

Original Research Article**Antibacterial Susceptibility of Urinary *Escherichia coli* from Outpatients with Community Acquired Urinary Tract Infections, Report from Tertiary Health Care Center, Egypt.****Abstract:**

Background: *Escherichia coli* is the main etiology urinary tract infections (UTIs). Antibacterial resistance spreads rapidly among community acquired urinary *E. coli*.

Objectives: The aim of this prospective study was to describe antibiotic susceptibility profile and prevalence of multidrug resistant (MDR) urinary *E. coli* isolated from outpatients with community acquired UTI.

Methods: Urine samples were collected from patients attending outpatient departments of Mansoura University Hospitals in Egypt presented with symptoms of UTI. Samples were cultured and *E. coli* isolates were identified by colony morphology, Gram stained film, and API 20E. Antibiotic sensitivity testing was performed by standard Kirby-Bauer disk diffusion method.

Results: One hundred and forty one *E coli* isolates uropathogen were collected isolated. The highest resistance was to beta

lactam antibiotics. Amoxicillin susceptibility was only 2.1%. Resistance to 3rd generation cephalosporins was (57.4%, 40.4%, 46.8% to cefotaxime, ceftazidime, and cefoperazone) respectively. The resistance to norfloxacin was (46.8%). Resistance to nitrofurantoin was (27.7%). The least resistance was to cefoperazone-sulbactam and amikacin (8.5% and 12.8% respectively). Most of the isolates were multidrug resistant (87.9%).

Conclusion: High level of antibiotic resistance among *E. coli* causing community acquired urinary tract infection.

24 **Key words:** Urinary tract infection, *Escherichia coli*, Antibacterial resistance, Multidrug
25 resistant.

26 **Introduction**

27 Urinary tract infection (UTI) remains one of the most common community acquired infections
28 which necessitate the prescription of empirical antibiotics [1]. *Escherichia coli* is the most
29 important uropathogen which cause about 80% of these infections [2,3]. The inappropriate
30 prescribing of broad spectrum antibiotics for treatment of community acquired UTI leads to
31 rapid emergence of multidrug resistance (MDR) *E. coli* which associated with poor clinical
32 outcomes and lower cure rates [4, 5].

33 For proper empirical therapy and prevention of antibiotic resistance, it is essential to evaluate the
34 antibiotic sensitivity of the common etiological agents which differ from county to county
35 according the antibiotic usage (recast) [6,7].

36 Few studies reported resistance pattern of urinary *E. coli* and prevalence of MDR among patients
37 with community acquired UTI in Egypt. The present study was performed to identify antibiotic
38 susceptibility profiles of *E. coli* implicated in community acquired UTI among patients attending
39 outpatient departments of Mansoura University Hospitals (Mansoura, Egypt). Literature review
too short.

40

41 **Methods**

42 This study was performed in outpatient departments of Mansoura University Hospitals in
43 Egypt. Urine samples were collected from patients presented with symptoms of urinary tract
44 infection (burning, urgency, and frequency). Patients previously admitted to hospital in the
45 last 2 weeks and catheterized were excluded. Midstream urine samples were collected using
46 clean catch technique in sterile container, after instructing patients for washing the perineal

area. Early morning samples were collected as possible. Collected samples were stored at 4° C till they were transported to Microbiology Lab in faculty of medicine, Mansoura Univerisity. Samples were inoculated on CLED agar using calibrated loop (10μ). Cultures were incubated for 24h at 37°C, and they were considered positive if colony count $\geq 10^5$ CFU/ ml. *E. coli* was identified by colony morphology, Gram stained film, and API 20E (bioMerieux, Marcy-l'Etoile, France) [8]. Antibiotic sensitivity testing was done by standard Kirby-Bauer disk diffusion method, on Mueller-Hinton agar (oxoid) medium [9].

We considered the isolates not susceptible to one or more agents of at least 3 antimicrobial groups as MDR. The tested antibiotics were classified into groups: penicillins (amoxicillin) non-extended spectrum cephalosporins (cefuraxime, and cefaclor), extended-spectrum cepalosporines (cefotaxime, cefoperazone, ceftazidime, and cefpime), penicillin beta latamse inhibitor (amoxicillin-clavulanic acid, ampicillin-sulbactam), cephalosporine beta latamse inhibitor (cefoperazone-sulbactam), aminoglucoisides (gentamicin and amikacin), quinolones (norfloxacin), nitrofurans (nitrofurantoin), trimethoprim-sulphamethoxazole , and naldixic acid [10]. All antibiotic discs were obtained from (oxoid manufactures). Number of subject enrolled was not indicated and statistical package used not mentioned.

Results

This study was performed during period extending from March 2014 to December 2015 in outpatient departments of Mansoura University Hospitals. One hundred and forty four *E. coli* strains were isolated from 120 female patients (85.1%) and 21 male patients (14.9%). The mean age was 32 years (range 4-70 years). All male patients were aged above 40 years.

Female patients aged from (15-40 years) represent the major sector (Part of methodology) (44.7%) table (1). The

least resistance was to cefoperazone-sulbactam (8.5%) and the highest was to amoxicillin

69 (97.9%). Regarding 3rd generation cephalosporins, the resistance pattern to cefotaxime,

cefoperazone and ceftazidime was (57.4%, 46.8%, and 40.4% respectively). Resistance to nitrofurantoin was (27.7%). Amikacin resistance was lower than gentamicin (12.8% versus 29.8%) table (2). Majority of the isolates were MDR (87.9%).

Table (1) Patients' characters

Sex	NO (%)
Male	21 (14.9)
Female	120 (85.1)
Age	
Mean $\pm$ SD (min-max)	32 $\pm$ 20.9 (4-70)
Age groups	NO (%)
<15	36 (25.5)
15-40	63 (44.7)
>40	42 (29.8)

Table 1 has no significant information in the research.

Table (2) antibiotic sensitivity pattern of *E. coli* isolates

	S	I	R
	NO%	NO%	NO%
Amoxiacillin	3 (2.1)	-	138 (97.9)
Cefaclor	9 (6.4)	3 (2.1)	129 (91.5)
Cefuraxime	27 (19.1)	15 (10.6)	99 (70.2)

Cefotaxime	54 (40.4)	6 (4.3)	81 (57.4)
Ceftazidime	57 (40.4)	27 (19.1)	57 (40.4)
Cefoperazon	54 (38.3)	21 (14.9)	66 (46.8)
Cefpime	96 (68.1)	12 (8.5)	33 (23.4)
Cefoperazone-sulbactam	126 (89.4)	3 (2.1)	12 (8.5)
Norfloxacin	75 (53.2)	-	66 (46.8)
Gentamicin	93 (66)	6 (4.3)	42 (29.8)
Amikacin	93 (66)	30 (21.3)	18 (12.8)
Nalidixic acid	27 (19.1)	3(2.1)	111 (78.7)
Nitrofurantoin	84 (59.6)	18 (12.8)	39 (27.7)
Trimethoprim-sulphamethoxazole	27 (19.1)	12 (8.5)	102 (72.3)
Amoxacillin-clavulanic acid	42 (29.8)	30 (21.3)	69 (48.9)
Ampicillin-sulbactam	42 (29.8)	15 (10.6)	84 (59.6)

S: susceptible I: intermediate R: resistant

Discussion:

The majority of urinary *E. coli* were from female patients 120 (85.1%), sixty three (44.7%) were in the child bearing period (15-40). However, all male patients were above 40 years (Not relevant here). This result is expected as females especially in reproductive age are in higher risk for UTI than males [11, 12]. This result agrees with most studies in other countries like Ethiopia, Nigeria, and Iran [13-15]. Antibiotics belong to beta lactams and fluroquinolones groups are the most widely used

83 agents for empirical therapy of UTI [16]. The current study finds high rates of resistance to
84 amoxicillin about 98%. This result confirms IDSA guidelines, it better to avoid use of
85 amoxicillin in treatment of UTI due to poor efficacy [1]. Regarding extended spectrum
86 cephalosporins; the least resistance was to fourth generation agent cefpime and 3rd generation
87 ceftazidime (23.4% and 40.4%) respectively. The resistance to beta lactam- beta lactamase
88 inhibitor combinations was (48.9% and 59.6%) to amoxicillin clavulanic acid and ampicillin-
89 sulbactam respectively. Trimathoprim-sulfamethoxazole which an agent used widely for
90 treatment of UTI, have high resistance (72.3%). This result is consistent with results of studies in
91 other areas by Mamani et al and Rasamiravaka et al [15, 17]. This high resistance may be due to
92 overuse of these antibiotics as a self medication, or **or** over prescription by private pharmacies
93 and clinics. Most patients did not ask medical advice in hospital except after failure of these
94 therapies. In addition, these agents are used widely as an empirical treatment for other
95 community associated infections like upper respiratory tract and GIT infections. This over use of
96 antibiotics leads to development of resistance as reported previously [18]. Lower resistance rates
97 were described in areas that restrict use of these antibiotics in community setting, for example
98 amoxicillin resistance which range from ranges 48% in Netherland to 60% in Belgium [19]. In
99 our study, we test one antibiotic agent which not used as empirical therapy or self therapy;
100 cefoperazone-sulbactam. The resistant to this agent was only (8.5%). This augments our
101 explanation for the higher rates of resistance described for other agents. High prevalence of
102 MDR bacteria was obtained relative to other studies. This is an expected result due to higher
103 resistance to antimicrobial agents also may be due to the inclusion of the intermediate group in
104 the definition of MDR. This study has some limitations. First, the lack of medical data about the
105 patients like DM and other chronic illness which represent risk factors for recurrent infections

and repeated antibiotic courses. Second, the study did not investigate the type of UTI upper or lower. Furthermore, we did not test for extended spectrum beta lactamases which represents important cause of antibiotic resistance. However, our study presents preliminary information about the state of antibiotic resistance community acquired *E. coli* causing UTI.

Conclusion:

High level of antibiotic resistance to beta lactam antibiotics among *E. coli* causing community acquired urinary tract infection was detected. While agents like Nitrofurantoin is still retaining some activity against this organism. Multidrug resistant *E. coli* is a serious problem in community setting.

Ethical approval Ethical

Approval was given by local Ethical Committee Mansoura Faculty of Medicine (Mansoura, Egypt).

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