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Research Article

Isolated Bacterial Pathogens In Urinary Tract Infection and Antibiotic Susceptibility Pattern In Hospital

Md. Ishtiaque Ahmad[1], Syed Md. Javed[2], Y. Muzzafari[3]

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Corresponding Author:

*** Dr. Md. Ishtiaque Ahmad,**
M.D. Microbiology Assistant,
Narayan Medical College & Hospital,
Sasaram, Jamuhar, Bihar,
India.

*Email Id- driahmad@yahoo.com

ABSTRACT

Background: Urinary tract infection (UTI) is commonest infections encountered in hospitals despite the widespread availability of antimicrobial agents UTI has become difficult to treat because of appearance of pathogens with Poly Antimicrobial antibiotics resistant bacteria which is emerging.

Objectives: The aim and objectives of this study were to identify the prevalent etiological Bacterial pathogens of the UTI and to determine the antibiotic sensitivity pattern of pathogens isolated.

Methodology: The present study was a cross sectional study carried out in a Narayan Medical College and Hospital Jamuhar, Sasaram in department of microbiology. From December 2010 to march 2012. Total 258 urine samples were tested bacteriologically and for antibiotic susceptibility using standard procedures.

Results: Out of 258 urine samples 142 (55%) patients tested positive for culture out of 142 samples 125 gram negative bacteria 17 gram positive *bacteria* isolated, most commonly associated bacteria isolated were E.coli (57.60%) followed by and *Klebsiella spp* (16.90%) *Enterobacter spp* (7.04%),proteus(5.63%),pseudomonas sp (3.52%) citrobacter(2.81%)etc. amongst the gram negative bacilli .Amongst the gram positive bacteria *Staphylococcus aureus* (8.45 %) was commonest. *E. coli* which was the main isolate identified was found to be highly susceptible to Meropenem(80.78%) Amikacin (70.4%) followed by Ciprofloxacin (68.14%) norfloxacin (80.92%) and Nitrofurantoin (48.58%). Ceftriaxone (68.74%),ceftazidime(70.42%) etc.

Key-words: Urinary tract infection, etiological Bacterial pathogens, Antibiotic Susceptibility, Anti-Microbial agents.

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1 M.D., Microbiology Assistant , Narayan Medical College & Hospital, Sasaram, Jamuhar, Bihar, India.
2 M. D., Pharmacology, Assistant Professor, Narayan Medical College & Hospital, Sasaram, Jamuhar, Bihar, India.
3 M.D., Assistant Professor, Narayan Medical College & Hospital, Sasaram, Jamuhar, Bihar, India.

Introduction:-

Urinary Tract Infection (UTI) remains the second most common bacterial infection in human population after (RTI) both community acquired and hospital acquired infection is the commonest infection [1]. Its annual global incidence is of about 250 million worldwide [2, 3]. UTI is defined as disease caused by microbial invasion of the genitourinary tract that extend from the renal cortex of the kidney to the urethral meatus. The presence of bacteria in the urine is named as bacteriurea. Pathogens within the urinary tract and it is usually classified by the site of infection as urethra (urethritis) bladder (cystitis), kidney (pyelonephritis) prostate(prostitis). They may be asymptomatic or symptomatic. UTIs that occur in a normal genitourinary tract with no prior instrumentation are considered as "uncomplicated", whereas "complicated" infections are diagnosed in genitourinary tracts that have structural or functional abnormalities including instrumentation such as indwelling urethral catheters, and are frequently asymptomatic [4, 5]. Many different microorganisms can cause UTIs though the most common pathogens causing the simple ones in the community are *Escherichia coli* and other Enterobacteriacae, which accounts for approximately 70 of the isolates [6] . Treatment of UTI is often started empirically and therapy is based on information determined from the antimicrobial resistance pattern of the urinary pathogens [7] . The prevalence of antimicrobial resistance among urinary pathogens has been increasing already on antibiotic treatment. Total 258 samples were collected during this study period.

Procedure:

For collection of urine samples patients were advised to clean genital part prior sample collection Then catch midstream urine (MSU) specimen in a sterile wide mouthed leak proof container supplied by the laboratory and patient on catheter urine was collected after all aseptic precaution and after removing urine bag and transported to the laboratory immediately after collection. Isolation and identification of bacterial pathogens was done by microscopy and culture method followed by sensitivity test done by Kirby bueir method.

Microscopy:

Urine is centrifuged and deposit is examined under microscope after wet mount preparation for detection of pus cells, epithelial cells, erythrocytes and bacteria. This was followed by a Gram's stain.

Culture*:*

Uncentrifuge urine is inoculated on blood agar and MacKonkeys agar. A standard calibrated loop is used to culture a fixed volume of un-centrifuge urine sterile semi-quantitative method was used for the plating. It has a 4.0 mm diameter to deliver 0.01 ml. A loopful of the well mixed urine sample was inoculated on Blood and Mac-Conkey agar plates. The plates were then incubated at 37ºC aerobically for 24 hrs. They were then examined for bacterial growth. A significant bacterial count was taken as any count equal to or in excess of 100,000 CFU /ml. A less than 100 CFU/ml was interpreted as negative. Bacterial isolates were identified generally using conventional biochemical tests [12, 13].

Antibiotic susceptibility testing:

In the present study antimicrobial susceptibility testing was done on Mueller- Hinton agar using disk diffusion (Kirby Bauer's) method according to the Clinical and Laboratory Standards Institute (CLSI) guidelines using the following antimicrobial drugs: meropenem ,ceftriaxone Amikacin, Gentamicin, Ciprofloxacin, Norfloxacin, Nitrofurantoin, Cephazolin, Cotrimaxozole and Ampicillin for both Gram positive and negative Bacterial isolates. Also we used Chloramphenicol, Tetracycline and Penicillin [14].

Results

Out of the total 258 samples collected in this study, 142 (55.03%) came out to be positive for isolates. Among these 52(36.61%) samples belonged to male and 90 (63.38%) belonged to female patients. The most

common isolates in this study have been the Gram negative bacilli which accounts for 82.02% of the total positive isolates. In the gram negative bacilli, the predominant isolate was the *E.coli* (57.60%) followed by other bacilli like *Enterobacter* (7.04%), *Klebsiella sp* (16.90%) and *Citrobacter* (4.28%) among the major isolates. In the gram positive bacteria the main organism identified was *Staphylococcus aureus* (8.45%). Table 1 shows the detailed frequency of all the isolates identified. The antibiogram of the isolated pathogens is shown in Table 2. Among the tested antibiotics the highest susceptibility for the Gram negative bacteria was shown by Amikacin, Gentamicin and Ciprofloxacin followed by Nitrofurantoin, Norfloxacin and Ampicillin. *E coli* which was the predominant isolate gave high susceptibility to Amikacin 82.2%, Gentamicin 80.4% and Ciprofloxacin 78.2%. *Enterobacter*, the second most isolated organism, showed high susceptibility to Amikacin 74.7%, Gentamicin 79.1% and Ciprofloxacin 69.4%. Amongst Gram positive bacteria's *Staphylococcus aureus* was commonest isolate showing susceptibility to Amikacin 69%, Gentamicin 58.1%, Ciprofloxacin 58.4% and Chloramphenicol 76%.

Table 1. Distribution of positive isolates identified from urine samples

Gram negative bacilli (N= 125)	**Gram positive bacilli (N= 17)**
E. Coli	Streptoccocus sp.
Enterobacter	Enterococcus sp.
Klebsiella sp.	
Citrobacter	
Proteus sp.	
Pseudomonas sp.	
Staphylococcus aures	

Table 2. Distribution of Antibiotic susceptibility amongst the bacterial isolates

	Amikacin	Gentamycine	Ciprofloxacin	Norfloxacin	Ceftriaxone	Cefazolin	Mesopenam	Cotriamaxazole	Chloramphenicol	Tetracycline	Erythromycine
E. Coli	70.4	74.4	68.4	60.92	80.4	70.4	90.4	30.4	28.4	20.4	38.4
Klebsiella sp.	76.2	72.8	70.44	58.22	78.4	70.4	94.4	38.4	26.4	16.4	40.72
Enterobacter	68.6	60.8	58.1	56.66	68.44	50.44	95.6	30.4	28	20.8	50.88
Proteus sp.	48.2	50.21	48.41	62.49	68.4	68.1	86.6	28.3	28.3	18.2	56.6
Serratia	65.2	25.49	29.6	30.6	70.4	35.44	95.44	29.2	23.2	20.2	25.2
Staphylococcus aures	28.22	50.72	50.72	48.47	60.4	58.3	99.4	28.4	34.1	28.2	39.45
Enterococcus sp.	29.4	58.1	62.4	68.4	64.4	70.4	90.4	26.18	20.18	30.2	60.4
Citrobacter	48.2	60.4	60.43	46.44	70.44	56.22	88.4	20.4	18.4	20.4	34.1
Pseudomonas sp.	65.2	48.2	40.58	56.2	70.2	60.2	86..20	28.2	30.2	28.2	50.4

Discussion:

UTI IS the one of the commonest infection of the hospital and community acquired infection and among causative organism coliform organism are commonest cause of uti and *E. coli* being the predominant aetiological agent in UTI. Other bacterial agents include species of *Klebsiella, Enterobacter, Proteus, Pseudomonas, Staphylococcus, Streptococcus* and *Enterococcus faecalis* As is evident from the results, this study demonstrated *E. coli* to be the predominant bacilli and *Staphylococcus aureus* amongst the gram positive bacteria (8.4%) as the causative agents of UTI. These findings are similar to other studies conducted [17, 18, 19].

The isolates of most of the species exhibited a high rate of resistance to Ampicillin, Co-trimoxazole, Cefozolin, Norfloxacin and Nitrofurantoin. Resistance to antibiotics develops due to its frequent misuse. This pattern of resistance has also been reported within the country from different states [18, 20]. From other parts of the world also such pattern has been reported [21].

It must be borne in mind that the variations in antimicrobial susceptibility in different countries and within states in our country may depend upon the easy availability of antimicrobial drugs over the counter. Norfloxacin, Nitrofurantoin and Ampicillin are very commonly used over the counter drugs for UTI in

our country. In this study we have shown growing resistance pattern to these anti microbial agents.

Conclusion:

Drug resistance among bacterial pathogens is a natural process, injudicious irrational use of antibiotic use are main reason for emerging resistant bacteria regular surveillance and monitoring according to hospital antibiotic policy and must be monitored by hospital infection control committee necessary to provide appropriate antibiotic on the updated and most effective empirical treatment of UTIs.

Periodic reassessment of *in vitro* susceptibility pattern of urinary pathogens to serve as a guide for antibiotic therapy since these organisms exhibit resistance to first-line drugs used for UTI infection. In order to prevent or decrease resistance to antibiotics, the use of antibiotics should be kept under supervision, should be given in appropriate doses for an appropriate period of time.

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