

Growth pattern of urinary pathogens in children with febrile UTI

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Objective: To determine the frequency of urinary tract infection (UTI) in febrile children at Prince Rashed Bin Al Hasan Hospital, Irbid, Jordan.

Methodology: This descriptive study includes boys and girls from age two months to 14 years with fever ($>38.5^{\circ}\text{C}$) who did not have a definite source for their fever on physical examination who were admitted to the pediatric ward from January 1, 2013 to December 31, 2013. And patients with symptoms of change in color of urine, offensive odor, hematuria, abdominal and suprapubic tenderness, dysuria and frequency were included in the study. Patients who had chest infection, bronchiolitis, otitis media, gastroenteritis, and convulsions were not included. Urine cultures were considered positive if growth of a single pathogen at 10^5 cfu/ml was found. Urine cultures were collected for all patients included in the study under complete aseptic techniques and by suprapubic urine aspiration for patients up to one year old, by catheterization for toilet trained and older children up to 5 years old and by Mid stream urine sample for patients up to the age of 14 years. Urine analysis, complete blood count (CBC), C-reactive protein and Erythrocyte sedimentation rate (ESR) were done. Renal ultrasounds, DMSA Scans and micturating cystourethrogram (MCUG) were also done. Microorganism positive cultures were divided into two groups: E. coli positive and non-E. coli positive cultures group. Microorganisms and their anti-microbial

sensitivity were studied.

Results: During the study period, 2347 cases were admitted with fever and symptoms of UTI; 1340 (57%) were males and 1007 (43%) were females. A total of 1331 urine cultures were considered positive. The E. coli positive cultures were in 1211 (91%); 854 (70.5%) were females and 357 (29.5%) were males. In the 120 (9%) Non-E. coli positive cultures 68 (57%) were males and 52 (43%) were females. Non E. coli included Klebsiella (47%), proteus (20%), Pseudomonas (16.6%), Citrobacter (8.3%), Enterobacter (6.5%), and Enterococcus (3.3%). 68 (57%) were males and 52 (43%) were females. E. coli UTIs were more common in females and non E. coli UTIs were more common in males. 1291 (97%) patients were admitted for the first time and 40 (3%) were at least twice. Most organisms (84.1%) were sensitive to gentamycin. Both organisms were least sensitive to ampicillin; E. coli (19%) and Non E. coli (15%).

Conclusion: E. coli UTI was more common in females and the non E. coli species, which were common in males. The frequency of UTI in febrile children is difficult to estimate exactly as we cannot exclude UTI in patients with specific findings of higher fever. (Rawal Med J 2014;39:319-322).

Key words: Urinary tract infections, uropathogens, febrile children.

INTRODUCTION

The prevalence of urinary tract infection (UTI) varies with age, in girls urinary tract infection occur by the age of 5 years with peaks during infancy and toilet training, while in boys the most urinary tract infection occurs during 1st year of age.^{1,2} Incidence of UTI in children is difficult to estimate, because young children with UTI may only have fever and non specific urinary tract symptoms.² Fever is the most common symptom of UTI in infants and may be the only symptom in them,³ as up to one third of children seen in pediatric clinics in United States

presented with elevated temperature.⁴ In children aged three months-three years and older, the vast majority of these have viral disease.^{5,6} Pediatric UTI account for 0.7% of physician office visits and 5-14% of emergency department visits by children.⁷

METHODOLOGY

Our descriptive study includes all patients who were admitted to the pediatric ward from January 1, 2013 to December 13, 2013. All boys and girls who were above the age of two months to fourteen years with fever ($\geq 38.3^{\circ}\text{C}$) and who did not have a definite

source for their fever and had symptoms of UTI like change in color of urine, offensive odor, hematuria, abdominal and suprapubic tenderness, dysuria and frequency were included in the study. Patients who had chest infection, bronchiolitis, otitis media, gastroenteritis and convulsions were excluded from the study. Urine cultures were obtained for all patients as part of routine practice and considered positive as growth of a single pathogen at 10^5 cfu/ml. Microorganism positive cultures were divided into two groups: E. coli positive group and non-E. coli positive group. The gender, microorganisms and their anti-microbial drug sensitivity were noted.

The diagnosis of urinary tract infection is on the growth of a single pathogen in urine cultures. C-reactive protein (CRP) and Erythrocyte sedimentation rate (ESR) levels and Complete blood counts (CBC) were performed. Chi square method was used to compare groups.

RESULTS

During the study period a total of 5054 patients were admitted; 2347 (46.4%) had UTI. 1340 (57%) were males and 1007 (43%) females. A total of 1331 cultures were considered positive; 906 (68%) were females and 425 (32%) males.

The most common microorganism isolated was E. coli in 1211 (91%) and Non-E. coli in 120 (9%) cases. E. coli group had 357 (29.5%) males and 854 (70.5%) females, while non E. coli group had 68 (56.6%) males and 52 (43%) females ($P=0.0000$). The non E. coli cultures mainly had klebsiella, proteus and pseudomonas (Table 1).

Table 1. Non-E. coli group.

| Microorganism | Number | Percentage |
|---------------|--------|------------|
| Klebsiella | 65 | 47% |
| Proteus | 24 | 20% |
| Pseudomonas | 20 | 16.6% |
| Citrobacter | 10 | 8.3% |
| Enterobacter | 6 | 5% |
| Enterococcus | 4 | 3.3% |

CRP level was found elevated ($>20\text{mg/L}$) in 293 (22%) cases. ESR was elevated in 425 (32%) cases. Leukocytosis was found in 200 (15%) cases.

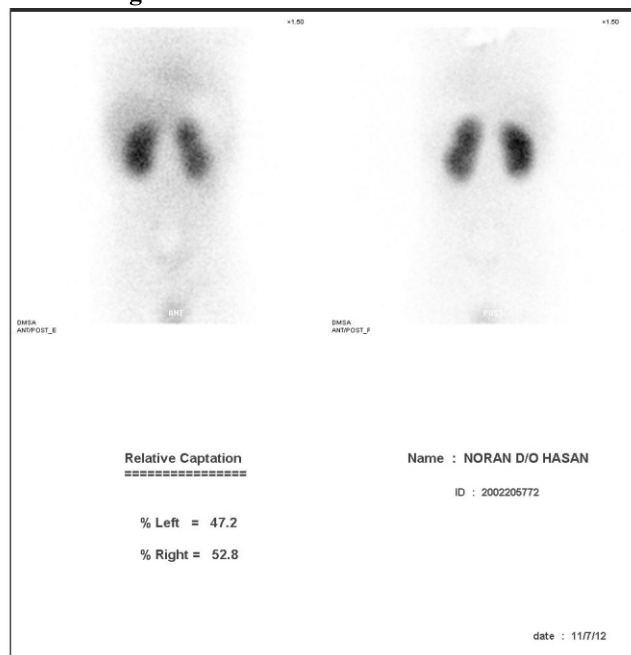
Urinalysis showed elevated WBC in urine in 400 (18%) cases. 1291 (97%) patients were admitted for the first time and 40 (3%) at least twice.

Table 2. Antibiotics sensitivity of all isolated microorganisms

| Antimicrobial | E. coli N=1211 (91%) | Non-E.coli N=120 (9%) | All pathogens N=1331 |
|-----------------|----------------------------|-----------------------------|-------------------------|
| Gentamycin | 84%-1017 | 86%-103 | 84%-1120 |
| Nitrofuradantin | 82%-993 | 70%-84 | 80.9%-1077 |
| Ceftriaxone | 73%-884 | 41%-49 | 70%-933 |
| Nalidixic acid | 71%-860 | 55%-66 | 69.5%-926 |
| Norfloxacin | 58%-702 | 64%-77 | 58.5%-779 |
| Cefataxim | 58%-702 | 32%-38 | 55.5%-740 |
| Septtrin | 52%-630 | 35%-42 | 50.4%-672 |
| Ampicillin | 19%-230 | 15%-18 | 18.6%-248 |

Renal Ultrasound showed mild to moderate hydronephrosis in 17 cases and single kidney in 5 cases, while 8 cases had kidney scarring as documented by DMSA scanning after treatment (Fig. 1).

Fig. 1. DMSA scan showing good function of left kidney with scarring in its lateral border.



Voiding cystourethrogram (VCUG) showed 13 cases had vesicoureteric reflux (VUR). VUR grades (II-III) were seen in 9 cases, grade (IV) in 2

cases and still treated medically, while ureteric reimplantation was done for 2 cases with VUR grade V (Fig. 2).

Fig. 2. VCUG showing VUR grade III-IV



The antimicrobial sensitivity for both *E. coli* and non *E. coli* groups are shown in Table 2.

DISCUSSION

The predominant uropathogen isolated was *E. coli* in 91% patients which is consistent with previous studies.^{8,9} Non- *E. coli* microorganisms were found in 9% of all positive urine cultures and this nearly agreed with other studies.^{1,9}

UTI was more common in females for all age groups than males and *E. coli* was the commonest organism. This is in agreement with other studies.^{1,2,10,11} Non- *E. coli* microorganisms, mainly *klebsiella* and *proteus* species were more common in male than female and this also agreed other studies.^{1,12} In patients who were admitted with higher fever bronchiolitis, gastroenteritis, otitis media and tonsillitis, UTI cannot be excluded.^{9,13}

Intravenous gentamycin, ceftriaxone and norfloxacin were the most commonly used antimicrobial drugs for patients with UTI admitted to our pediatric unit and their sensitivities were 84%, 73%, 58%, respectively. This agrees with other studies.¹⁴⁻¹⁶ The frequency of UTI in females was 1.3 % and in males was 0.061% in our all admitted patients. This is relatively less than the prevalence of UTI of 3-5% in females and 1% in males, as reported

in other studies.^{1,2} Most of the male patients in our study were circumcised and all of our patients related to the same locality.

CONCLUSION

Escherichia coli urinary tract infection was more common in females. Non-*Escherichia coli* species like *klebsiella* and *proteus* were more common in males. The frequency of urinary tract infection in febrile children is difficult, as we can't exclude urinary tract infection in patients with specific findings of higher fever.

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Conflict of Interest: None declared

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