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Research

Urinary Tract Infections in Children: A Hospital-Based Study

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Abstract

Objectives: Estimate the incidence of UTI as well as antibiogram patterns of UTI in kids.

Result: In 90 patients, the overall incidence of UTIs was (30%), female was (87%) and males were (13%). (56%) were less than 5 years old while (54%) were found more than 5. Urine was collected in (67%) by clean catch method and (33%) by catheterization. (7%) were circumcised and (16%) were uncircumcised meanwhile in (67%), the status was not known. (20%) patients had underlying renal structural anomalies while (14%) of patients had underlying neurodevelopmental anomalies. Children who showed positive culture, E. coli (86%) was the most common organism with ESBL (19%), Klebsiella Pneumonia (3.6%) Pseudomonas (6.6%) and Enterobacter species (3.3%). All bugs were sensitive to amikacin, gentamycin, meropenum, tazocin, fosfomycin and nitrofurantoin. (72%) and (39%) were sensitive to third-generation cephalosporins and Augmentin groups respectively

Conclusion: UTI is very common in pediatric patients, we can use cephalosporins initially if not responding then amikacin or gentamycin can be added. For ESBL E. coli we can use initially amikacin/gentamycin plus fosfomycin/nitrofurantoin if not responding then we can use meropenem and tazocin.

***Keywords:** UTI, organisms, Medicines*

Introduction

Urinary tract infection is an acute illness usually accompanied by fever, with or without other constitutional symptoms, and local signs of loin tenderness and bladder inflammation.

Upper urinary tract infection (acute pyelonephritis) may lead to kidney scarring, hypertension, and end-stage kidney disease. Although children with pyelonephritis tend to present with fever, it is often difficult on clinical grounds to distinguish cystitis from pyelonephritis, particularly in smaller children (those younger than 2 years).

UTI is a common and important clinical problem in paediatric population, and it can cause many complications. If not discover and treated early, it will cause discomfort to patient and worry to family.

The majority of children with UTI has a good prognosis. However, some may develop seizure or long-term complication especially if it's recurrent or if the patient has a malformation like reflux.

Obstructive malformation occurs in 2% of girls and 10% of boys while the gross reflux may present in 5% within the infantile group.

During the first year of life (1,2), 5% -10% of febrile UTI may complicated with kidney scar or reflux nephropathy,10% -26% of asymptomatic bacteriuria among the school age girl may have also Kidney scar or reflux nephropathy. (3,4)

However, children with recurrent UTI are prone to some complication like hypertension, stones or end-stage renal disease, all these complications can be avoided by good treatment and appropriate care.

Acute management of urinary tract infection consists of antimicrobial therapy to treat the acute infection and evaluation of possible predisposing factors such as obstructive and congenital uropathies.

Methods

This was a retrospective study in which we reviewed records of 300 pediatric patients using The Cerner PowerChart® Electronic Medical Record system from 1 month to 12 years who had signs and symptoms of UTI and confirmed by urine analysis as well as culture and sensitivity from 2014 to 2016 at Mafraq Hospital UAE. Prevalence and culture and sensitivity patterns were seen in all cases of UTI.

Results

During the study period from 2014 to 2016 with a total number of 300 patients suspected UTIs were screened. Among 300 patients, 90 patients were found to be urinary tract infections which were confirmed by urine culture and sensitivity. The incidence rate of UTI among the total admissions was 30%.

Among 90 patients, males were 12 and females were 78 respectively. When we look into the age factor 50 patients were < 5 years old 40 patients were > 5 years old.

The positivity rate of urinary tract infection from clean catch, we found 67% while 33% were confirmed by catheterization, we also found that, 67% of the patients in which we did not know the status of circumcision, 7% patients were circumcised while 16% patients were not circumcised. Interestingly also found that 19% of the patients have structural renal abnormalities and 14% of patients were neurodevelopmental delayed.

E Coli was the most common organism followed by Extended-spectrum of beta-lactamase (ESBL) Klebsiella pneumonia, Pseudomonal species Enterobacter species. The details of the organism profile are elicited in the below-mentioned table (6)

In children who showed positive culture, E. coli (86%) was the common organism with ESBL (19%) followed by Klebsiela.Pneumonia (3.6%) Pseudomonas (6.6%) and Enterobacter species (3.3%). The antimicrobial susceptibility test showed variable degrees of resistance which are highlighted in the below-mentioned table (7) again.

All organisms were sensitive to amikacin, gentamycin, meropenem, tazocin, fosfomycin, and nitrofurantoin. (72%) and (39%) were sensitive to third generation cephalosporins and Augmentin group respectively.

Total UTI Positive: 90 patients

1. Gender.

Gender	Number	Percentage
Male	12	13%
Female	78	87%

2. Age.

Age	Number	Percentage
<5 years	50	56%
>5 years	40	44%

3. Method of collection.

Method of collection	Number	Percentage
Clean catch	60	67%
Catheterization	33	33%

4. Circumcision status.

Circumcision status	Number	Percentage
Not known	60	67%
Circumcised	6	7%
Not -circumcised	14	16%

5. Comorbidities.

Comorbidities	Number	Percentage
Structural renal	17	19%
Neurodevelopmental delay	13	14%
Others	60	67%

6. Bacteriogram.

Bacteria	Number	Percentage
E.coli	78	86%
Extended spectrum of Beta lactamase	17	19%
Klebseila pneumonie	3	3.6%
Pseudomonas species	6	6.6%
Enterobacter species	3	3.3%

7. Antibiogram.

Antibiotics	Number	Percentage
Ampicillin/augmentin	35	39%
Cephalosporins	65	72%
Amikacin	90	100%
Gentamycin	90	100%
Meropenum	90	100%
Tazocin	90	100%
Fosphomycin	90	100%
Nitrofurantoin	85	94%

Discussion and Conclusion

Urinary tract infection is a common issue after upper and lower respiratory tract infections and acute gastroenteritis with most children are admitted to pediatric wards, especially in the first couple of years (5).

It was also depicted in our study we screened almost 300 patients who presented with history, examinations and labs that were suggestive of UTI, and 30%of the total samples were positive for UTI which were supported by other studies around the world and countries like Nepal, India, Iran, and USA (6,7,8,9,10).

UTI is always challenging for paediatricians to diagnose and present with vague symptoms and signs (11) which were proved by our findings (12,13).

In our study, E. coli (86%) was the leading cause for UTI with the presentation of high-grade fever (14). Our finding is consistent with researchers (15,16,17,18).

The reason most likely highest incidence due to E. coli, due to local flora, and invasion of bladder due to urethral opening (19,20)

Gram-negative organisms are commonly causing UTI in children but interestingly found that gram-positive Enterobacter species (3.3) are the second most cause of UTI in children (21,22,23).

Another alarming finding in our study the highest incidence percentage of ESBL strains almost 19% which was also correlated with other studies (24,25,26,27,28). We had the impression that due to overuse of antibiotics in the community by GPs and paediatricians without proper screening and work up of urinary tract infections.

ESBL strain is almost resistant to ampicillin and cephalosporin group but 100% sensitive to amikacin, gentamycin, meropenem, fosfomycin and tazocin respectively.

Aminoglycosides may also be useful to treat susceptible uropathogens, including many ESBL producers, a comparative study on community acquired ESBL showed that 50% of isolates showed resistance to gentamicin but only 8% to amikacin. Amikacin is active against most ESBL strains and may spare empiric carbapenems use.

We also found that before using meropenem or tazocin for ESBL. Cost-effective and commonly available drugs aminogycosides or fosfomycin can be tried to minimise the resistance which also supports our findings.

Our study shows that nitrofurantoin and fosfomycin are still the most effective antimicrobial agents for the treatment of UTIs. The finding is in agreement with studies done elsewhere [26, 28–33].

Management of UTIs in children remains challenging. Empiric prescribing guidelines must be tailored to local antibiograms and drug availability, in order to maximize clinical and microbiological cures, minimizing unnecessary broad-spectrum antibiotics use.

Conflict of Interest

The authors declare no conflict of interest.

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