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PREVALENCE, RISK FACTORS AND ANTIBIOTIC RESISTANCE OF *E. COLI* ISOLATED FROM URINARY TRACT INFECTION IN PREGNANT FEMALES

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ABSTRACT

The present study deals with the isolation of *E. coli* causing Urinary Tract Infection among pregnant women, its antibiotic resistance pattern and to find the association between the risk factors contributing towards the occurrence of infections. A total of 300 urine samples were collected from pregnant ladies visiting for their antenatal checkup in different hospitals of Lahore. Details of patients regarding age, socioeconomic status, personal hygiene, previous history of Urinary Tract Infection, trimester of pregnancy, habit of retaining urine, history of diabetes, history of catheterization, history of symptoms of Urinary Tract Infection and frequency of sexual activity were noted. Bacteria were isolated and biochemically identified. Antibiotic sensitivity pattern of *E. coli* was tested by using Kirby Bauer disc diffusion method. Out of 300 urine samples, 69 showed positive growths for *Escherichia coli* and it was the most common pathogen. The prevalence of Urinary Tract Infection was 23%. *E. coli* showed 73.91%

resistance to doxycycline and maximum sensitivity to imipenem 84.05%. It was observed that pregnant females were more prone to Urinary Tract Infection in 2nd trimester followed by 1st and 3rd trimester of pregnancy.

Keywords: Urinary tract infection, *Escherichia coli,* Antibiotics, Risk factors in pregnancy

INTRODUCTION

Infections of urinary tract are a severe health problem affecting millions of people every year and are the top most source of Gram-negative bacteremia. UTIs are also the principal cause of indisposition and health care outflows in persons of all age groups. UTI has turn into, the most shared hospital-acquired infection accounting for about 35 % of nosocomial infections [1]. In developing countries, like other major infectious diseases, infections of urinary tract are frequently met diseases by clinicians with predictable annual global prevalence of at least 250 million [2]. Numerous reports have recommended that UTI can occur in both females and males of any age group [3]. Except at extremes of life, females are however supposed to be more frequently affected in comparison to males [4].

During pregnancy urogenital symptoms are seen in nearly all females [5]. Several risk factors increase the chances of urinary tract infection like age, sex, kidney stones, pregnancy, catheterization, tumors, acquired /congenital anomalies of bladder, neurological diseases, suppressed immune system, vesico-ureteric reflex, diabetes mellitus and ureteric stresses. In females, bacterial contamination of urethra increases due to sexual activity [3]. The anatomical relationship of vagina and urethra predispose it to trauma during sexual intercourse and during pregnancy or child birth bacteria may be massaged up the urethra and reaches the bladder [6]. The use of spermicides and diaphragms, short urethra and delay in micturition in females increases the chances of UTIs [7]. UTI is also commonly observed in diabetic patients. Diabetes mellitus amends the genitourinary system and can cause UTI [8]. Physicians and microbiologists frequently use molecular characterization to provide indication of genetic similarity as assistance in the epidemiological investigation of infectious diseases [9].

The present study was designed to check the incidence of UTI caused by *E. coli*, its antibiotic resistance pattern and to find the association between the risk factors contributing towards the occurrence of infections. The study was also conducted to

compare the incidence of Urinary Tract Infection during different trimesters of pregnancy.

MATERIALS AND METHODS

Collection of samples

A total of 300 samples of urine from pregnant women were collected from public Hospitals of Lahore city. After instructing the pregnant females, mid-stream, clean catched urine samples were collected in sterilized wide mouth containers.

Assessment of risk factors

After taking the consent from the pregnant women, a questionnaire was filled by interviewing the pregnant women for the assessment of risk factors.

Processing of samples

All the samples were cultured under strict aseptic conditions. The urine samples were thoroughly mixed. After this, by using calibrated wire loop (0.001 ml) urine samples were inoculated on CLED agar. The plates were incubated at 37ºC for 24-48 hours and growth was examined. In order to isolate pure growth, colonies were picked up and sub cultured on MacConkey agar and blood agar. The isolated colonies were identified initially by colony characteristics, Gram staining and biochemical tests such as catalase, oxidase, indole production, methyl red and VP tests.

Antimicrobial susceptibility testing

The antibiotic sensitivity was done by using Kirby Bauer disc diffusion method described by [10]. Mueller Hinton agar (oxide) is a microbiological growth media that is commonly used for antibiotic susceptibility. Commonly available antibiotic discs that were prepared by the Difco laboratories of USA were used. The discs used were ciprofloxacin, levofloxacin, imepenem, gentamicin, augmentin, ceftriaxone, doxycycline, ampicillin, cefotaxime, amikacin, cotrimoxazole and nitrofurantoin. These discs were placed in the refrigerator so before use these were placed at room temperature for about 1-2 hours, to reduce chances of water condensation.

Statistical analysis

Statistical analysis of the data was done by using SPSS version 15.0 and chi-square tests were performed.

RESULTS AND DISCUSSION

Out of the total 300 urine samples, 23% cultures were positive for *E.coli.*It was also reported by Ebie *et al* that*E. coli* is most communal microorganism in rectal and vaginal area and high incidence of UTI might be due to poverty, unawareness and inadequate access to drugs [11]. Among 23% isolates, 50.72 % were resistant to Ampicillin, 53.62 % to Augmentin, 73.91 %

to Doxycycline, 11.59 % to Ciprofloxacin, 15.94 % to Levofloxacin, 42.02 % to Cefotaxime, 62.31% to Ceftriaxone, 8.69 % to Nitrofurantoin, 2.89 % to Imipenem, 49.27 % to Cotrimoxazole, 30.43 % to Gentamicin and 13.04 % were resistant to Amikacin (Table 1). These findings are similar to the findings of Taiwon and Aderounmu [12].

Kolawole *et al* [13] repoted that during pregnancy, functional and structural changes make difficult to maintain personal hygiene so the chances of UTI caused by *E. coli* increases. Age distribution of females in which *E. coli* growth was detected shows that there were 13 females in the age group of 18-23 year age group, 21 females were in the age group 24-38 years, 26 were in the age group of 29-33 and only 9 females were in the age group of 34-38 years respectively. P-value was adjusted to <0.05. According to p-value significant association was present between growths of organism in relation to age groups. i.e. (p-value=0.000) It was observed that growth of *E. coli* was high on the basis of percentage among 29-33 years of age group. Socioeconomic status had no significant relationship with the growth of *E. coli* in this study i.e. (p-value=0.396). The findings of Olusanya*et al* [14] suggested that incidence of UTI is high in developing countries as level of poverty is high in these countries. Previous history of UTI was also asked from these females. Females in which *E. coli* growth was observed among them 43 had previous history of UTI. In terms of p-value significant relation was present between previous history of UTI and growth of *E. coli.* i.e. (p-value=0.000). Sheikh *et al* [15] suggested that the presence of resistant strain might be the cause of UTI in patients having previous history of UTI. The frequency of UTI was high during 2nd trimester. Trimester and growth of *E. coli* was also significantly associated i.e. (p-value=0.000). Olusanya *et al* [14] repoted that various changes like uretheral dilatation, decreased concentration of urine, decreased tone, hormonal changes and increased stasis increases the risk of UTI in this trimester. Habit of retaining urine, diabetes and history of catheterization also had a significant association with *E. coli* growth. It was suggested by Sader *et al* [16] that poor glycemic control in diabetics increases capability of *E. coli* adherence. Bootsma *et al* [5] reported that during pregnancy plasma volume increases physiologically and urine volume decreases so about 70 % pregnant females develop glycosuria resulting in growth of bacteria in urine. Sexual activity was not significantly associated with growth results of *E. coli*. On the basis of presence

and absence of symptoms of Urinary tract infection, 33.33 % patients were symptomatic and 66.66 % were asymptomatic. No significant association was seen between symptoms and UTI in our study. So symptoms were not a risk factor for UTI. These findings are similar to the findings of Schieve *et al* [17]. Patients were distributed on the basis of their personal hygiene during this study. It was observed that among 69 patients who showed positive cultures for *E. coli,* 40.57 % patients were those whose personal hygiene was satisfactory and 59.42 % were those whose personal hygiene was unsatisfactory. Statistically personal hygiene was not a significant variable for UTI in our study. Sharma *et al* [18] suggested that poor hygienic conditions increase the chances of contamination because *E. coli* is commonly present in our environment (Table 2).

Table 1: Drug resistance pattern of *Escherichia coli* isolates.

Sr. no	Antibiotics	Code	Drug resistance pattern					
			Sensitive		Intermediate		Resistant	
			No	%age	No	%age	No	%age
1	Ampicillin	AMP	13	18.84	21	30.43	35	50.72
2	Augmentin	AMC	9	13.04	23	33.33	37	53.62
3	Doxycycline	DOX	7	10.14	11	15.94	51	73.91
4	Ciprofloxacin	CIP	43	62.31	18	26.08	8	11.59
5	Levofloxacin	LEV	39	56.52	19	27.53	11	15.94
6	Cefotaxime	CTX	27	39.13	13	18.84	29	42.02
7	Ceftriaxone	CRO	20	28.98	6	8.69	43	62.31
8	Nitrofurantoin	N	52	75.36	11	15.94	6	8.69
9	Imipenem	IMP	58	84.05	9	13.04	2	2.89
10	Cotrimoxazole	SXT	12	17.39	23	33.33	34	49.27
11	Gentamicin	GEN	41	59.42	7	10.14	21	30.43
12	Amikacin	AMK	39	56.02	21	30.43	9	13.04
	Total isolates of *E. coli*= 69							

Table 2: Risk factors associated with UTI caused by *E.coli.*

Variables		Culture Sensitivity (Growth)	
		E. coli	No. Growth
		69	183
Age Groups	18-23	13	36
	24-38	21	34
	29-33	26	56
	34-38	9	57
Socioeconomic Status	Poor	31	67
	Middle	22	74
	Upper	16	42
Previous UTI History	Yes	43	26
	No	26	157
Trimester	1st	21	66
	2nd	36	45
	3rd	12	72
Habit of Retaining Urine	Yes	27	33
	No	42	150

Diabetes	**Yes**	**18**	**21**
	No	**51**	**162**
History of Catheterization	**Yes**	**43**	**26**
	No	**26**	**157**
Symptoms	**Yes**	**23**	**60**
	No	**46**	**123**
Personal Hygiene	**Satisfactory**	**28**	**58**
	Unsatisfactory	**41**	**125**
Sexual Activity	**Low**	**12**	**48**
	Moderate	**22**	**67**
	High	**35**	**68**

CONCLUSION

Special attention to the pregnant women is one of the most important points in health care system. Pregnancy enhances the progression from asymptomatic to symptomatic bacteriuria, which could lead to different complications so early diagnosis and creation of awareness in pregnant females is very important. Thus urine culture and sensitivity should be performed as screening and diagnostic tool of UTI in pregnancy. It can be helpful not only in the selection of suitable drug but also reduces the increasing frequency of resistance in uropathogenic *E. coli*.

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