

Prevalance Of Antibiotic Resistant Isolates Of E.coli From Urine Samples

A. Paritha bhanu and C. Vijayan



ABSTRACT

Urine samples were collected from urinary tract infected patients of different age groups of both sexes. *E.coli* isolates were characterized and identified in the urine samples followed by isolation of biofilm – forming and β –lactamase – producing strains. Of 173 samples, 35 isolates (47.94 %) were recorded to be *E.coli* in different age groups of males and females. Nearly 80 % of the strains were found to be biofilm producers with high occurrence in age groups of 21 – 30 and above 60 years of males and 31 – 40 and 41 – 60 groups of females. Again, 51 - 40 %isolates exhibited capability of β – lactamase production. The results were discussed with appropriate literature.

Keywords:

E.coli strains, β – lactamase, Urinary tract infection (UTI) and Extended – Spectrum Beta Lactamases (ESBLs).

Introduction

Urinary tract infection (UTI) is a serious health problem that affect millions of people every year throughout the world. The normal urine is usually sterile and is free from bacteria, viruses and fungi. The urinary infection occurs when the microorganisms especially bacteria cling to the opening of the urethra and begin to multiply. A number of bacterial species like *Escherischia coli*, *Streptococcus*, *Staphylococcus*, *Proteius*, *Klebsiella*, *Pseudomonas*, *Micoplasma*, etc. are found to cause urinary tract infections in humans (Kalaiselvi and Padmavathi (2014)). Among them, most of the infections are caused by *E.coli* which are normally found in the colon of man.

All UTIs are treated by a variety of antibiotics depending on the nature of infection and type of patient. Thus the administration of antibiotics is the most effective treatment strategy in UTI. However, multiple antimicrobial resistances among the gram negative organisms have been a long term and well recognized problem. The mechanism of antibiotic resistance may vary ranging from intrinsic impermeability to acquired resistance involving plasmids, transposons and mutations as reported by Otajevwo (2012).

Cladiavatto *et al.*, (2014) have shown that the antibiotic resistance in microbes is mainly due to acquisition of plasmid and a single plasmid has the property of multidrug resistance (MDR). In microorganisms, Extended – Spectrum Beta Lactamases (ESBLs) are the major causatives of resistance to the antibiotics (Sibhghatulla Shaikh *et al.*, 2015). The ESBLs are mostly plasmid – mediated bacterial enzymes which are able to hydrolyse a wide variety of antibiotics. At present, the bacteria *E.coli* are found to possess the ESBLs enormously which make them to be resistant strains.

In the present study, the *E.coli* strains are characterized, identified in the urine samples of affected patients followed by isolation of biofilm – forming and β –lactamase - producing strains.

A. Paritha bhanu and C. Vijayan

From

P.G.and Research Department of
Zoology, Chikkaiah Naicker College,
Erode , Tamilnadu, India.

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Materials and methods

Persons suffering from urinary tract infection belonging to different age groups (8-10, 11 – 20, 21 – 30, 31 – 40, 41 – 60 and above 60) of opposite sexes from hospitals in and around Nammakal (Tamilnadu) were selected in the present study. A total of 35 urine samples were collected from them each in 10 ml sterile plastic bottles. The samples were properly labeled and were transported in cooler boxes to the laboratory within 4-6 hours of collection.

The primary identification of the bacterial isolates was made based on colonial appearance and pigmentation. Characterization and identification of *E.coli* isolates were done by using the methods of Cowan (1985), Fawole and Oso' (1988) and Cheesbrough (2004).

The biofilm – forming *E.coli* strains were isolated by adopting the method of Mathur (2006).

Betalactamase production was assayed using the method given by lateef (2004). The results obtained were tabulated and discussed.

Results and Discussions

In the present study, out of 73 samples, 35 isolates (47.94 %) are being evaluated to be the strains of *E.coli*. Maya et al. (2011) have also found that *E.coli* are the predominant uropathogens among the isolated organisms. A higher incidence of *E.coli* has been found in females (50 %) followed by males. The overall results indicate that the 41 – 50 age groups of both sexes exhibit the highest occurrence of *E.coli* (table 1). These observations are in agreement with the report of Olivier Tenaillon et al (2010). In the present investigation, the age groups 11 – 20 of opposite sexes do not show any prevalence of *E.coli* whereas the age groups 41 – 60 exhibit highest incidence. The reason for these differences could be attributed to poor hygienic conditions, lack of educations and improper hygienic practices.

Among the isolated *E.coli*, 80 % are found to be biofilm producers. In this study, biofilm - producing *E.coli* are absent in the age groups of 0 – 10 and 11 – 20 years. Among the five types of age groups, higher occurrence of biofilm formation is evident in age groups 21 – 30 and above 60 in males and 31 – 40 and 41 – 60 groups in females (Table 2). According to Rajesh *et al.* (2009), biofilm formation makes the strains to persist for a long time in the urinary tract, interfere with bacterial eradication and initiate colonization and dispersion of pathogenic bacteria inside the host leading to blood stream infection. It is also reported that the biofilm is responsible for antibiotic resistance in microbes (Saravanamurugan *et al.*, 2011).

Among the 35 samples, nearly 51.4 % isolates are recorded to produce β – lactamases (Table 3). Damien Dubois *et al.* (2009) have reported that the β – lactamase production has been significantly increased in recent times in Enterobactors particularly *E. coli* in several countries. As the plasmid – mediated ESBLs are predominant cause for the resistance in gram negative bacteria, the ESBL positive bacteria may lead to out breaks or to endemics (Deepti 2010).

In short, the biofilm – producing isolates are very difficult to treat because they are highly resistant to antibiotics so that they pose serious threat and challenge to health care professionals as also opined by SaravanaMurugan et al. (2011).

Table 1.Prevalance of *E.coli* from Urine samples.

S.No	Sex	Age groups						% of occurrence	Total % of occurrence
		0-10	11-20	21-30	31-40	41-60	Above 60		
1	Male	1/1(100%)	-	2/3(66.66%)	0/5(-)	9/18(50%)	2/4(50%)	45.16	47.55
2	Female	-	0/1(-)	2/5(40%)	5/11(45.4%)	13/20(65%)	¼ (25%)	50	

Table 2.Prevalance of biofilm – producing *E.coli* from Urine samples.

S.No	Sex	Age groups						% of occurrence	Total % of occurrence
		0-10	11-20	21-30	31-40	41-60	Above 60		
1	Male	0/1(0%)	-	2/2(100%)	(-)	7/9(77.7%)	2/2(100%)	46.2	40.9
2	Female	(-)	0/1(0%)	1/2(50%)	4/5(80%)	11/13(84.6%)	0/1(0%)	35.7	

Table 3. β - Lactamase – producing strains of *E.coli*.

No	Strain No.	β - Lactamase test
1	E - 2	+
2	E - 4	+
3	E - 6	-
4	E - 9	-
5	E - 11	+
6	E - 21	+
7	E - 23	-
8	E - 24	+
9	E - 25	-
10	E - 29	+
11	E - 33	+
12	E - 34	-
13	E - 35	+
14	E - 36	-
15	E - 37	+
16	E - 39	-
17	E - 40	-
18	E - 41	+
19	E - 42	+
20	E - 44	+
21	E - 45	+
22	E - 46	-
23	E - 48	-
24	E - 49	+
25	E - 50	+
26	E - 51	-
27	E - 52	+
28	E - 53	+
29	E - 62	-
30	E - 64	-
31	E - 66	-
32	E - 67	-
33	E - 68	+
34	E - 71	-
35	E - 73	-

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