Pattern of antibiotic sensitivity and resistance of uropathogenes among pediatric patients with urinary tract infection.

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ABSTRACT

Objectives: studying the microbiological profile by isolation of the types of bacteria that are most frequently causing UTI in pediatric patients and assessing the antibiotic resistance profile of ١٠ different antibiotics that are used for treatment of such infection. .

Methods: Urine samples from ٩٠٠ symptomatic UTI cases attending Ibn Alatheer Teaching Hospital from May ٢٠١٠ to September٢٠١١ were collected . Urinary isolates were identified by conventional methods and antibiotic resistance testing was performed by Kirby Bauer's disc diffusion method.

Results: We identify ٦ species of uropathogens responsible for UTI in pediatric patients . Females are more susceptible to the UTI than males, however they usually infected by the same bacterial species. E. coli is the most predominant uropathogen in pediatric UTI. The isolated uropathogenes showed a heavy resistance pattern toward many antibiotics like Cotrimoxazole (٨٤.١%) Amoxicilline(٧٢.٦%), Nalidixi acid(٥٧.٤%). Cephalosporin (particularly cefotaxime) , Augmentin, gentamycine and nitrofurantoin exhibit adequate antibiotic activity against uropathogens while Ciprofloxacin and Amikacine subjected to the least resistant pattern of commonly used antibiotics.

Conclusion: E. coli is still the most common type of bacteria causing UTI in male and female pediatric patients. Pediatric urine culture isolates are becoming increasingly resistant to commonly used antibiotics. Empirical treatment with Cotrimoxazole, Amoxicillin, or Nalidixic acid as initial drug is relatively ineffective. Cefotaxim and gentamycin can be considered as effective line for treatment of UTI . Amikacine and Ciprofloxacine are less likely to be subjected to drug resistance.

Keywords: Urinary tract infection, pediatrics urinary tract infection, bacterial resistance

الملخص:

الخلفية العلمية : تعتبر انتانات المجاري البولية من اكثر الأنتانات شيوعا في الأطفال وعادة ما تكون مصاحبة لنسبة عالية من الاعتلال وتعقيدات مرضية طويلة الأمد.

من هنا جاءت أهمية التشخيص المبكر ومن ثم العلاج الصحيح لهذه الأنتانات والذي يستلزم معرفة أنواع البكتيريا التي تسبب هذه الأنتانات ومدى مقاومتها للمضادات الحيوية المستخدمة في العلاج.

أهداف البحث :

يهدف البحث إلى دراسة أنواع البكتيريا المسببة لأنتانات المجاري البولية لدى الأطفال من خلال عزل هذه الأنواع ومن ثم دراسة قابليتها على مقاومة المضادات الحيوية العشرة التي تستخدم غالبا في علاج هذه الأنتانات.

طرق العمل:

اجريت هذه الدراسة في مستشفى بن الأثير التعليمي للأطفال في الفترة مابين مايس 2010 – ايلول 2011 حيث اخذت 900 عينة من بول الأطفال (من كلا الجنسين) الذين يعتقد أنهم مصابين بأنتانات المجاري البولية وعزلت أنواع البكتيريا المسببة للأنتان بعد التأكد من الإصابة من خلال التحليل ألمختبري وتمت ايضا دراسة قابلية

البكتيريا المعزولة على مقاومة عشرة من المضادات الحيوية المستخدمة في علاج هذه الانتانات بطريقة كيربي – باور.

النتائج:

تم عزل وتشخيص 6 أنواع رئيسية من البكتيريا المسببة لأنتانات المجاري البولية لدى الأطفال وقد وجد أن الإناث أكثر عرضة للإصابة بهذه الانتانات من الذكور علما أن الإصابة لدى الجنسين كانت بنفس أنواع البكتيريا حيث كانت بكتيريا الأشيريشية القولونية هي أكثر أنواع البكتيريا شيوعا في مثل هذه الانتانات . ومن خلال الدراسة لوحظ أن تأثير بعض المضادات الحيوية يكون ضعيفا في علاج مثل هذه الانتانات مثل الكوترايموكسازول والأموكسيسيلين والناليدكسيك اسيد بينما اظهرت مجموعة أخرى من المضادات الحيوية مثل الاوكمنتين والجينتامايسين والنايتروفيورانتوين والسيفالوسبورينات وخصوصا السيفوتاكسيم فاعلية جيدة نسبيا في العلاج كما لوحظ ايضا أن الأميكاسين والسايبروفلوكسلسين أقل عرضة للمقاومة البكتيرية مقارنة بباقي المضادات الحيوية.

الاستنتاج:

إن أكثر أنواع البكتيريا شيوعا في انتانات المجاري البولية لدى الأطفال الذكور والإناث هي بكتيريا الأشيريشية القولونية كما أن نسبة كبيرة من البكتيريا المعزولة من بول الأطفال المصابين بأنتانات المجاري البولية قد تكون لديها مقاومة عالية نسبيا لبعض المضادات الحيوية شائعة الاستخدام في علاج هذه الأنتانات مثل الكوترايموكسازول والاموكسيسيلين والناليديكسيك اسيد ويمكن اعتماد السيفالوسبورينات وخاصة تلك التي تنتمي إلى الجيل الثالث وكذلك الاوكمنتين والجنتامايسين كخط اولي في العلاج . كما أظهرت الدراسة أن السايبروفلوكساسين والاميكاسين لهما فاعلية جيدة جدا في علاج البكتيريا المقاومة للمضادات الحيوية الأخرى.

Urinary tract infection (UTI) is a common cause of fever and one of the most common cause of childhood infection that usually associated with high rate of morbidity[١,٢]. Serious long term complications like renal scarring, hypertension, or chronic renal failure can be caused by inadequately treated conditions[٣,٤]. The resistance is a significant problem not only in complicated UTI but also in community acquired UTI[٤,٥].

The increasing prevalence of antimicrobial resistance in both out and hospital patients with UTI is of world-wide concern and can vary according to geographical and regional location[٦,٧] resulting in increased illness, death and healthcare cost[٨]. Many strains of bacteria that are usually causing UTI have developed resistance to various types of antimicrobial agents like Amoxicillin, Ampicillin[٩,١٠] Nitrofurantoin, Pipercillin, nalidixic acid[١١,١٢] Chloramphenicol, Erythromycin,[١٢, ١٣] Tetracycline [١٤] and even third generation Cephalosporines[١٥].

Although Ampicillin and Amoxicillin have been considered the mainstay of oral treatment for community acquired UTI in many years, these agents can no longer be recommended as reliable agents since a substantial percentage of common uropathogens particularly E-coli are resistant to these antibiotics[١٦]. There is also growing concern regarding the resistance of urinary tract pathogens to the first generation cephalosporines and sulfonamides because of the increasing number of therapeutic failure after empiric treatment[١٧,١٨]. This trend is a part of the overall change in pattern of antimicrobial resistance. It is especially worrisome in children with UTI in whom quinolones are not accepted for routine use leaving fewer treatment options than in adult UTI[١٩].

To ensure appropriate treatment, knowledge of the organisms that cause UTI and their antibiotic susceptibility is mandatory to eliminate the symptoms, eradicate the infection, prevent the urosepsis and to reduce the likely hood of renal damage [٢٠,٢١,٢٢]. With the increase in over-the counter

availability of drugs , antibiotic resistance is on the rise so knowledge about antibiotic resistance is very important for the prevention of resistance amongst microbes as the treatment given without considering the prevalent microbe and its antibiotic resistance pattern results in the selection of more resistant strains[٢٣].

The aim of this study was to identify the uropathogenes recovered in children with community acquired UTI and to study the pattern of antibiotic susceptibility of such pathogens and the prevalence of resistance among such uropathogenes .

Materials and methods

Out of ٩٠٠ urine samples collected a total of ٥٤٠ sample were fulfill our criteria. The urine samples were collected from pediatric patients (٢٤٠ males, ٣٠٠females) at age less than ١٢ years who suspected to have UTI attending Ibn Al-Atheer Teaching Hospital between May ٢٠١٠ and September ٢٠١١. Exclusion criteria include antibiotic usage within week , large fluid intake (less than one hour) before hospital attendance , and those with comorbidities such as anatomic and/or functional problems involving the urinary tract . The clean catch midstream urine samples that obtained after proper cleaning of the perianal and urethral were analyzed within ٦ hrs of collection in order to ensure that the pathogenic organisms present in the urine were isolated and also to avoid contamination and overpopulation of the pathogenic organisms. Prior to inoculation, the samples were properly shaken in order to have an even distribution of the microorganisms. The urine samples were cultured on plates of Blood agar and MacConkey agar media and the sample plates were incubated at ٣٧°C for ١٨-٢٤ hours. The cultures were subjected to identification of the organisms by using microscopical and macroscopical examinations and routine biochemical tests[٢٤].

The antibiotic susceptibility patterns of all the isolates to ١٠ antibiotics were determined by the modified Kirby - Bauer diffusion technique . The concentration of the standard antibiotics discs used were; Amoxicillin ٢٥ µg ; Augmentin (amoxicillin - clavulanic acid) ٣٠ µg; Cefadroxil ٣٠µg ; Cefotaxime ٣٠ µg ; Gentamicin ١٠ µg; Amikacin ٣٠ µg ; Nitrofurantoin ٣٠٠ µg; ; Nalidexic acid ٣٠ µg , Ciprofloxacin ٥µg and trimethoprim/ sulfamethoxazole (١.٢٥/٢٣.٧٥ µg).

Standardized culture of each isolate was prepared and incubated at ٣٧°C overnight. The standardized overnight culture of each isolate was used to flood the surface of Mueller-Hinton agar plates. The standard antibiotic discs were then aseptically placed at reasonable equidistance on the inoculated Muller-Hinton agar plate and the plate allowed to stand on the bench for ١ hour. The plates were then incubated at ٣٧°C for ١٨ hrs. The diameter of the zone of inhibition produced by each antibiotic disc was measured, recorded and the isolates were classified as “resistant”, or “sensitive” based on the standard interpretation chart.(the intermediately sensitive are considered to be resistant)[٢٥] .

Statistical analysis: The data were analyzed using SPSS software (version ١٣, SPSS Inc., USA). Wilcoxon Rank Sum test with significance level of ≤ ٠.٠٥ was used to compare the proportions(the results showing values less than ٠.٠١ is considered highly significant)[٢٦].

Results:

A group of ٩٠٠ pediatric patient aged less than ١٢ year and suspected to have UTI were enrolled in this study. Of this group only ٥٤٠ patients shown to have culture proven UTI , ٢٤٠ (٤٤.٤%) of them are males and ٣٠٠ (٥٥.٦%) are females.

E.coli was determined to be the predominant bacteria in both sexes (Fig ١).The types of bacteria isolated from the urine samples including , E.coli which represent the predominant isolated bacteria in both sexes, followed by S. aureus, S. faecalis, Poteus mirabilis, Klebsiella pneumonia and P. aeroginosa (Fig ١ and Fig ٢) . Male and female patients were found to be infected by the same bacterial species but the prevalence of resistant pathogens showed some differences in both sexes as shown in Table ١ and Table ٢. The overall sensitivity of uropathogenes irrespective to the isolate to the ten antibiotics are shown in Table ٣ and Fig. ٣

Antibiotic susceptibility was tested and the overall resistance to antibiotics was as follow : cotrimoxazole(٨٤.١%), amoxicillin (٧٢.٦%), cefadroxil (٦٢.٦%) , nalidixic acid(٥٧.٤%), augmentin (٤٧.٦%), cefotaxime (٤٢.٤%), Gentamycin (٣٧.٤%), nitrofurantoin (٣١.٩%), amikacin (٢٧%), and ciprofloxacin (١١.٩%) as shown in Table٣.

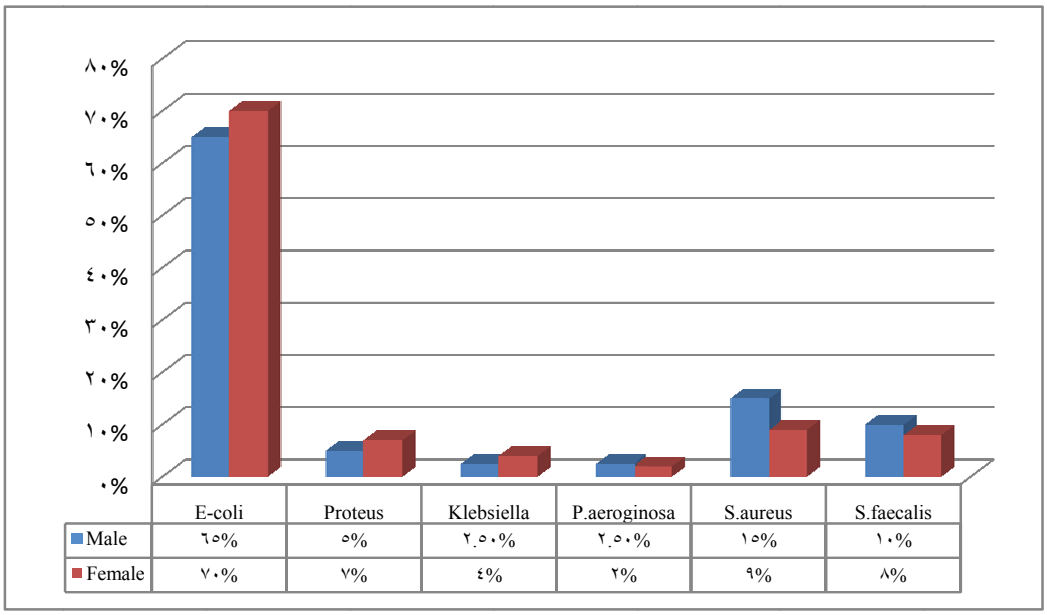

Fig. (١) The percentage of types of bacteria isolated in male and female patients

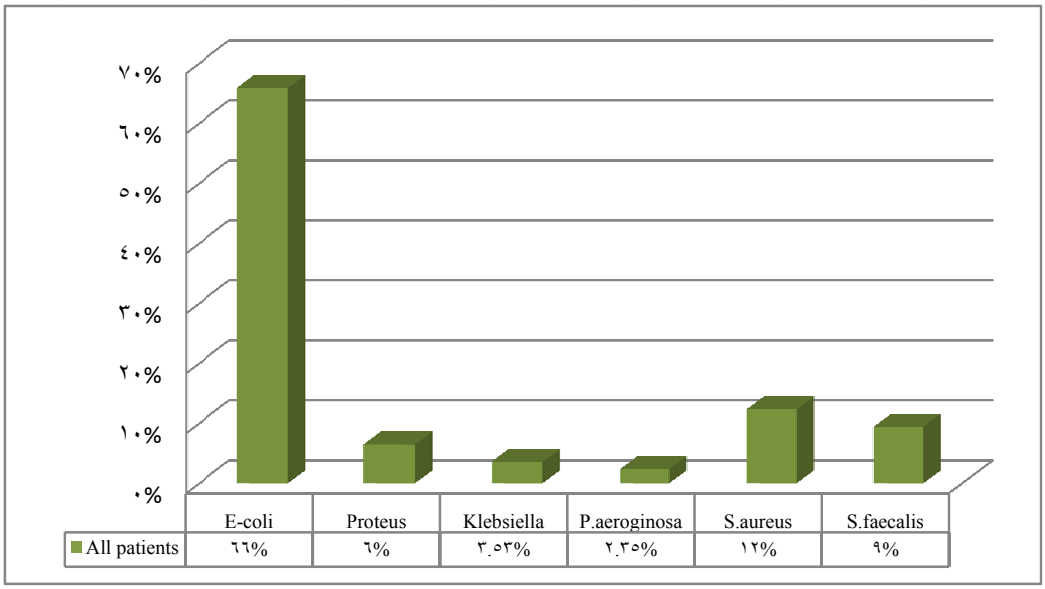

Fig. (٢) The percentage of types of bacteria isolated in all patients.

Table(١)Types of bacteria and antibiotic sensitivity in male patients

Types of bacteria / Antibiotics	Sensitivity	E-coli n=١٥٦	Proteus n=١٢	Klebsiella n=٦	P.aeroginosa n= ٦	S.aureus n=٣٦	S.faecalis n=٢٤
Amoxicillin	sensitive	٣٩ (٢٥%)	٠ (٠%)	٠ (٠%)	٠ (٠%)	١٨** (٥٠%)	١٨** (٧٥%)
	resistant	١١٧ (٧٥%)	١٢ (١٠٠%)	٦ (١٠٠%)	٦ (١٠٠%)	١٨ (٥٠%)	٦ (٢٥%)
Augmentin	sensitive	٧٨* (٥٠%)	٣ (٢٥%)	٠ (٠%)	٠ (٠%)	٢٧** (٧٥%)	٢١** (٨٧.٥%)
	resistant	٧٨ (٥٠%)	٩ (٧٥%)	٦ (١٠٠%)	٦ (١٠٠%)	٩ (٢٥%)	٣ (١٢.٥%)
Cefadroxil	sensitive	٧٨* (٥٠%)	٢ (١٦.٧%)	٠ (٠%)	٠ (٠%)	٢٠** (٥٥%)	٨* (٣٣.٣%)
	resistant	٧٨ (٥٠%)	١٠ (٨٣.٣%)	٦ (١٠٠%)	٦ (١٠٠%)	١٦ (٤٥%)	١٦ (٦٦.٧%)
Cefotaxime	sensitive	١١٧** (٧٥%)	٤* (٣٣.٣%)	٢ (٣٣.٣%)	٠ (٠%)	٢ (٥.٦%)	٢ (٨.٣%)
	resistant	٣٩ (٢٥%)	٨ (٦٦.٧%)	٤ (٦٦.٧%)	٦ (١٠٠%)	٣٤ (٩٤.٤%)	٢٢ (٩١.٧%)
Gentamycin	sensitive	١٠٩** (٦٩.٩%)	٨** (٦٦.٧%)	٣* (٥٠%)	٢* (٣٣.٣%)	١٤* (٣٨.٩%)	٦ (٢٥%)
	resistant	٤٧ (٣٠.١%)	٤ (٣٣.٣%)	٣ (٥٠%)	٤ (٦٦.٧%)	٢٢ (٦١.١%)	١٨ (٧٥%)
Amikacin	sensitive	١١٧** (٧٥%)	٩** (٧٥%)	٣* (٥٠%)	٦** (١٠٠%)	١٤* (٣٨.٩%)	٦ (٢٥%)
	resistant	٣٩ (٢٥%)	٣ (٢٥%)	٣ (٥٠%)	٠ (٠%)	٢٢ (٦١.١%)	١٨ (٧٥%)
Nitrofurantoin	sensitive	١٣٠** (٨٣.٣%)	٣ (٢٥%)	٠ (٠%)	٢* (٣٣.٣%)	٢٧** (٧٥%)	١٦** (٦٦.٧%)
	resistant	٢٦ (١٦.٧%)	٩ (٧٥%)	٦ (١٠٠%)	٤ (٦٦.٧%)	٩ (٢٥%)	٨ (٣٣.٣%)
Nalidixic acid	sensitive	٧٨* (٥٠%)	٦** (٥٠%)	٣* (٥٠%)	٣* (٥٠%)	٨ (٢٢.٢%)	١٢** (٥٠%)
	resistant	٧٨ (٥٠%)	٦ (٥٠%)	٣ (٥٠%)	٣ (٥٠%)	٢٨ (٧٧.٨%)	١٢ (٥٠%)
Ciprofloxacin	sensitive	١٤٣** (٩١.٧%)	١٢** (١٠٠%)	٣* (٥٠%)	٦** (١٠٠%)	٢٦** (٧٢.٢%)	٢١** (٨٧.٥%)
	resistant	١٣ (٨.٣%)	٠ (٠%)	٣ (٥٠%)	٠ (٠%)	١٠ (٢٧.٨%)	٣ (١٢.٥%)
Cotrimoxazole	sensitive	٢٦ (١٦.٧%)	٣ (٢٥%)	٠ (٠%)	٠ (٠%)	٦ (١٦.٧%)	٢ (٨.٣%)
	resistant	١٣٠ (٨٣.٣%)	٩ (٧٥%)	٦ (١٠٠%)	٦ (١٠٠%)	٣٠ (٨٣.٣%)	٢٢ (٩١.٧%)

Antibiotic sensitivity in male (♂) patients
** Means that the test is highly significant
* Means that the test is significant

Table (٢) Types of bacteria and antibiotic sensitivity in female patients

Antibiotics \ Types of bacteria	Sensitivity	E-coli n=٢١٠	Proteus n=٢١	Klebsiella n=١٢	P.aeroginosa n= ٦	S.aureus n=٢٧	S.faecalis n=٢٤
Amoxicillin	sensitive	٦٣ (٣٠%)	٠ (٠%)	١ (٨.٣%)	٠ (٠%)	٦ (٢٢.٢%)	٣ (١٢.٥%)
	resistant	١٤٧ (٧٠%)	٢١ (١٠٠%)	١١ (٩١.٧%)	٦ (١٠٠%)	٢١ (٧٧.٨%)	٢١ (٨٧.٥%)
Augmentin	sensitive	١٢٦** (٦٠%)	٠ (٠%)	١ (٨.٣%)	٠ (٠%)	١٥** (٥٥.٦%)	١٢** (٥٠%)
	resistant	٨٤ (٤٠%)	٢١ (١٠٠%)	١١ (٩١.٧%)	٦ (١٠٠%)	١٢ (٤٤.٤%)	١٢ (٥٠%)
Cefadroxil	sensitive	٧٠ (٣٣.٣%)	٠ (٠%)	٠ (٠%)	٠ (٠%)	١٨** (٦٦.٧%)	٦ (٢٥%)
	resistant	١٤٠ (٦٦.٧%)	٢١ (١٠٠%)	١٢ (١٠٠%)	٦ (١٠٠%)	٩ (٣٣.٣%)	١٨ (٧٥%)
Cefotaxime	sensitive	١٦٨** (٨٠%)	٧* (٣٣.٣%)	٣ (٢٥%)	٠ (٠%)	٣ (١١.١%)	٣ (١٢.٥%)
	resistant	٤٢ (٢٠%)	١٤ (٦٦.٧%)	٩ (٧٥%)	٦ (١٠٠%)	٢٤ (٨٨.٩%)	٢١ (٨٧.٥%)
Gentamycin	sensitive	١٦٨** (٨٠%)	٧* (٣٣.٣%)	٣ (٢٥%)	٣* (٥٠%)	٣ (١١.١%)	١٢** (٥٠%)
	resistant	٤٢ (٢٠%)	١٤ (٦٦.٧%)	٩ (٧٥%)	٣ (٥٠%)	٢٤ (٨٨.٩%)	١٢ (٥٠%)
Amikacin	sensitive	١٨٩** (٩٠%)	١٤** (٦٦.٧%)	٦* (٥٠%)	٦** (١٠٠%)	٩* (٣٣.٣%)	١٥** (٦٢.٥%)
	resistant	٢١ (١٠%)	٧ (٣٣.٣%)	٦ (٥٠%)	٠ (٠%)	١٨ (٦٦.٧%)	٩ (٣٧.٥%)
Nitrofurantoin	sensitive	١٦١** (٧٦.٧%)	٧* (٣٣.٣%)	٢ (١٦.٧%)	١ (١٦.٧%)	٣ (١١.١%)	١٦ ** (٦٦.٧%)
	resistant	٤٩ (٢٣.٣)	١٤ (٦٦.٧%)	١٠ (٨٣.٣%)	٥ (٨٣.٣%)	٢٤ (٨٨.٩%)	٨ (٣٣.٣%)
Nalidixic acid	sensitive	١٠٥* (٥٠%)	٣ (١٤.٣%)	٦* (٥٠%)	٣* (٥٠%)	٠ (٠%)	٣ (١٢.٥%)
	resistant	١٠٥ (٥٠%)	١٨ (٨٥.٧%)	٦ (٥٠%)	٣ (٥٠%)	٢٧ (١٠٠%)	٢١ (٨٧.٥%)
Ciprofloxacin	sensitive	١٨٩** (٩٠%)	١٨** (٨٥.٧%)	٩ ** (٧٥%)	٦** (١٠٠%)	٢١ (٧٧.٨%)	٢٢** (٩١.٧%)
	resistant	٢١ (١٠%)	٣ (١٤.٣%)	٣ (٢٥%)	٠ (٠%)	٦ (٢٢.٢%)	٢ (٨.٣%)
Cotrimoxazole	sensitive	٤٢ (٢٠%)	٠ (٠%)	٠ (٠%)	٢ (٣٣.٣%)	٣ (١١.١%)	٢ (٨.٣%)
	resistant	١٦٨ (٨٠%)	٢١ (١٠٠%)	١٢ (١٠٠%)	٤ (٦٦.٧%)	٢٤ (٨٨.٩%)	٢٢ (٩١.٧%)

Antibiotic sensitivity in female (♀) patients
** Means that the test is highly significant
* Means that the test is significant

Table (٣) Types of bacteria and antibiotic sensitivity in male and female patients

Types of bacteria / Antibiotics	Sensitivity	E-coli n=٣٦٦	Proteus n=٣٣	Klebsiella n=١٨	P.aeroginosa n= ١٢	S.aureus n=٦٣	S.faecalis n=٤٨	Total No. of Bacteria N=٥٤٠
Amoxicillin	sensitive	١٠٢ (٢٧.٩ %)	٠ (٠%)	١ (٥.٦%)	٠ (٠%)	٢٤* (٣٨.١%)	٢١* (٤٣.٧٥%)	١٤٨ (٢٧.٤%)
	resistant	٢٦٤ (٧٢.١%)	٣٣ (١٠٠)	١٧ (٩٤.٤%)	١٢ (١٠٠%)	٣٩ (٦١.٩%)	٢٧ (٥٦.٢٥%)	٣٩٢ (٧٢.٦%)
Augmentin	sensitive	٢٠٤** (٥٥.٧%)	٣ (٩.١%)	١ (٥.٦%)	٠ (٠%)	٤٢** (٦٦.٧%)	٣٣** (٦٨.٧٥%)	٢٨٣** (٥٢.٤%)
	resistant	١٦٢ (٤٤.٣%)	٣٠ (٩٠.٩%)	١٧ (٩٤.٤%)	١٢ (١٠٠%)	٢١ (٣٣.٣%)	١٥ (٣١.٢٥%)	٢٥٧ (٤٧.٦%)
Cefadroxil	sensitive	١٤٨* (٤٠.٤%)	٢ (٦.١%)	٠ (٠%)	٠ (٠%)	٣٨** (٦٠.٣%)	١٤ (٢٩.٢%)	٢٠٢* (٣٧.٤%)
	resistant	٢١٨ (٥٩.٦%)	٣١ (٩٣.٩%)	١٨ (١٠٠%)	١٢ (١٠٠%)	٢٥ (٣٩.٧%)	٣٤** (٧٠.٨%)	٣٣٨ (٦٢.٦%)
Cefotaxime	sensitive	٢٨٥** (٧٧.٩%)	١١* (٣٣.٣%)	٥ (٢٧.٨%)	٠ (٠%)	٥ (٧.٩%)	٥ (١٠.٤%)	٣١١** (٥٧.٦%)
	resistant	٨١ (٢٢.١%)	٢٢ (٦٦.٧%)	١٣ (٧٢.٢%)	١٢ (١٠٠%)	٥٨ (٩٢.١%)	٤٣ (٨٩.٦%)	٢٢٩ (٤٢.٤%)
Gentamycin	sensitive	٢٧٧** (٧٥.٧%)	١٥** (٤٥.٥%)	٦* (٣٣.٣%)	٥* (٤١.٧%)	١٧ (٢٧%)	١٨* (٣٧.٥%)	٣٣٨** (٦٢.٦%)
	resistant	٨٩ (٢٤.٣%)	١٨ (٥٤.٥%)	١٢ (٦٦.٧%)	٧ (٥٨.٣%)	٤٦ (٧٣%)	٣٠ (٦٢.٥%)	٢٠٢ (٣٧.٤%)
Amikacin	sensitive	٣٠٦** (٨٣.٦%)	٢٣** (٦٩.٧%)	٩** (٥٠%)	١٢** (١٠٠%)	٢٣* (٣٦.٥%)	٢١* (٤٣.٧٥%)	٣٩٤** (٧٣%)
	resistant	٦٠ (١٦.٤%)	١٠ (٣٠.٣%)	٩ (٥٠%)	٠ (٠%)	٤٠ (٦٣.٥%)	٢٧ (٥٦.٢٥%)	١٤٦ (٢٧%)
Nitrofurantoin	sensitive	٢٩١** (٧٩.٥%)	١٠* (٣٠.٣%)	٢ (١١.١%)	٣ (٢٥%)	٣٠* (٤٧.٦%)	٣٢** (٦٦.٧%)	٣٦٨** (٦٨.١%)
	resistant	٧٥ (٢٠.٥%)	٢٣ (٦٩.٧%)	١٦ (٨٨.٩%)	٩ (٧٥%)	٣٣ (٥٢.٤%)	١٦ (٣٣.٣%)	١٧٢ (٣١.٩%)
Nalidixic acid	sensitive	١٨٣* (٥٠%)	٩ (٢٧.٣%)	٩** (٥٠%)	٦* (٥٠%)	٨ (١٢.٧%)	١٥* (٣١.٢٥%)	٢٣٠* (٤٢.٦%)
	resistant	١٨٣ (٥٠%)	٢٤ (٧٢.٧%)	٩ (٥٠%)	٦ (٥٠%)	٥٥ (٨٧.٣%)	٣٣ (٦٨.٧٥%)	٣١٠ (٥٧.٤%)
Ciprofloxacin	sensitive	٣٣٢** (٩٠.٧%)	٣٠** (٩٠.٩%)	١٢** (٦٦.٧%)	١٢** (١٠٠%)	٤٧** (٧٤.٦%)	٤٣** (٨٩.٦%)	٤٧٦** (٨٨.١%)
	resistant	٣٤ (٩.٣%)	٣ (٩.١%)	٦ (٣٣.٣%)	٠ (٠%)	١٦ (٢٥.٤%)	٥ (١٠.٤%)	٦٤ (١١.٩%)
Cotrimoxazole	sensitive	٦٨ (١٨.٦%)	٣ (٩.١%)	٠ (٠%)	٢ (١٦.٧%)	٩ (١٤.٣%)	٤ (٨.٣%)	٨٦ (١٥.٩%)
	resistant	٢٩٨ (٨١.٤%)	٣٠ (٩٠.٩%)	١٨ (١٠٠%)	١٠ (٨٣.٣%)	٥٤ (٨٥.٧%)	٤٤ (٩١.٧%)	٤٥٤ (٨٤.١%)

Overall antibiotic sensitivity in male and female patients (♂&♀)
** Means that the test is highly significant
* Means that the test is significant

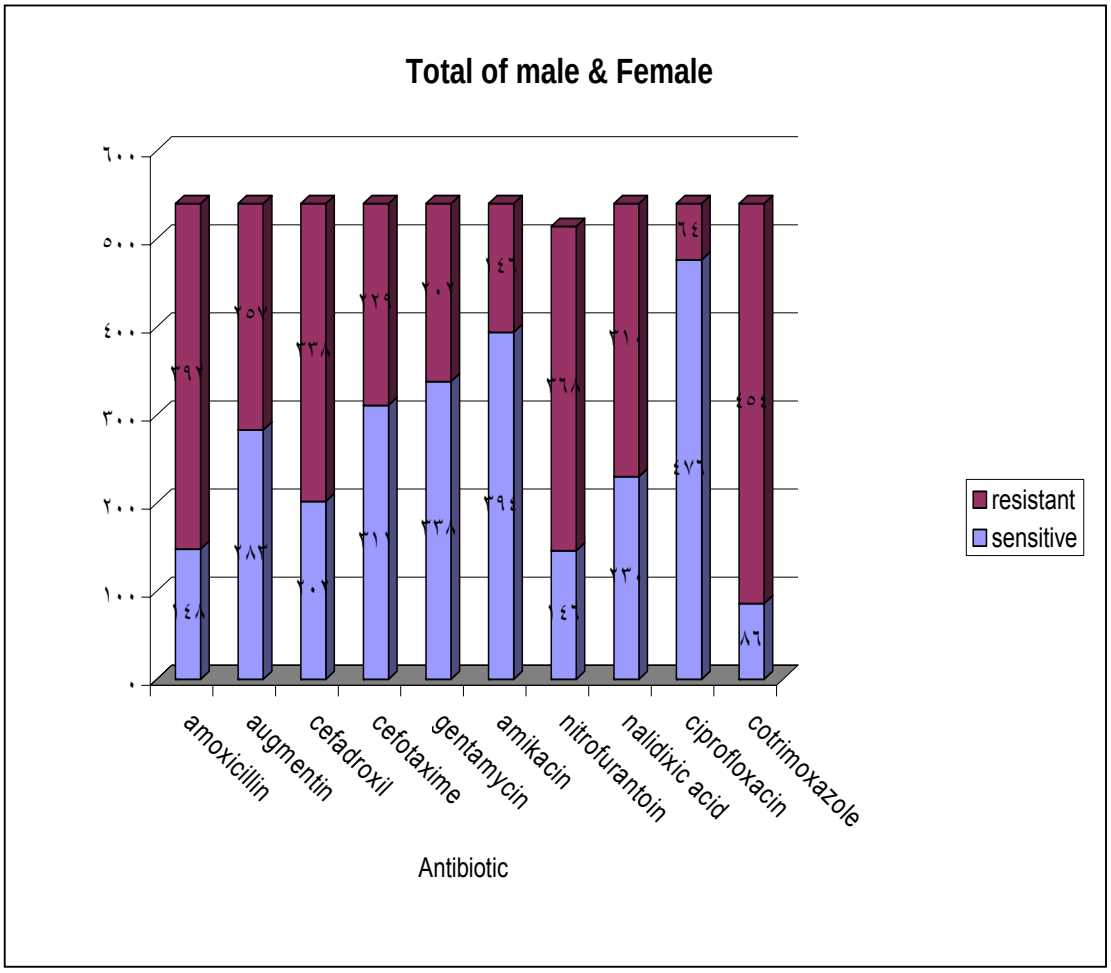

Fig-٣- Overall antibiotic sensitivity(irrespective of isolate).

Discussion

Constant survey of antimicrobial resistance plays a very important role in the empiric treatment of UTI. In a health care setting, a very little extra studies on antimicrobial resistance survey can facilitate to provide extremely practical information of the resistance pattern [٢٧]. The present study reveals the resistance pattern of uropathogens isolated from community acquired UTI .Amoxycillin, Cefadroxil, Nalidixic acid and Cotrimoxazole were the antimicrobials that had heavy resistance from organisms that belonged to Enterobacteriaceae family. Among the ٦ species of uropathogens that were identified in the study, E.coli (٦٧.٨%) emerged as the most predominant organism followed by Staph. aureus spp (١١.٧%), Strep. faecalis (٨.٩%), Proteus spp. (٦%), Klebseilla spp. (٣.٣%) and P.aeroginosa (٢.٢%). These results were in agreement with other previous studies [٢٨,٢٩,٣٠] . Our study also revealed that females were more susceptible to UTI than males which was also similar to other studies [١٥,٣١, ٣٢] .The major factor that make the females population more

prone to UTI are their anatomical and physiological characteristics [٣٣]. Despite that both sexes are infected by the same uropathogenes , the prevalence of resistant pathogens showed a relative difference.

Antimicrobial resistance offered by different uropathogens is one of the barricades that might hinder a successful treatment. Antimicrobial resistance pattern varies with time which might increase or decrease [١٤]. This study also indicated the different pattern of antimicrobial resistance in different families of uropathogen, specially in Enterobacteriaceae family as shown in Table ٣ . E.coli identified in this study were highly resistant to Cotrimoxazol (٨١.٤%) and Amoxycillin (٧٢.١%). E.coli offered almost similar pattern of resistance towards Cefadroxil (٥٩.٦%) and Nalidixic acid (٥٠%). The possible cause of such resistance is the wide spread use of these antibiotics specially those related to β-lactam agents in pediatric population. Studies that were conducted in India reported that, the isolates of E.coli showed high resistance towards ampicillin and amoxycillin which were in agreement with this study[٣٤,٣٥]. The high resistance to amoxicillin by Klebsiella spp was seen in many other studies[٢٩,٣١].

The frequency of Klebsiella , Proteus and P. aeroginosa isolates were found to be low in this study which was consistent with some studies [٣٦,٣٧,٣٨] .However, they comparatively showed a higher resistance pattern toantibiotics included in our study, but it showed a very little resistance toward ciprofloxacin and amikacin .On going with our results some recent studies also revealed a low resistance to ciprofloxacin and amikacin[٣٩,٤٠] however, these studies found a heavy resistance to nalidixic acid unlike our results which reveal a relatively good sensitivity to nalidixic acid.

Aminoglycosides were in use for quite a long period in the history of infectious diseases. They have not considerably developed much resistance against all uropathogens. The current study showed that Pseudomonas spp has developed considerable resistance against gentamycin but a very good sensitivity to amikacin in male and female patients, and this may also be related to the greater use of gentamycin in our community.

Several studies conducted in Spain , France and Nepal[٣٦,٣٧,٣٩] found that the Gram +ve bacteria (Staph. aureus and Strep. faecalis) showed moderate pattern of resistance to the antibiotics that commonly used in the empiric therapy of UTI except for cotrimoxazole, amoxicillin, and cefotaxim.

Nitrofurantoin surprisingly appear to have adequate activity against uropathogens suggesting that it is suitable for prophylaxis. This may be due to multiple mechanisms of action, requiring organisms to develop more than a single mutation in order to develop resistance , also it is less widely used than other antibiotics. However, this urinary antiseptic fails to achieve therapeutic concentration in the blood stream; because of pharmacokinetic profile , it is not recommended to treat febrile infant or child in whom renal involvement is suspected.[١]

Conclusion

E. coli is the most common uropathogene found in pediatric patients. Pediatric urine culture

isolates are becoming increasingly resistant to commonly used antibiotics. Empirical treatment with cotrimoxazole or amoxicilline or first generation cephalosporin (cefadroxil) as initial drug is inadequate. Aminoglycosides, augmentin and third generation cephalosporines are suitable to be used as a first line antibiotics for treatment of UTI in pediatric patients. Compared to other antibiotic ciprofloxacine and amikacine are less likely to be subjected to the bacterial resistance. Nitrofurantoin is an inexpensive antimicrobial agent with good activity against UTI etiological agents and preferred to be used for prophylaxis.

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