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A STUDY ON AEROBIC BACTERIAL ISOLATES FROM PATIENTS SUFFERING FROM SYMPTOMATIC URINARY TRACT INFECTION

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ABSTRACT

- **BACKGROUND**: Urinary tract infection (UTI) is one of the most important causes of morbidity in the general population and is the second most common cause of hospital visits. UTI is the most frequent bacterial infections in women. They occur most frequently between the ages of 16 and 35 years. 10% of women getting an infection yearly and more than 40–60% having an infection at some point in their lives. Urinary tract infection occurs four times more frequently in females than males. Recurrences are common, with nearly half of people getting a second infection within a year.

- **MATERIALS AND METHODS:** A total number of 312 Mid stream urine (MSU) specimens received aseptically in the Microbiology laboratory for a period of one year from November 2015 to October 2016.All the specimens were subjected to culture on Blood agar and MacConkey agar and were incubated overnight at 37°C aerobically. The isolated organism was identified by colony morphology, Gram stain and biochemical reactions using standard techniques. All the isolated bacteria were subjected for antimicrobial sensitivity testing on Mueller Hinton agar using the disc diffusion technique.

- **RESULTS:** In the present study, Escherichia coli (52.43%) was the most common pathogen followed by Klebsiella spp (24.27%). The other organisms isolated were Staphylococcus aureus (12.62%), Pseudomonas aeruginosa (3.89%), Enterococcus faecalis (4.85%), Proteus vulgaris (1%) and Coagulase negative Staphylococcus (1%). Uropathogens in the present study showed higher susceptibility to Amikacin (81.6%) and the other antimicrobial susceptibility were Netlimicin (79.6%), Gentamicin (65%), Ofloxacin (51.5%). Nalidixic acid (6.8%) was least active against uropathogens in the present study and the other antibiotics that were resistant included, Cefaclor (90.3%), Cefadroxil (87.4%), Cefuroxime (85.4%). The isolation rate of uropathogens was 33.22% and higher female preponderance (58.25%) was observed in the present study.

- **CONCLUSION:** UTI still remains a worldwide therapeutic problem, not only as a nosocomial disease, but also as a community-acquired infection. Antimicrobial resistance of uropathogens has increased worldwide. Knowledge of local prevalence and antimicrobial resistance patterns among urinary bacterial isolates is important in guiding the clinicians for appropriate empirical therapy of UTI before the culture report is ready.

KEYWORDS: Antimicrobial Sensitivity, Empirical Therapy, Microorganisms, Urinary Tract Infection

INTRODUCTION

Urinary tract infection (UTI) is one of the most important causes of morbidity in the general population, and is the second most common cause of hospital visits[1]. UTI are the most frequent bacterial infections in women[2].They occur most frequently between the ages of 16 and 35 years[3]. 10% of women getting an infection yearly and more than 40–60% having an infection at some point in their lives[4]. Recurrences are common, with nearly half of people getting a second infection within a year. Urinary tract infections occur four times more frequently in females than males[3]. Rates of asymptomatic bacteriuria increase with age from 2%-7% of women of childbearing age to as high as 50% in elderly women in care homes[5]. Asymptomatic bacteriuria occurs in 2% to 10% of pregnant women[6]. Around 50-60% of women will develop a UTI in their lifetime[7]. Acute uncomplicated UTI and acute pyelonephritis are very common infections affecting many women throughout their lives[8]. UTI may affect 10% of people during childhood[3]. Among children urinary tract infections are the most common in uncircumcised males less than three months of age, followed by females less than one year[9].

UTI is mostly caused by gram negative aerobic bacilli of enterobacteriacieae group found in Gastrointestinal tract, which are Escherichia coli, Klebsiella, Enterobacter, Citrobacter, Proteus and Serratia species. Other common pathogens include Staphylococcus epidermidis, Staphylococcus saprophyticus and Enterococcus species which presumably result in UTI following colonization of the vagina or perianal skin. Less common organism such as Gardenella vaginalis, Mycoplasma species and Ureaplasma urealyticum may infect patients with intermittent or indwelling catheters[10].

Estimates of frequency among children, however vary widely. In a group of children with fever, ranging in age between birth and two years, 2 to 20% were diagnosed with UTI [9]. The urinary tract has several defense mechanisms to prevent infection. The points where the ureters attach to the bladder act like one-way valves to prevent urine from vesicoureteral reflux and continuous flow of urine washes away microbes out of the body. In men, the prostate gland produces secretions that inhibit bacterial growth. In both male and females various immune defense mechanisms also prevent infection. Despite so many safeguards, infections still do occur. Certain bacteria have a strong capability to attach themselves to the lining of the urinary tract.

For anatomical reasons women are especially prone to UTI. The female urethra is shorter, allowing bacteria quicker access to the bladder and urethral opening is near sources of bacteria from the anus and vagina. UTI in men is not as common as in women but can be of serious nature when it occurs. An attempt was made in the present study to evaluate the prevalence of aerobic bacterial isolates and their antimicrobial sensitivity pattern in a teaching hospital of semi urban setup.

MATERIALS AND METHODS

A total number of 312 Mid stream urine (MSU) specimens received aseptically in the Microbiology laboratory for a period of one year from November 2015 to October 2016. All the specimens were subjected to culture on Blood agar and

MacConkey agar and were incubated overnight at 37°C aerobically. The isolated organism was identified by colony morphology, Gram stain and biochemical reactions using standard techniques[11]. All the isolated bacteria were subjected for antibiotic sensitivity testing on Mueller Hinton agar using disc diffusion technique[12].

RESULTS

Out of 312 urine samples, 103 samples were culture positive. The mean age was 49.3 and the standard deviation was 18.9. Culture positivity was higher (20.2%) in the age group between 51-60 years, followed by above 60 years (19.2%). Table: -1

Out of 103 culture positive patients, 43 were males (41.74%) and 60 were females (58.25%). In both sexes, Escherichia coli was the most common organism isolated (52.43%) followed by Klebsiella pneumonia 24. 27%, Staphylococcus aureus12. 62%, Enterococcus faecalis4. 85%, Pseudomonas aeruginosa 3.89%, Proteus vulgaris 0.97% and Coagulase negative Staphylococcus 0.97% were isolated. Table: -2

Amikacin was the most effective antimicrobial agent (81.6%) followed by Netilmicin (79.6%) Gentamicin (65%), and Ofloxacin (51.5%). And most of the isolates are resistant to Nalidixic acid (93.2%). Table: -3

DISCUSSION

Urinary tract infection (UTI) is one of the most common infectious diseases seen in the community. Empirical antibiotic therapy is usually given for which knowledge of the common uropathogens and their susceptibility to commonly used antibiotics is needed. Treatment becomes even more challenging in the presence of risk factors such as advanced age, morbidity and immunosupression[13]. Poor patient compliance and incomplete course of antibiotic therapy have resulted in the evolution of resistance to many of these antibiotics. Various studies done worldwide have shown changing patterns in the etiology of UTIs[13]. The present pattern of the uropathogens and their susceptibility to various antibiotics are essential to formulate guidelines for the empirical treatment of UTIs while waiting for culture sensitivity report.

In the present study, Escherichia coli (52.43%) where the most common pathogen followed by Klebsiella (24.27%) and it was consistent with studies done by Akram M et al. [14], Chiu CC, et al. [15], Bhuvanesh SK, et al., [16] Banerjee S, et al. [17]. The other organisms isolated were Staphylococcus aureus (12.62%), Pseudomonas aeruginosa (3.89%), Enterococcus faecalis (4.85%), Proteus vulgaris (1%) and Coagulase negative Staphylococcus (1%). Uropathogens in the present study showed higher susceptibility to Amikacin (81.6%), and was comparable to studies of Mohammad MA et al.[18]. The other antibiotics susceptible were Netlimicin (79.6%), Gentamicin (65%), Ofloxacin (51.5%). Nalidixic acid (6.8%) was least active against uropathogens in the present study and was comparable to studies of Odongo CO et al.[19], Okinda NA et al.[20] and the other antibiotics that were resistant included, Cefaclor (90.3%), Cefadroxil (87.4%),Cefuroxime (85.4%).The isolation rate of uropathogens was 33.22% and is consistent with the studies of Bhuvanesh SK et al.[16], Al Benwan K et al.[21] and Haber N et al.[22]. Higher female preponderance (58.25%) was observed in the present study and is comparable to studies of Okinda NA, et al. [18] and Akram M et al. [12].The present study provides an important data of uropathogens and their antimicrobial susceptibility among the causes of symptomatic UTI in the surrounding area. The limitations of the present study were that it was laboratory based and limited to the cases for which cultures were requested from the hospital.

CONCLUSIONS

UTI still remains a worldwide therapeutic problem, not only as a nosocomial disease, but also as a community-acquired infection. Antibiotic resistance of uropathogens has increased worldwide. Knowledge of local prevalence and antimicrobial resistance patterns among urinary bacterial isolates is important in guiding the clinicians for appropriate empirical therapy of UTI before the culture report is ready.

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APPENDICES

Table 1: Age-Wise Distribution of the Isolates

Age in Years	Number of Samples (n=312)	Percentage
≤ 10	12	3.8
11-20	28	9.0
21-30	58	18.6
31-40	45	14.4
41-50	46	14.7
51-60	63	20.2
>60	60	19.2
Total	**312**	**100.0**

Table: 2 Sex-Wise Distributions of the Isolates

Isolated Growth	Sex				Total (n=103)	
	Male (n=43)		Female (n=60)			
	Isolates Number	%	Isolates Number	%	Isolates Number	%
Coagulase Negative Staphylococcus (CoNS)	0	0	1	2	1	0.97
Staphylococcus aureus	5	12	8	13	13	12.62
Enterococcus faecalis	2	5	3	5	5	4.85
Escherichia coli	19	44	35	58	54	52.43
Klebsiella pneumonia	14	32	11	18	25	24.27
Proteus vulgaris	1	2	0	0	1	0.97
Pseudomonas aeruginosa	2	5	2	3	4	3.89
Total	43	100	60	100	103	100

Table 3: Antimicrobial Sensitivity Pattern of the 103 Isolates

		Sex				Total	
		Male		Female			
		Number	%	Number	%	Number	%
AN	R	7	16.3	12	20	19	18.4%
	S	36	83.7	48	80	84	81.6%
CD	R	39	90.7	51	85	90	87.4%
	S	4	9.3	9	15	13	12.6%
CFC	R	41	95.3	52	86.7	93	90.3%
	S	2	4.7	8	13.3	10	9.7%
CFP	R	29	67.4	33	55	62	60.2%
	S	14	32.6	27	45	41	39.8%
CIP	R	31	72.1	38	63.3	69	67.0%
	S	12	27.9	22	36.7	34	33.0%
CR	R	41	95.3	47	78.3	88	85.4%
	S	2	4.7	13	21.7	15	14.6%
CTX	R	39	90.7	43	71.7	82	79.6%
	S	4	9.3	17	28.3	21	20.4%
G	R	16	37.2	20	33.3	36	35.0%
	S	27	62.8	40	66.7	67	65.0%
NA	R	42	97.7	54	90	96	93.2%
	S	1	2.3	6	10	7	6.8%
NET	R	10	23.3	11	18.3	21	20.4%
	S	33	76.7	49	81.7	82	79.6%
NR	R	35	81.4	46	76.7	81	78.6%
	S	8	18.6	14	23.3	22	21.4%
OX	R	24	55.8	26	43.3	50	48.5%
	S	19	44.2	34	56.7	53	51.5%

Note: AN-Amikacin, CD-Cefadroxil, CFC-Cefacclor, CFP-Cefperazone, CIP-Ciprofloxacin, CR-cefuroxime, CTX-Ceftriaxone, G-Gentamicin, NA-Nalidixicacid, NET-Netilmicin, NR-Norfloxacin, OX-Ofloxacin, S-Sensitivity and R-Resistant.