Bacterial identification and susceptibility testing are important for selecting the appropriate antimicrobial agent affecting the bacterial disease[19]. Hence, the present study was done to isolate and identify the pathogenic agents of UTI, their antibiotic susceptibility pattern and detection of ESBLs and MRSA of the isolated organisms in a tertiary care hospital.

MATERIAL AND METHODS

The present study was conducted in the Department of Microbiology, Andhra Medical College & King George Hospital, a tertiary care, referral and teaching hospital in south India for a period of 3 months from May to July 2018. A total of 175 urine samples from all age groups suffering from UTI were included in the study. Samples from diabetic cases and from catheters were excluded.

All the samples were processed in the lab. Isolation and identification of organisms was done as per the standard protocols in the laboratory. Antibiotic sensitivity test was done by Kirby-Bauer disc diffusion method and MDR strains (ESBLs) were detected by double disc diffusion method and MRSA were detected by Cefoxitin disc and interpretation of zones was done as per the CLSI guidelines.

RESULTS

In the present study a total of 175 samples were included and out of these 48 (27.4%) were culture positive and 127 (72.6%) were culture sterile. Most of the samples were from the age group 21-30 years followed by 1-10 years and culture positivity was higher in the same groups, 31.2% & 20.8% respectively. Female preponderance (56%) was observed in the present study and the rate of bacterial isolation in females & males was 64.5% and 35.5% respectively.

In the present study out of 48 samples, E.Coli was isolated predominantly (54.1%) followed by Klebsiella species (27%), Pseudomonas aeruginosa (8.3%), Staphylococcus aureus (6.2%) and Enterococci (4.1%).

Most of the gram positive cocci were sensitive to vancomycin (94%) followed by amikacin and linezolid (90% each) and imipenem (88%). Most of the gram negative bacilli were sensitive to colistin (96%), amikacin (92.5%) and imipenem(90%). In the present study out of 3 Staphylococcus aureus isolates, 1 was MRSA (33.3%) and out of 45 gram negative bacilli, 11(24.4%) were ESBLs.

DISCUSSION

Urinary tract infections are one of the most common infectious diseases encountered in the medical practice and only second to respiratory tract infections as a cause of hospital visit[20]. E.Coli accounts for as much as 90% of the community acquired and 50% of the nosocomial UTIs[13]. Upto 50% of females eventually experience at least 1 episode of UTI in their life time. E.Coli UTI is more common in females than in males because of differences in anatomic structure and changes during sexual maturation, pregnancy and child birth.

Men older than 45 years with prostatic hypertrophy are at an increased risk of UTI due to related bladder stasis. UTIs, including cystitis and pyelonephritis are the most common infectious diseases in childhood[21]. E.Coli is the leading cause of nosocomial bacteremia from a gastrointestinal or genitourinary source. The mortality and morbidity associated with E.Coli bacteremia is the same as that for other aerobic gram negative bacilli[22].

Antimicrobial resistance is now recognized as an increasingly global problem, especially in gram negative bacteria[23]. UTIs are mainly treated with beta lactam antibiotics. However, acquired resistance to these antibiotics in UTI pathogens is commonly augmented by bacterial enzymes and leads to the emergence of ESBLs[24].

Numerous studies have pointed towards high incidence rate of UTIs

associated with E Coli and anti biotic resistance. The emergence of multi drug resistant (MDR) variant of E Coli has been accounted. The resistance of gram negative bacteria is typically owed to plasmid mediated enzymes ESBLs.

Nowadays in UTIs, ESBL expressing gram negative bacilli generally cause community acquired infections[25]. ESBL producing bacteria are typically associated with MDR and anti-bacterial choice is often complicated[16-18]. Accurate diagnosis of UTI and determination of antibiotic sensitivity pattern is important for selection of appropriate drug for effective treatment.

In the present study, out of 175 samples, culture positivity was obtained in 27.4% which correlates with Dnyaneshwari Puroshottam et al[26] (36.2%), Mulugeta Kibret et al[27] (22.7%) and Kausar et al[28] (21%), and Vinita Dogra et al[29] (20.9%) whereas Navin Kumar Chaudhary et al[30] reported lower incidence of 16% of culture positivity in their studies. In the present study culture positivity was more in females (64.5%) than in males (35.5%) which correlates with Dnyaneshwari Puroshottam et al (66%&34%) and Kausar et al[28] (56%&44%), where as Navin Kumar Chaudhary et al reported lower incidence of 32%&24% in their study.

Out of the 48 culture positive samples, E. coli was the predominant isolate (54.1%) followed by Klebsiella pneumoniae (27%) in the present study which correlates with Dnyaneshwari Puroshottam et al (41.3% & 11.5%), Kausar et al (56% & 17%) and Navin Kumar Chaudhary et al (52% & 16%).

Antibiotic sensitivity pattern of Gram positive and Gram negative isolates in the present study correlates with Dnyaneshwari Puroshottam et al, Navin Kumar Chaudhary et al and Mansour Amin et al.

In the present study ESBLs were isolated in 24% which correlates with Kausar et al (21%) and Dnyaneshwari Puroshottam et al (32.7%).

CONCLUSION

Bacterial identification and susceptibility test are important for selecting appropriate anti microbial agent affecting bacterial diseases. Resistance to beta lactam antibiotics has increased significantly in last two decades and has been documented in both community and hospital settings. Current updated knowledge of the susceptibility pattern of bacteria is vital for the appropriate assortment and utilization of antimicrobial drugs and also for prescribing suitable guidelines.

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