Bacterial Pathogen Responsible For Urinary Tract Infection.

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ABSTRACT

Introduction: Urinary Tract Infection (UTI) is one of the common medical conditions which seek the help of clinician and prompt intervention with suitable antibiotics to prevent morbid conditions. Therefore, identification of causative agent with their antibiotic sensitivity pattern is always mandatory for successful treatment of the cases.

The main objective of the study was to identify the common bacterial pathogen responsible for causing Urinary Tract Infection with determination of sensitivity pattern of commonly used antibiotics.

Methods: A total of 8270 urine samples were collected from the patient attending Outpatient Department and admitted as Inpatient in ward during the period of January 2011 to December 2011 in Shree Birendra Hospital. The samples were subjected to culture for identification of pathogen with their antibiotic sensitivity pattern following standard methodology.

Results: Out of total, only1654 (20%) showed growth of pathogenic organisms. Among them positivity was highest in patient attending Outpatient Department. Eight different species of bacteria was isolated as causative agent. Among them *Escherichia coli* (67%) was predominantly higher in number followed by *Proteus spp* (22.24%), *Klebsiellaspp* (4.07%), *Pseudomonas aeruginosa*(2.7%) and *Citriobacterfreundii* (2.3%). Among these organisms sensitivity was highest towards Amikacin (86%) & Gentamycin (69%) followed by Nitrofurantion (60.5%).

Conclusions: Causative agent of Urinary Tract Infection may vary in different situation. Definite identification of pathogen with their antibiotic sensitivity pattern is always key point for success of treatment.

Keywords: antibiotic sensitivity, E. coli, UTI

INTRODUCTION

Urinary tract infections (UTI) could be defined as the persistent presence of actively multiplying microorganisms within the urinary tract. UTI implies both microbial colonization of the urine and invasion of the lower or upper urinary tract by microorganisms[1].According to Kass[2] presence of 100 000 or more colony forming units (CFU) of bacteria per ml of urine implies UTI. But this criteria has been questioned and bacterial counts of 10^2 or more organism per ml particularly when accompanied by pyuria (>10 wbc/mm^3) provide impressive evidence of urinary tract infection in symptomatic young women[3].Therefore, the Infectious Disease Society of America (IDSA) gave a slightly more relaxed consensus definition requiring 10^3 organisms per ml to diagnose cystitis and 10^4 per ml for pyelonephritis[4].

It is among the most common bacterial infections encountered by clinicians in developing countries with an estimated annual global incidence of at least 250 million. It has been estimated that symptomatic UTIs result in

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as many as 7 million visits to outpatient's clinics and 1 million visits to emergency department and 100,000 hospitalizations annually[5].

UTIs have become the most common hospital-acquired infection, accounting for as many as 35% of nosocomial infections and they are the second most common cause of bacteremia in hospitalized patients[6]. But fortunately it is rapidly responsive to modern antibiotic therapy.

Therefore, study of the causative agent with their antibiotic sensitivity pattern is necessary tools for treatment and it also gives guideline for empirical therapy where there is laboratory facilities lacking. With all these views the present study was carried out to know the common bacterial isolates involve in Urinary Tract Infection among the patients attending Shree Birendra Hospital, Chauni with their sensitivity pattern.

METHODS

This study was conducted retrospectively from January 2011 to December 2011.Clinically suspected cases of Urinary Tract Infection were included in this study. Of total 8270 urine samples were collected during the period. All the samples were processed according to standard methodology guided by CLSI (Clinical Laboratory Standard Institute)[7-8] and antibiotic sensitivity pattern were determined by Modified Kirby's Bauer method [9].

RESULTS

Among 8270 urine sample processed, only 1654 showed significant growth. It constitutes 20% of positivity as shown in the figure 1.

During the study *E.coli*(67.2%) was found to be the predominant organism followed by *Proteus spp* (22.2%), *Klebsiellaspp* (4.05%) and *P.aeruginosa* (2.78%) as shown in Table 1.

In the study isolated organisms showed sensitivity towards Aminoglycoside group of antibiotics like Amikacin (86%) and Gentamycin (69%) followed by Nitrofurantion (60.5%). Table 2 showing the elaborated sensitivity pattern of each of isolate.

Figure 1. Pattern of Growth positivity (n=8270)

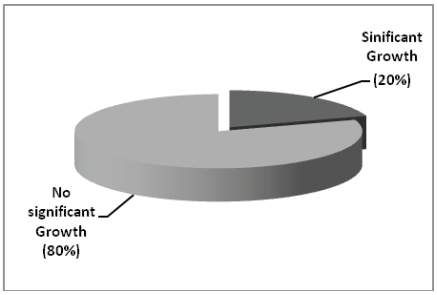

Table 1. Pattern of Bacterial Isolates (n=1654)

Organisms	Total Numbers	%
Escherichia coli	1111	67.2
Proteus spp	366	22.12
Klebsiellaspp	67	4.05
Pseudomonas aeruginosa	46	2.78
Citrobacterfreundii	38	2.29
Morganellamorganii	18	1.08
Providenciaspp	6	0.36
Acinetobacterspp	2	0.12

Table 2. Sensitivity Pattern for different Antibiotic.

Antibiotics	*E.coli* n=1111	*Proteus spp* n=366	*Klebsiellaspp* n=67	*P.aeruginosa* n=46	*C.freundii* n=38	*M.morganii* n=18	*Providenciaspp* n=6	*Acinetobacterspp* n=2
Amoxicillin	118	73	ND	ND	14	5	1	0
Amikacin	920	343	65	42	32	15	6	1
Cephalexin	119	125	15	ND	10	3	1	0
Ceftazidime	ND	ND	ND	37	ND	ND	ND	1
Co-trimoxazole	355	112	20	ND	13	12	4	2
Cefotaxime	187	250	7	ND	30	12	6	1
Gentamycin	816	250	43	ND	24	16	4	0
Norfloxacin	344	141	29	22	19	8	5	0
Nitrofurantoin	716	184	18	41	20	17	6	0
Ofloxacin	409	193	34	30	18	16	6	2
Piperacillin	ND	ND	ND	35	ND	ND	ND	ND

ND-Not Done

DISCUSSION

Bacterial infection of the urinary tract is one of the common causes for seeking medical attention in the community. Effective management of patients suffering from bacterial UTIs commonly relays on the identification of causative organism and the selection of proper antibiotic.

Escherichia coli is the most frequently isolated bacteria in both community acquired as well as hospitalized patients [10-12]Therefore, this study is also no more exception and isolated *E.coli* (67.2%) as predominant organism. This was followed by *Proteus* spp (22.12%) and *Klebsiella*spp(4.05%). Various studies showed *Enterococcus fecalis*[13], *Klebsiella pnumoniae*[14,15], *Staphylococcus aureus*[16,17]as second commonest organisms. But this study was contrary to other studies. Most interestingly during this study *Proteus spp* was found to be the second commonest organism. The reasons behind this may be the isolates were from the patients admitted in the hospital.

However, the study was unable to focus on other bacterial causes like *Neisseria gonorrhoeae, Chlamydia trachomatis, Mycoplasmagenitalium.*

According to this study *E.coli*showed effective sensitivity towards Amikacin (82.8%), Gentamycin (73.44%) and Nitrofurantion (64.4%). This result was similar to the study done by H.P. Kattel[16]Amikacin (81.5%), Getamycin(65%) and Nitrfurantion(79.2%), A Acharya[18]; Amikacin (77.92%), Gentamycin (73.1%) and Nitrofurantion (71.2%) from Nepal. But the study showed commonly used antibiotic like Amoxicillin (89.4%) as highest resistance, the result was similar with the study result by A. Acharya[18](100%) from Nepal, Asad U Khan[19] (90%) from India, Ava Behrooozi[20](85%) from Iran, Savitha T[21] (69.39%) from India and Annabelle T. Dytan[22] (55.6%) from Philippine. Therefore, there is no doubt the commonest causative organism of UTI is no longer responsive to commonly prescribed antibiotic.

Other Gram negative bacteria are also showing the similar type of sensitivity pattern. So we can conclude that Amikacin and Gentamycin is the drug of choice for the Gram negative bacilli as uropathgen for UTI. But its drawback is that need to be administered intravenously and might need hospital admission. Therefore, Nitrofurantion can be taken as best option for first line drug and it is readily available in affordable price in developing countries like Nepal. It is found to be safe even in pregnancy[23]. Even than clinicians are so reluctant to prescribe such wonderful drug.

But *Pseudomonas aeruginosa* was showing different type of sensitivity pattern. This organism was isolated from admitted patient and accounted for only 2.78% of total which was in accordance with the study result done by A Acharya[18] et.al (2.9%), A Sharma[14] et.al (2.5%) from Nepal. *Pseudomonas aeruginosa*showed sensitivity towards Amikacin (91%), Nitrofurantaion (89.1%) and Ceftazidime (80.43%). The sensitivity pattern of Amikacin and Nitrofurantaion is similar with study done by A Behrooozi[20]et.al ;Amikacin (87%) and Nitrofurantion (74%).

The study showed that treatment option is being narrowed down due to emergence of multi drug resistance organisms. Therefore, the mechanism of resistance pattern has to be studied in detail in near future with best alternative choice of drug.

CONCLUSIONS

Constant survey of antimicrobial sensitivity pattern plays a very important role in the empiric treatment of UTIs. In health care setting, a very little extra venture on antimicrobial sensitivity pattern survey can facilitate to accrue extremely practical information of resistance pattern as well as successful treatment.

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