

Uropathogenic Bacterial Resistance isolated from Oncology Center in Mansoura University

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Abstract

Infections of Urinary tract are one of the significant to recommending antibiotic utilization. To involve the most perfect antibiotic for treatment patients, solid and ongoing information about the study of disease transmission and antibiotic resistance of pathogenic bacteria should be accessible for clinicians. So, the normal checking in every nation is required. The points of our review to explore the uropathogenic bacterial variety and antibiotics resistance rates of pathogenic bacteria at the Mansoura Oncology Center (Egypt, Mansoura city) from first October, 2019 to 30th September, 2020 and furthermore to add to checking and topographical variation of treatment by antibiotic. 150 urine samples by aretrospective analysis at Mansoura Oncology Center was processed according to the perfect protocol of urine analysis. Current results were prepared to obtain the prevalence of Urinary tract infections, antibiotics bacterial resistance, time over evolution, and multidrug resistance rate. Bacteria collected from 100 samples were the *Escherichia coli* and *Klebsiella pneumoniae* were to be the most identified with 42.0%, and 35.0% respectively. Other main detected species were Enterococci (9%), *Pseudomonas* (5%), *Proteus mirabilis* (4%), *Citrobacter* (2%), *Breundimona* (1%), *Raoultella* (1%), and *Kluyvera cryocrescens* (1%). Resistance tests to antibiotics indicated *K. pneumoniae* was more resistance to Cefotriaxon 39.3%, while *E. coli* was resistant to Ciprofloxacin and Levofloxacin by 41.8%. The variety of some uropathogenic bacteria acquired had all the reserves of being resistant to various antibiotics. Ready facing by arestorative impasse and the coming of bacteria with multi-resistant, recognizing explicit causes also is significant to adjust antibiotic treatment.

Keywords: Urine infections, Antibiotic resistance, Bacteria.

Introduction

Infections of urinary tract are one of the significant explanations behind using of

antibiotic (Asseray *et al.*, 2002). Among the uropathogenic bacteria, *E. coli* and *K. pneumoniae* are overwhelming in both local area and hospital infections of urinary tract. Nonetheless, the variety of uropathogens is known to change locally (Cullen *et al.*, 2011)

Diseases are more and more difficult to treat and may prompt restorative impasses. These opposition designs have shown huge between provincial fluctuation. Many of complicated infections of urinary tract are associated with inhabiting catheters, urinary tract abnormalities, immunity or openness to antibiotics, the most widely recognized reasons specialist for straightforward and confounded Urinary tract infections is *Escherichia coli*. Other reasons are *E. faecalis*, *K. pneumoniae*, *Staphylococcus saprophyticus*, *Streptococcus*, *Pseudomonas aeruginosa*, *Candida spp* and *Proteus mirabilis* (Ana *et al.*, 2015).

Understanding the range and resistance examples might assist with directing viable exact antibiotic treatments, decline treatment disappointment and expenses (Edlin *et al.*, 2013). In many nations, few constructions, for example, meetings of agreement on the appropriate utilization of antibiotics and medication commissions in Mansoura Oncology Center Hospital draw on information on the administrations microbial biology to characterize a contemplated utilization of antibiotics. Empiric antibiotics treatment is generally founded on epidemic information which refreshed and adjusted by geographic, featuring the significance of neighborhood and standard observing of resistance of bacteria.

Resistant of bacteria to beta lactam antibiotics are common in hospitalities and continue to be the more causative of bleakness and death rate around the world (Aleksun *et al.*, 2007). Penicillins and cephalosporins as a beta lactam antibiotics were the most discussed as antibiotics in treating positive and negative gram bacterial infections in human treatment (Bradford, 2001).

Although bacterial protection from antibiotics is explicit to every locale, except no nation can safeguard from resistance of microbes by movement and exchange (WHO, 2001). The aim of the study was to survey variety and opposite condition for pathogenic bacteria to antibiotics at Mansoura Oncology Center Hospital.

Materials and Methods

During the period of study, 150 urine samples from patients were collected in perfect services then microscopically analyzed. Under good

condition of sterilization, the urine sample was collected as morning sample. These samples were signed up to urine analysis plan. Examination of samples in lab was completed according to identify leukocytes. Outcomes assisted with making the underlying finding of urinary tract infection. urine samples displaying in excess of 10^4 leukocytes for every mL were utilized to refer to the decision of disconnection medium.

Samples inoculated on MacConkey agar, and the plates were incubated for twenty four hours at 37 °C. Following the presence of pure bacterial growth including all isolates of bacteria with a clinically huge growth were remembered for the review, the bacterial strains were identified utilizing the Vitek 2 system (bioMérieux, France) at Mansoura Oncology Center. All the isolates were tried for their antimicrobial protection from different antibiotics in vitro by the disk diffusion method, the antibiotic disks were put on the plates then incubation for twenty four hours 37 °C. After 24 hours incubation, the size of inhibition zone was estimated in mm. The susceptibility testing results were noted according to the Clinical and Laboratory Standards Institute (CLSI) rules (CLSI 2009) (table1).

Statistical analysis

Using computer and utilizing IBM SPSS. 2013, for Windows, V 22.0. information was portrayed utilizing number and percent. Meaning of the results was detected at the (0.05) level, Chi-Square test using Monte Carlo test as rectification when over 25% of cells have include less than five in tables.

Results

From 150 urine samples, 100 samples were produced bacterial growth. *E. coli* and *K. pneumoniae* were the most identified strains 42.0%, and 35.0% respectively. Other main detected species were Enterococci (9%), *Pseudomonas* (5%), *Proteus mirabilis* (4%), *Citrobacter* (2%), *Breundimona* (1%), *Raoultella* (1%), and *Kluyvera cryocrescens* (1%) (Figure 1), Distribution of studied cases according to sex in table 2.

Table1. List of antibiotics and inhibition zone standard

Antibiotic	Inhibition zone (mm)			Antibiotic	Inhibition zone (mm)		
	S	I	R		S	I	R
Amoxicillin-clavulanic acid	≥18	13-17	≤14	Doxacycline	≥16	9-15	≤10
Amoxicillin	≥18	12-17	≤13	Ertapenem	≥19	13-18	≤14
Azetroneam	≥17	11-16	≤12	Erythromycin	≥23	12-22	≤13
Azithromycin	≥20	12-19	≤13	Nitrofurantoin	≥17	11-16	≤12
Amikacin	≥17	13-16	≤14	Cefepime	≥18	12-17	≤13
Azlocillin	≥18	12-17	≤13	Cefoxitin	≥18	12-17	≤13
Ceftazidime	≥17	12-16	≤13	Gemifloxacin	≥17	12-16	≤13
Cefpodoxime	≥21	16-20	≤17	Gentamycin	≥15	11-14	≤12
Ciprofloxacin	≥21	14-20	≤15	Impeneme	≥16	12-15	≤13
Cefoprazon	≥19	12-18	≤13	Meropem	≥16	13-15	≤14
Cefotriaxon	≥21	12-20	≤13	Minocycline	≥19	13-18	≤14
Cefotaxime	≥21	13-20	≤14	Norfloxacin	≥17	11-16	≤12
Cephaloxin	≥18	12-17	≤13	Oxacillin	≥13	9-12	≤10
Cephalothin	≥18	13-17	≤14	Ofloxacin	≥16	11-15	≤12
Cefuroxime	≥18	12-17	≤13	Piperacillin	≥18	12-17	≤13
Clarithromycin	≥18	12-17	≤13	Rifampin	≥20	15-19	≤16
Ceftibuten	≥15	11-14	≤12	Streptomycin	≥15	9-14	≤10
Ceftolozan/tazobactam	≥17	12-16	≤13	Trimethoprim-sulpham	≥16	9-15	≤10
Chloramphenicol	≥18	11-17	≤12	Cefoprazon-sulbactam	≥18	12-17	≤13
Chlortetracycline	≥19	11-18	≤12	Ampicillin-sulbactam	≥17	12-16	≤13
Colistin	≥10	8-9	≤9	Vancomycin	≥17	13-16	≤14
Cefixime	≥19	14-18	≤15	Piperacillin-tazobactam	≥18	13-17	≤14
Cefazolin	≥18	13-17	≤14	Tetracycline	≥15	10-14	≤11
Ceftazidime avibactam	≥16	11-15	≤12	Levofloxacin	≥17	12-16	≤13
Clindamycin	≥21	13-20	≤14	Linozolid	≥20	14-19	≤15

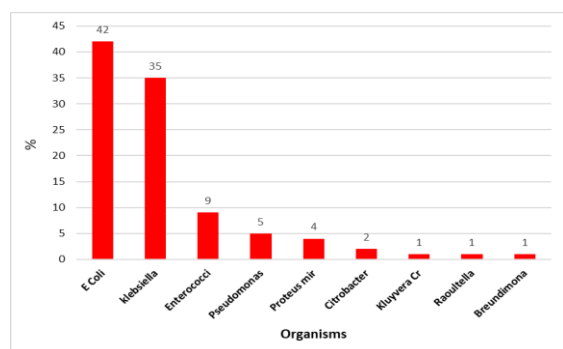


Figure 1: Organism distribution among studied cases

Table 2. Studied cases according to sex

Sex	%
Male	48.0
Female	51.0

Resistance of Antibiotic

Comparison of antibiotic resistance rates was performed (Table 3). Very high rates of resistance to Levofloxacin (p-value < 0.001), Ciprofloxacin (p-value 0.009), and Ceftazidime (p-value < 0.001) were 98 %. Other antibiotics maintained nearly half of their activity, as Impeneme (p-value 0.274), Meropem (p-value

0.631), Doxacycline (p-value 0.214), and Gentamycin (p-value 0.015*). These results were observed for all strains combined the Figure 2 show the antibiotic effect on growth of *K. pneumonia* and *E.coli*, that *K. pneumonia* was resistant to Levofloxacin , Piperacillin-tazobactam, and Trimethoprim-sulpham but sensitive to Amoxicillin - clavulanic acid, Ertapenem, Meropem, and Doxacycline where *E.coli* as sensitive to Meropem, Doxacycline, Amoxicillin - Clavulanic acid, and Amikacin but resistant to Amoxicillin, and Trimethoprim-sulpham.

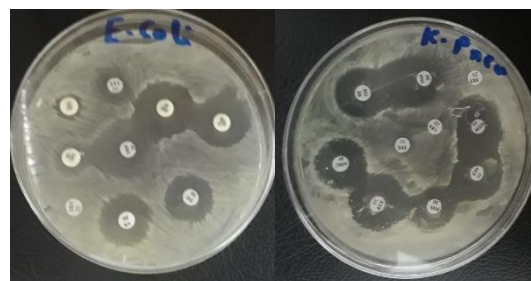


Figure (2): Different antibiotic effect on growth of *K. pneumonia* and *E.coli*

Table 3. Different antibiotics resistance rates.

Antibiotic	Strains as all			Antibiotic	Strains as all		
	N	R%	p-value		N	R%	p-value
Amox/Clav. acid	24	88.8	0.142	Doxacycline	7	53.8	0.214
Amoxicillin	14	100	.....	Ertapenem	38	77.5	0.093
Azetronam	6	100	.....	Erythromycin	3	100	.....
Azithromycin	3	100	.....	Nitrofurantoin	2	100	.....
Amikacin	22	61.1	0.254	Cefepime	50	98.0	0.950
Azlocillin	1	100	.....	Cefoxitin	54	96.4	<0.001*
Ceftazidime	66	98.5	<0.001*	Gemifloxacin	6	75.0	0.261
Cefpodoxime	39	90.6	<0.001*	Gentamycin	17	70.8	0.015*
Ciprofloxacin	74	97.3	0.009*	Impeneme	33	50.0	0.274
Cefoprazon	27	87.0	0.039*	Meropem	39	50.6	0.631
Cefotriaxon	66	98.5	0.982	Minocycline	2	100	.....
Cefotaxime	57	98.2	0.963	Norfloxacin	29	100	.....
Cephaloxin	27	60.0	0.533	Oxacillin	2	100	.....
Cephalothin	1	100	.....	Ofloxacin	4	100	.....
Cefuroxime	1	100	.....	Piperacillin	2	100	.....
Clarithromycin	1	100	.....	Rifampin	2	100	.....
Ceftibuten	3	100	.....	Streptomycin	1	50.0	.....
Ceftolozan/tazobactam	1	100	.....	Trimeth-sulph	61	95.3	0.997
Chloramphenicol	1	100	.....	Cefop-sulba	28	96.5	0.574
Chlortetracycline	1	100	.....	Ampic-sulba	2	100	.....
Colistin	1	50.0	.....	Vancomycin	3	100	.....
Cefixime	1	100	.....	Piperac-tazob	42	95.4	<0.001*
Cefazolin	1	100	.....	Tetracycline	1	100	.....
Ceftazidime- aviba	1	100	.....	Levofloxacin	74	97.36	<0.001*
Clindamycin	2	100	.....	Linzolid	1	100	.....

N: number- R: resistance.

p values with * considered as significant

Discussion

The variety of pathogenic bacteria of urine detached in Mansoura Oncology Center (Egypt, Mansoura) that revealed in comparable examinations. True to form, *Escherichia coli* was demonstrated to be the most pathogen in urine. Be that as it may, we detailed a lower commonness of *E. coli* disease (under half) when contrasted with European studies (more than 60%) (Schito *et al.*, 2009). *K. pneumoniae* represented high rate in this study than definite in European examinations. Such outcomes are like those itemized from concentrates on in sub-Saharan Africa (Boukadida *et al.*, 2002; Abubakar 2009; Kolawole *et al.*, 2009; Beyene and Tsegaye 2011; Oladeinde *et al.*, 2011; Akoachere *et al.*, 2012; Lahlou *et al.*, 2009). This particularity of urine pathogenic bacteria variety might be expected climatically variables and propensities for nearby populace. The opposition of strains in this review revealed a high opposition rate than revealed in some Europe investigations. It was observed that opposition rates of *Escherichia coli* from

infection of urinary tract to Gentamycin, Piperacillin-tazobactam and Ceftazidime, Ciprofloxacin, and Levofloxacin by 58.8%, 57.1%, 46.1, 41.8%, and 41.8 respectively. Such a strong resistance was noticed overall (Abubakar 2009; Lahlou *et al.*, 2009; Randrianirina *et al.*, 2007; Sire *et al.*, 2007). With *Escherichia coli*, the opposition raised by 26.1% from 2000 to 2010 in Abidjan (Moroh *et al.*, 2014). Comparable pattern had additionally been seen in Dakar (Senegal) (Sire *et al.*, 2007).

Correlation of antibiotic opposition was produced, extremely high resistance to Levofloxacin, Ciprofloxacin, and Ceftazidime were noticed (close to 98 %). Different antibiotics kept up with almost 50% of their relative activity, as Impeneme, , Gentamycin Doxacycline, and Meropem. These outcomes were noticed for all strains joined. Past Egyptian writing showed a pervasiveness of 44.2% of carbapenem resistant *Klebsiella pneumoniae* (El-Sweify *et al.*, 2015). Others announced lower occurrence at nearly 13.8% in the National Cancer center of Egypt (Hossam and Amany 2009) and 14.1% at Hospital of Al-

Azhar Egypt (**Khaleid et al., 2010**). Correspondingly different investigations showed shifting predominance rate from 20 to 40% in New York and Greece (**Bratu et al., 2005**), (**Giakkoupi et al., 2009**). 83% was reported as a higher effect in a Study in USA (**Marquez et al., 2013**). Resistant of Enterobacteriaceae for Ceftriaxone are pathogens of importance. *Escherichia coli* was the most isolated Enterobacteriaceae (**Chua and Stewardson 2019**). *K. pneumoniae* was the most isolated Enterobacteriaceae at intensive care units of Mansoura University hospitals (**Dalia et al., 2017**)

It was noticed the rate of resistance to, ceftazidime (98.5%) (p -value < 0.0001), ciprofloxacin (97.3%) (p -value 0.009), cefoxitin (96.4%) (p -value < 0.001), and cefpodoxime (90.6%) (p -value < 0.001). The cephalosporin held few action on urine pathogenic bacteria in Africa and Ivory Coast, yet the tests uncovered so proficiency diminishing continuously along the haul, opposition to ceftazidime raised by 47% from 2000 to 2008 (p -value < 0.0001) opposition to cefotaxime raised by 30 % from 2000 to 2009 (p -value < 0.0001) (**Moroh et al., 2014**).

Resistant rate for amoxicillin-clavulanic acid in our review was more than 88%, The obtaining of opposition to amoxicillin-clavulanic consider a worldwide peculiarity and broadly differing event rates. at Marrakesh, antibacterial obstruction of *Klebsiella pneumoniae* disengages to amoxicillin-clavulanic acid was accounted for like the opposition revealed in the capital city of Morocco district (**Tlamcani et al., 2009**), and in Algeria (50%) (**Bouzenoune et al., 2009**). In Tunisia, nonsusceptibility to amoxicillin-clavulanic acid was very nearly twice lower (23.7%), as revealed in the writing (**Ben Haj Khalifa and Khedher 2012**).

This study has showed opposition to Ciprofloxacin by 97.3% and that was higher than that of college emergency clinic in Morocco, North Africa 32.0% Ciprofloxacin resistance rate (**Bouamri et al., 2015**). Urinary *K. pneumoniae* resistance to ciprofloxacin was 32% in the rabat district (**Tlamcani et al., 2009**). Due to treatment disappointment with routine medications, fluoroquinolones, like ciprofloxacin, had been utilized as an elective prescription, also, this might be obligated for the high opposition to quinolones in *klebsiella pneumoniae*. Obtained insurance from

fluoroquinolones results from a mix of a few instruments remembering a decline for film porousness, overexpression of efflux frameworks and opposition by transformations of the topoisomerase in the quinolone-hindrance choosing region (**Bouzenoune et al., 2009**).

Different tested antibiotics were kept up with almost 50% of their relative movement, like Imipenem, Meropem, Doxacycline, and Gentamycin. These outcomes were noticed for all strains joined, with developing opposition of urinary pathogenic microbes to the generally utilized antibiotics, Imipenem, meropem, cephaloxin, and amikacin have become progressively significant in the solving the infections of urinary tract problems. also advancing obstruction and accordingly ought to be utilized specially.

Conclusion

This study gives an outline of the more urine pathogenic bacteria present at Mansoura Oncology Center Hospital and had shown a particular bacterial variety. The range of antibiotics actions showed that less antibiotics hold their effectiveness on infections of urinary tract. Antibacterial opposition raised additional time whatever their sufficiency. Mansoura Oncology Center Hospital as well as in other nations, a few propensities were at that point recognized as activities which advance the development of safe bacterial strains to antibiotics like self-prescription, upheld by the offer of unlawful medications.

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الملخص العربي

عنوان البحث: التنوع البكتيري المسبب للأمراض البولية ومقاومتها للمضادات الحيوية بمركز الأورام بجامعة المنصورة

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^٢ قسم الباثولوجيا الإكلينيكية، كلية الطب، جامعة المنصورة، مصر.

تعد التهابات المسالك البولية أحد الأسباب الرئيسية لوصف الأدوية واستهلاك المضادات الحيوية من أجل استخدام أفضل علاج بالمضادات الحيوية لمرضاها، يجب أن تتوفر للأطباء بيانات موثقة وحديثة حول علم الأوبئة ومقاومة المضادات الحيوية للبكتيريا المسببة للأمراض البولية، لذلك فإن المراقبة المنتظمة في كل دولة مطلوبة.

هدفت هذه الدراسة إلى التحقق من التنوع البكتيري الممرض ومعدلات مقاومة مضادات الميكروبات للبكتيريا المسببة للأمراض البولية بمستشفى المنصورة للأورام (مصر - مدينة المنصورة) في الفترة من ١ أكتوبر ٢٠١٩ إلى ٣٠ سبتمبر ٢٠٢٠ وكذلك المساهمة في الرصد والمراقبة والتكيف للعلاج بالمضادات الحيوية. تم إجراء التحليل لـ ١٥٠ عينة بول في مستشفى مركز الأورام بالمنصورة وفقاً للبروتوكول الروتيني لتحليل البول. تم تحليل النتائج للحصول على معدل انتشار التهاب المسالك البولية ومعدل المقاومة البكتيرية للمضادات الحيوية واتجاه تطورها بمرور الوقت ومعدل مقاومة الأدوية المتعددة. كما تم الكشف عن وجود البكتيريا في حوالي ١٠٠ عينة حيث كانت إشريشيا كولاي و كلبسيلا بنيومنيا أكثر سلالات تم التعرف عليها بنسبة ٤٢,٠% و ٣٥,٠% على التوالي. أظهرت اختبارات المقاومة للمضادات الحيوية أن بكتيريا كلبسيلا بنيومنيا كانت أكثر مقاومة لـ سيفترياكسون بنسبة ٣٩,٣%، بينما كانت مقاومة إشريشيا كولاي لمضادات سيبروفلوكساسين و ليفوفلوكساسين بنسبة ٤١,٨%. يبدو أن تنوع بعض البكتيريا المسببة للأمراض البولية التي تم الحصول عليها مقاومة لمضادات حيوية مختلفة كان يتبع اتجاهًا مثيرًا في انتظار مواجهة طريق علاجي مسدود مع ظهور بكتيريا متعددة المقاومة، فإن تحديد الأسباب الخاصة بالمنطقة أمر بالغ الأهمية لتكييف العلاج بالمضادات الحيوية.