Biomedical & Pharmacology Journal Vol. **2**(1), 137-140 (2009)

Antibiotic resistance and sensitivity pattern of pathogenic bacteria isolated from urinary tract infected sample

V. P. ZAMBARE

P.G. Department of Biochemistry, New Arts, Commerce and Science College, Ahmednagar - 414 001 (India).

(Received: March 10, 2009; Accepted: April 29, 2009)

ABSTRACT

Urinary tract infection (UTI) represents one of the most common diseases encountered in medical practice today and occurring from the neonate to the geriatric age group. Despite the widespread availability of antibiotics, it remains the most common bacterial infection in the human being. Four s pathogenic bacteria as *Escherichia coli*, *Proteus* sp *Shigella* sp. and *Klebsiella* sp. were isolated from urine samples collected from pathology laboratory. Identification of these cultures was done o the basis of morphological and biochemical characteristics. *E. coli*, *Proteus* sp., *Shigella* sp. and *Klebsiella* sp. were resistance to 59, 68, 14 and 32% respectively.

Key words: Multiple antibiotic resistance; pathogenic bacteria; Urinary Tract Infections (UTI).

INTRODUCTION

Antibiotics are thought to be the final answer in the treatment of the infectious disease. However, the emergence of antibiotic resistant bacteria owing to mutation or transfer of drug resistant marker to other bacteria has had a profound effect. Most of the genetic determinants that confer resistance to antibiotics are located on plasmid or extracellular chromosomal elements.

Urinary tract infection represents one of the most common diseases encountered in medical practice today and occurring from the neonate to the geriatric age group (Kunin, 1994; Raju and Tiwari, 2004; Tambekar *et al.* 2006). The incidence of UTI is greater in women as compared to men who may be either due to anatomical predisposition or urothelial mucosa adherence to the mucopolysaccharide lining or other host factors (Schaeffer *et al.* 2001). *Escherichia coli* is the most frequent urinary tract pathogen isolated from 50 to 90% of all uncomplicated urinary tract infections as it is present in the gastrointestinal tract and provide a pool for initiation of UTI (Steadman and Topley, 1998; Raksha *et al,* 2003).

Antibiotic resistance is that situation when a particular *E. coli* has been reported (Asis *et al.* 2002). *Vibrio* strains isolated in Bombay have been reported to be resistant to ampicillin strains are resistance to antibiotic has been reported (Rouahi *et al.* 1998)

Resistance may spread from one species to another (Graves *et al.* 1980). The product of mar operon, which was initially found in E. coli, cause the resistance to at least eight antibiotics and disinfectants (triclosan, quaternary ammonium compounds) possibly by decreasing the uptake

combined with increasing efflux. The mar operon was also found inside other enterobacterioceae: *Salmonella*, *Shigella*, *Kleibsiella*, *Citrobacter, Hafnia* and *Enterrobacter* sp. (Barbosa *et al.* 2000).

This study was designed to isolate pathogenic microorganisms from clinical samples. Antibiotic resistance and susceptibility pattern of these isolates was determined. The possible control measure against the development of antibiotic resistant strains is discussed.

MATERIAL AND METHODS

Urine sample collected from pathology laboratory. The media and antibiotic octa discs were purchased from Himedia laboratories (Mumbai).

Isolation of UTI microorganisms

With standard calibrated loop delivering 0.01 ml of urine was inoculated on Cysteine Lactose Electrolyte Deficient (CLED) agar and incubated aerobically at 37°C for 18-24 h. Four isolates were further processed for identification and antibiogram of bacterial pathogen.

Biochemical tests for bacterial identification

Biochemical tests carried out were indol production, methyl red, Voges Praskaeur, citrate utilization, glucose, lactose, sucrose fermentations, urease produciton, nitrate reduction and H_2S production as per Bergey's Manual of Systematic Bacteriology (Krieg and Holt, 1984).

Antibiogram

A loopful of 24 h old culture was placed

Table 1: Phenotypic and biochemical characteristics of UTI microorganisms

Test		Isolates			
		V1	**V2**	**V3**	**V4**
Phenotypic Characteristics					
1	Size (mm)	2	1	1	1.5
2	Shape	Circular	Circular	Circular	Circular
3	Color	Pink	Colorless	Colorless	Pink
4	Margin	Even	Even	Even	Even
5	Opecity	Translucent	Opaque	Translucent	Opaque
6	Consistancy	Smooth	Smooth	Smooth	Mucoid
7	Elevation	Convex	Convex	Convex	Convex
8	Gram nature	Negative	Negative	Negative	Negative
9	Motility	Motile	Motile	Non-motile	Non-motile
Biochemical Characteristics					
1	Indol production	+	-	-	-
2	Methyl Red (M.R.)	+	+	+	+
3	Voges- Praskaur (V.P.)	-	-	-	-
4	Citrate utilization	-	d	-	-
5	Glucose utilization	AG	AG	A	A
6	Lactose utilization	AG	-	-	A
7	Sucrose utilization	A	d	-	d
8	Urease production	-	+	-	-
9	Nitrate reduction	-	-	+	-
10	H_2S production	+	+	-	-
Bacteria identified		*E. coli*	*Proteus* sp.	*Shigella* sp.	*Klebsiella* sp.

(+) Positive test, (-) Negative test, (d) Intermediate test, (A) acid production, (AG) acid & gas production

atone end of the agar surface in petri dishes and spread uniformly it by sterile glass rod. Using sterile forcep, antibiotic octa-discs were placed on the nutrient agar medium. The petri dishes were incubated at 37^0C, for 24 h in an inverted position. Diameter of zone of inhibition around each antibiotic disc was recorded as sensitive and other has no inhibition was recorded as resistant.

RESULTS AND DISCUSSION

To identify the isolates obtained from urine sample of urinary tract infected patients were tested various morphological and biochemical character. According to the results of Table 1 the isolates V1, V2, V3 and V4are closely related to *E. coli*, *Proteus* sp., *Shigella* sp. and *Klebseilla* sp. respectively. Likewise many enterobacters were isolated and identified by Parvez *et al.* (2004).

The antibiogram of all four isolates is shown in Table 2. The *E. coli*, *Proteus* sp., *Shigella* sp. and *Klebsiella* sp. were resistance to multiple antibiotics used in this studies and showed 59, 68, 14 and 32% resistance respectively. Because of this enteropathogens have developed high-level resistance to first line agents used for empiric treatment of diarrhoea. Progressively increasing resistance to multiple antibiotics is a serious cause of concern (Taneja *et al.* 2004).

Table 2: Antibiotic sensitivity and resistance pattern for UTI microorganisms

S. No.	Antibiotics	Antibiotic code	Concentration (ug)	Isolates			
				E. coli	*Proteus* sp.	*Shigella* sp.	*Klebsiella* sp.
1	Cephotaxime	Ce	30	-	+	+	-
2	Cephalexin	Cp	30	+	+	+	-
3	Chloramphenicol	C	30	-	-	-	-
4	Furazolidone	Fr	50	-	-	-	-
5	Norfloxacin	Nx	10	+	+	-	+
6	Oxytetracyclin	O	30	+	-	-	-
7	Ampicillin	A	10	+	+	-	+
8	Carbenicillin	Cb	100	+	+	-	+
9	Co-trimazole	Cm	25	+	+	-	+
10	Gentamycin	G	10	+	+	-	-
11	Amikacin	Ak	30	-	-	-	-
12	Oxacillin	Ox	5	+	+	-	+
13	Cephoxitin	Cn	30	-	+	-	-
14	Ceftazidime	Ca	30	-	+	-	-
15	Ceftriaxone	Ci	30	-	-	+	-
16	Piperacillin	Pc	100	-	-	-	-
17	Cephalothin	Ch	30	-	-	-	-
18	Clindamycin	Cd	2	+	+	-	-
19	Erythromycin	E	15	+	+	-	-
20	Vancomycin	Va	30	+	+	-	-
21	Co-trimaxazole	Co	25	+	+	-	+
22	Nalidixic acid	Na	30	+	+	-	+
	% Resistance			59	68	14	32
	% Sensitive			41	32	86	68

-Sensitive, + Resistance

Most of isolated uropathogens showed multiple antibiotics resistance in this area. It may be due to large portion of the bacterial isolate being previously exposed to several antibiotics (Tambekar *et al.* 2006). The present study data gives idea about the common trend of increased antibiotics resistance of uropathogens. This data not only help in proper treatment of UTI patients but also discourage the indiscriminate use of antibiotics and prevent further development of bacterial drug resistance.

REFERENCES

1. Asis K., Das SC., Ramamurthy T., Sikdar A., Khanam J, Yamasaki S., Takeda Y. and Nair GB., Antibiotic resistance, virulence gene and molecular profile of Shiga toxin producing *Escherichia coli* isolated from diverse sources in Culcutta, India. *J. Clin. Microbiol.* **40**: 2009-2015 (2002).
2. Babosa T. and Levy SB., Differential expression of over 60 chromosomal genes in E. coli by constitutive expression of Mar-A. *J. Bacteriol.* **182**: 3467-3474 (2000).
3. Graves JF. and Riggs HG., Anaerobic transfer of antibiotic resistance from *Pseudomonas aeruginosa. Appl. Environ. Microbiol.* **40**: 1-6 (1980).
4. Kunin CM., Urinary tract infections in females. *Clin. Infect. Dis.* 18: 1-12 (1994).
5. Krieg NR. and Holt JG., Bergey's Manual of Systematic Bacteriology Volume 1. Williams and Wilkins, Baltimore (1984).
6. Parvez MKU., Hakim MA., Chowdhury DK. and Rahman MS., Study on antibiotic resistance by pathogenic bacteria isolated from clinical specimen. *Pak. J. Biol. Sci.* **7**(11): 2005-2008 (2004).
7. Raju CB. and Tiwari SC., Urinary tract infection – a suitable approach. Lecture notes. *J. Ind. Acad. Clin. Med.* **2**(4): 331- 334 (2004).
8. Raksha R., Shrinivasa H., Mawcaden RS., Occurrence and characterization of uropathogenic *Escherichia coli* in urinary tract infection. *Ind. J. Med. Microbiol*. **21**(2): 102-107 (2003).
9. Rouahi N., Zouhdi M., Zidouh A., Elyachioui M. and Mahjour J., Antibiotic resistance of Moroccan strains of *Salmonella enterotidis* isolated between 1996 and 1997. *East. Mediter. Health J.* **6**: 135-139 (1998).
10. Schaeffer AJ., Rajan N. Cao Q., Anderson BE., Pruden DL., Sensibar J., Duncan JL., Host pathogenesis in urinary tract infection. *Int. J. Antimicrob. Agentts,* **17**: 245-251 (2001).
11. Steadman R. and Topley N., The virulence of *Escherichia coli* in urinary tract, Chapter 3. In: Urinary tract infection. 1st Ed. Chapman and Hall publication, London. 37-41 (1998)..
12. Tambekar DH., Dhanorkar1 DV., Gulhane1 SR., Khandelwal1 VK. and Dudhane MN. Antibacterial susceptibility of some urinary tract pathogens to commonly used antibiotics. *Afr. J. Biotechnol.* **5**(17): 1562-1565 (2006).
13. Taneja N., Mohan B., Khurana S. and Sharma M., Antimicrobial resistance in selected bacterial enteropathogens in north India. *Ind. J. Med. Res.* **120**: 39-43 (2004).