Occurrence of *Escherichia coli* in Patients with Urinary Tract Infections in Najaf City

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Abstract:

The study was designed to determine *E.coli* as etiological organism for UTI in some patients & its antibiotics sensitivity pattern. The urine samples suspected with bacteriuria were collected from 130 subjects. A total of 19 isolates from *E.coli* were diagnosed. Susceptibility testing for 13 antimicrobials was done. The results were analyzed statistically& showed that infection rate in females was higher than males (significant). Also infection rate in aged groups were significantly higher in 20-29 years ,& 30-39 years .Infection rate in urban individuals had complete ratio in contrast of rural individuals . Our data also revealed that infection rate in housewife women was the highest(significant),but it was the less in other jobs. The results of sensitivity test appeared that most of used antibiotics were unaffected on *E.coli* isolates with exception of amikacin ,meropenem ,& ciprofloxacin respectively. Since, cefoxitin was unaffected on all *E.coli* isolates absolutely.

تواجد الايشريكيه القولونية في المرضى المصابين بالتهابات المجاري البولية في مدينة النجف

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الخلاصة:

صممت الدراسة لتعيين الايشريكية القولونية ككائن مسبب لالتهاب المجاري البولية في بعض المرضى وفحص حساسية المضادات الحيوية لها. جمعت عينات الإدرار المشكوك بإصابته بالتهاب المجاري البولية من 130 مراجع. تم الحصول على 19 عزله من الايشريكية القولونية. اجري فحص الحساسية للعزلات اتجاه 13 مضاد حيوي. تم تحليل النتائج إحصائيا . أظهرت النتائج أن معدل الإصابة في الإناث كان أعلى من ما هو موجود في الذكور(معنوي)، كذلك كان معدل الإصابة معنويا في الفئات ألعمريه 20-29سنه و30-39 سنه. كذلك كان معدل الإصابة في الأفراد المدنيين عال جدا على العكس من القرويين، بينما كانت ربات البيوت أعلى معدل إصابة (معنوية) لكن كان اقل في المهن الأخرى.أظهرت نتائج فحص الحساسية أن المضادات الأكثر تأثيرا على جرثومة الايشريكية القولونية كانت الايمكاسين ثم الميروبينيم ثم السبروفلوكساسين على التوالي في حين كان السفوكسيتين غير مؤثرا على الجرثومة مطلقا.

Introduction:

Urinary tract infections (UTIs)are the most common bacterial infections worldwide. Approxemat-ely 150 million cases of these infections are diagnosed per year , representing an annual expenditure of up to 6 billion dollars (1).UTIs are among the most infections in both community & hospital settings,& knowledge of its epidemiology & the sensitivity profile of the etiological agent is crucial (2).The predominance of Gram-negative sepsis, usually Enterobacteriaceae & particularly, *E.coli,* remains the principle pathogen causing UTI, accounting for 75-90 % of all UTIs in both inpatients & outpatients (3&4).There are more than 7 millions uncomplicated UTIs per year in the United States (5). In Iraq , some physicians & pharmacists , at large, give antibiotics without isolation & susceptibility test to pathogens. Therefore, the current study aims to identify of *E.coli* in patients with UTIs & its drugs resistance.

Materials & Methods:

The urine samples suspected with bacteriuria (one plus of pus or more , or one plus of RBCs or more, or both pus & RBCs in the same sample) were collected from 130 subjects in Al-Sader Teaching Hospital from OCT.2010 to JAN.2011. The information included : gender, age, residence, & job was taken from each subject (general urine examination).These samples were cultured on EMB agar (Himedia), macConkey agar (Acumedia) ,& blood agar (Mast). The isolates were identified according to MacFaddin(6)& Holt et al.(7).The susceptibility of *E.coli* isolates toward thirteen antibiotics was carried out by using the disc diffusion method as described by Bauer et al.(8) & the results were interpreted according to the NCCLS (9). The data were analyzed by x square & anova test.

Results & Discussion:

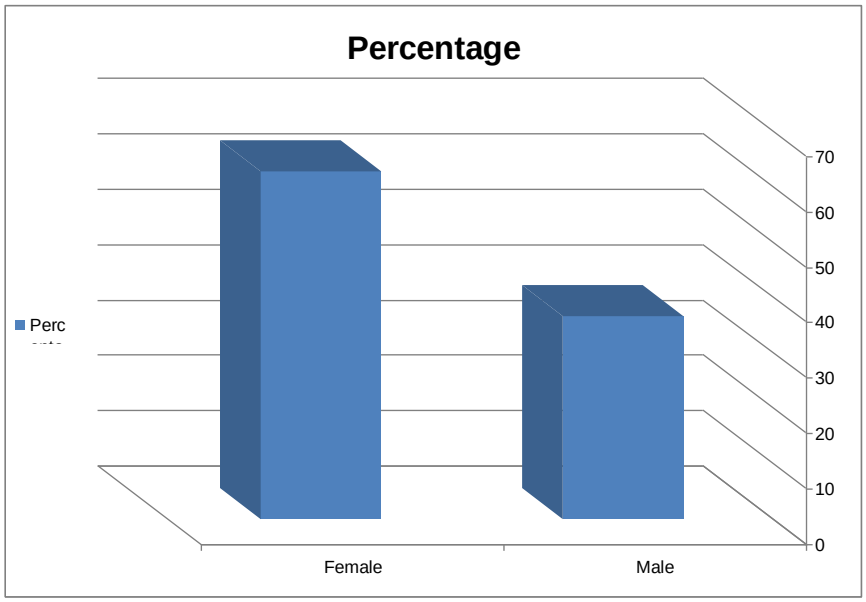
From 130 subjects ; 86 subjects were negative, while 44 of them were positive. A total of 19 *E.coli* isolates were recovered from patients with UTIs, whereas 25 patients were infected with other microbes. We focused in this study on patients infected with *E.coli* only (table1).

Table 1 : Incidence of microorganisms isolated from patients suspected with UTI.

Types of microorganisms & no growth of microorganisms	No.
E . coli	19
Other micobes	25
No growth	86
Total	130

Fig. 1 shows that infection rate in females (63.2%) was significant higher than males (36.8%). Our study sure previous studies about this high infection in women such as: Nakhjavani & coworkers (10), Zaria et al.(11), Khan & Zaman(12), Mehr et al.(13), Garcia- Morua et al.(14), Bashir & colleagues (15). Falagas et al.(16), & Uzunkovic (17). Uncomplicated UTI is a common clinical problem in women. Approximately one in three women will require antimicrobial treatment for UTI& 50% of women will have a UTI during their lifetime(18). The significant differences in UTI rates between females & males are believed to be due to physiological & anatomical variations between the genders. Increase of UTI in women may be resulted from sexual activity.

Jender	**Percentage**
Male	36.8
Female	63.2

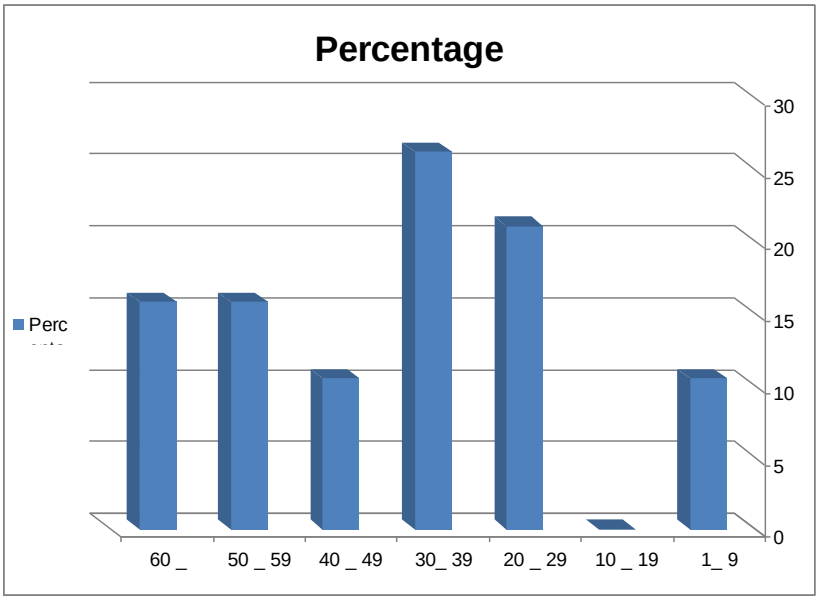


t = 3.3 Sign Female
P<0.05

Fig. 1: percentage of *E.coli* in both males & females .

Fig.2 reveals that infection rates in aged groups ranged from 10.5% in 1-9 year, 0% in 10-19 year, 21.1% in 20-29 year, 26.3% in 30-39 year, 10.5% in 40-49 year, 15.8% in 50-59 year,& 15.8% in 60 year. The ages 20-29 & 30-39 were significant but unexpected. Although infection may be endogenous but there is a possibility of infection being introduced from exogenous sources such as diagnostic or therapeutic instrumentation (11).

Ages	Percentage
1_ 9	10.5
10 _ 19	0
20 _ 29	21.1
30_ 39	26.3
40 _ 49	10.5
50 _ 59	15.8
60 _	15.8



X2 = 3.8 Sign 30 _ 39 , 20 _ 29
p<0.05

Fig.2: percentage of *E.coli* in aged groups

Fig. 3 exhibits that infection rate in urban individuals had complete ratio (100%) in contrast of rural individuals (0%). This result is unexpected, this may be due to difficult living circumstances in cities , environmental pollution with microbial, chemical,& physical contaminants. McLoughlin & Joseph (19) have indicated that prevalence of resistant organisms vary by geography, patients age, & hospitalization status.

Residence	**percentage**
Urban	100
Rural	0

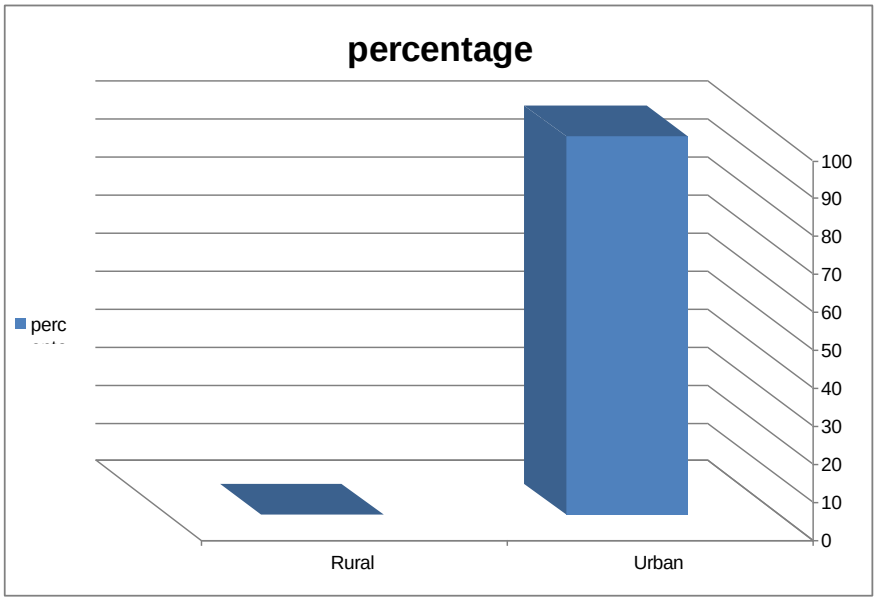
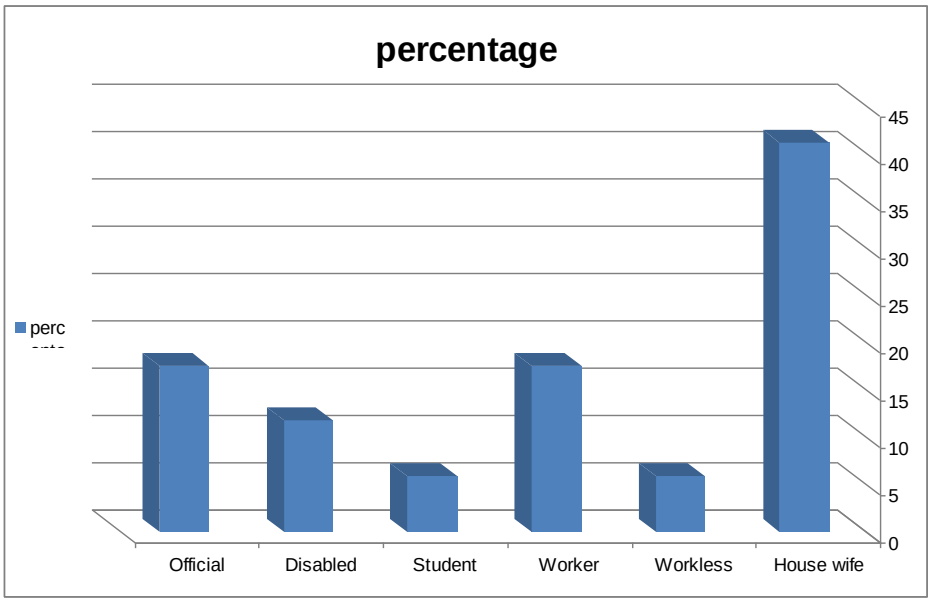


Fig. 3: : percentage of *E.coli* in both urban & rural patients

Fig.4 demonstrates that infection rate in housewife women was the highest 41.2%(significant), but it was the less in workless 5.9%, in workers 17.6%, in students 5.9% , in disableds 11.8%, & in officials 17.6%. We think that increased ratio in housewives may be attributed to low levels of education, public health negligence, unawareness, & poor sanitary measures.

Job	percentage
House wife	41.2
Workless	5.9
Worker	17.6
Student	5.9
Disabled	11.8
Official	17.6



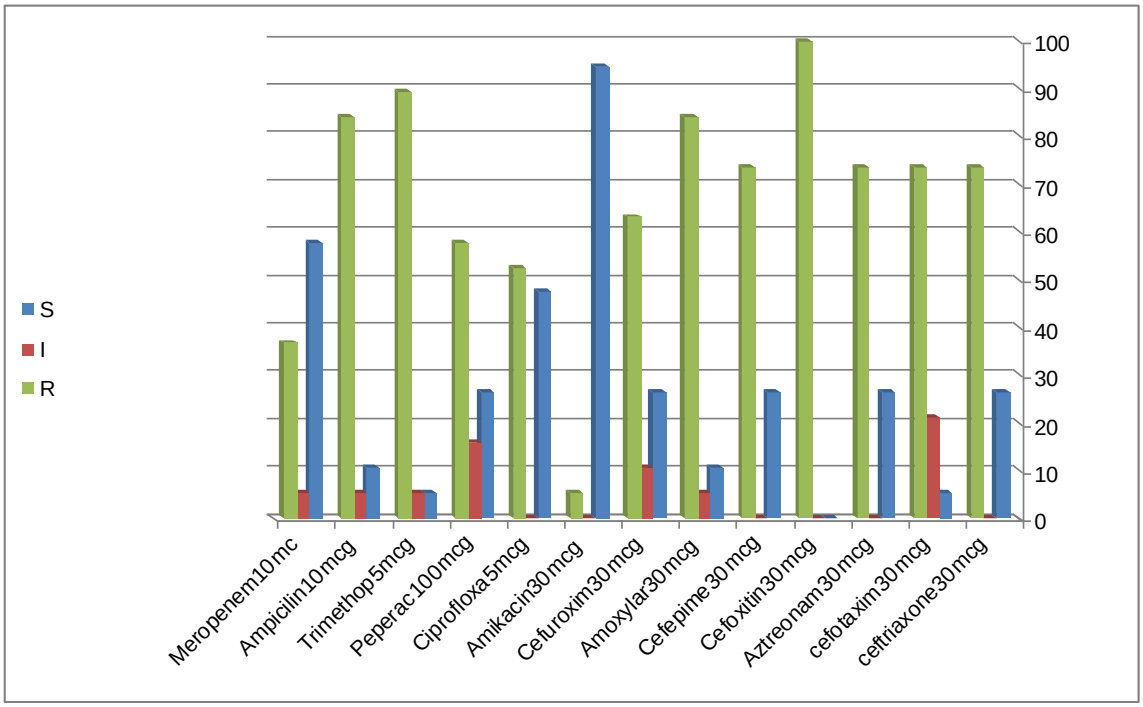
X2 = 4.1 Sign House Wife
P<0.05

Fig.4 : : percentage of *E.coli* in different jobs from patients

Fig 5 states that most of applied antibiotics in this study were unaffected on *E.coli* with exception of amikacin, meropenem,& ciprofloxacin respectively. Since, three drugs above were significant sensitive. Our results indicated that *E.coli* isolates were resistant (73.7%) to each of ceftriaxone, cefotaxime, cefepime, & aztreonam. 100% to

cefoxitin, 84.2% to each of amxyclav & ampicillin, 63.2% to cefuroxime axetil (oral), 5.3% to amikacin, 52.6% to ciprofloxacin, 57.9% to piperacillin, 89.4% to trimethoprim, & 36.8% to meropenem.

Antibiotics	S	I	R
ceftriaxone30mcg	26.3	0	73.7
cefotaxim30mcg	5.3	21	73.7
Aztreonam30mcg	26.3	0	73.7
Cefoxitin30mcg	0	0	100
Cefepime30mcg	26.3	0	73.7
Amoxylar30mcg	10.5	5.3	84.2
Cefuroxim30mcg	26.3	10.5	63.2
Amikacin30mcg	94.7	0	5.3
Ciprofloxa5mcg	47.4	0	52.6
Peperac100mcg	26.3	15.8	57.9
Trimethop5mcg	5.3	5.3	89.4
Ampicilin10mcg	10.5	5.3	84.2
Meropenem10mc	57.9	5.3	36.8



LSD = 2.14 Sign S Amik, Merop , Ciprof p<0.05

Fig 5 : Antibiotic susceptibility pattern

The current study appeared inefficacy of cefoxitin absolutely for all isolates. Our data agree with many previous studies in many regions in the world such as : Celen et al.(20), Mahesh et al. (21) who found that *E.coli* were sensitive (99% & 72.16%) to amikacin respectively. Rai et al. (23) also found in his study that *E.coli* were susceptible to amikacin. Khan & Zaman (12) reported that resistance of *E.coli* to ampicillin was high (90%). Also Nwadioha et al.(22) indicated that *E.coli* appeared resistance to ampicillin & sensitivity to ciprofloxacin. Zaria & coworkers (11) showed that *E.coli* were resistance to amxyclav, trimethoprim, & ampicillin, but they sensitive to ciprofloxacin. According to results of Bashir et al.(15), *E.coli* resist ampicillin(92%), trimethoprim (86%), ciprofloxacin (62%) , & amikacin(4%). Our results in accordance with results of Mehr et al.(13) who demonstrated that amikacin,& ceftriaxone affected 93.11%,& 19.2% on *E.coli* respectively. Nakhjavani et al.(10)& Garcia-Morua(14) were found that *E.coli* were sensitive to ciprofloxacin (59.8%)& (26%) respectively. There are some studies disagree with our study such as : Celen & colleagues(20) who pointed out that *E.coli* were sensitive to ampicillin(57.2%), 68% to amxyclav, 100% to meropenem, 90% to ceftriaxone & ciprofloxacin, 86% to cefuroxime oral. Ehinmidu(24) stated that *E.coli* were susceptible(93.75%) to ciprofloxacin, 3.12% to amikacin,& 50% to ampicillin. However, resistance to commonly used antibiotics, especially amoxicillin & trimethoprim, is rising (25).The increasing resistance of *E.coli* & *Klebsiella* sp. To penicillins & cephalosporins as a results of the production of extended spectrum B-lactamases is noteworthy (26). Continued exposure of bacteria to routine antibiotics used in the hospital consequently leads to development of resistant strains (27). We believe that antibiotics applying changes the vaginal flora & leads to colonization of genital tract with *E.coli* resulting in recurrent increased risk of UTI. Other risk factors associated with UTI such as use of spermicide, presence of catheter, pregnancy, diabetes, & waiting too long to urinate. This higher resistance rate seems to be the result of many factors-one of them is high& uncontrolled consumption of these antibiotics by the public during the past decade in our region. This can be explained by the widespread & easy access to first-line antimicrobials in pharmacies in Iraq without prescription, this case is similar to it in Pakistan (13). Recent studies indicate that poor hygienic control measures, overcrowded living conditions ,& social deprivation may related to the high resistance rate (28). We concluded that amikacin is the better antibiotic as the first choice treatment for UTI caused by *E.coli*. Since, this

antibiotic may effect an overall decrease in total costs of hospitalization, while meropenem then ciprofloxacin regards as second choice treatment. So we recommend using one of three drugs above as the initial empirical drug of choice for treating UTI while awaiting culture results. Also we recommend abuse of cefoxitin absolutely for all patients suffering from UTI with *E.coli*.

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