

## The Frequency of Urinary Tract Infection among Children with Febrile Convulsion

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### Abstract

#### Objective

This study was conducted to determine the frequency of urinary tract infection (UTI) among children with febrile convulsion (FC).

#### Materials & Methods

We analyzed the hospital records of 137 children who had been admitted to the pediatric ward from March 2004 to February 2007 because of FC. Information such as age, sex, developmental status, type of FC, family history of seizure, urine sampling method, and the results of antibiograms were recorded.

#### Results

The age distribution of 137 patients (82 boys, 55 girls) was as follows: 1–6 months of age, 1 infant (0.7%); 6–12 months, 21 infants (15.3%); 1–3 years, 75 (54.8%); 3–5 years, 30 (21.9%); and more than 5 years, 10 (7.3%). Three out of the 82 boys and 6 out of the 55 girls had UTI (3.7% vs. 10.9%, total, 6.6%). The age distribution of these 9 patients was as follows: 1–6 months, 1 patient (11.1%); 7–12 months, 5 (55.6%); and 1–3 years, 3 (33.3%). The relative incidence of UTI was 6.6%. The most common organisms causing infections were *Escherichia coli* in 8 and *Proteus spp.*, in 1 patient (88.8% vs. 11.1%). Simple FC was seen in all 9 patients with UTI.

#### Conclusion

In this study, the relative frequency of UTI among children with FC was 6.6% and this frequency was higher than the incidence of UTI in girls and boys (3–5% and 1%, respectively). Therefore, we recommend that UTI should be considered as an important cause of FC in children.

**Keywords:** Febrile convulsion; urinary tract infection; children

### Introduction

Febrile seizure (FS) or febrile convulsion (FC) is the most common seizure disorder in children, affecting 2–5% of children between the ages of 3 and 60 months (1). Peak incidence is at about 18 months (2). In the majority of cases, FC occurs during the first 24 h of the fever (2). FC can be classified as simple or complex. Simple FC comprises generalized tonic, tonic-clonic, or atonic seizure activity without focal features, with a duration of less than 10 min, and without recurrence in the subsequent 24 h. Complex FC has one or more of the following features: a focal onset or presentation of focal features during the seizure, prolonged duration (greater than 15 min), and recurrence within 24 h or within the same febrile illness (3, 4). The sources of infection in children with FC are varied and include upper respiratory

tract infections, otitis media, pneumonia, influenza-like diseases, gastroenteritis, and urinary tract infection (UTI) that may present as simple cystitis or pyelonephritis. The signs and symptoms of UTI in children are different and depend on their age. The frequency of fever in UTI is as follows: neonatal period, 11%; 1–24 months, 38%; 2–5 years, 57%; and 5–12 years, 50%. The frequency of seizure as a sign of UTI is as follows: neonatal period, 2%; 1–24 months, 7%; 2–5 years, 9%; and 5–12 years, 5% (5).

In this study, we evaluated all the children who had been admitted to the pediatric ward from March 2004 to February 2007 (duration of 4 years) because of FC and determined the frequency of UTI occurrence among them.

### Materials & Methods

In this retrospective, epidemiologic, cross-sectional, descriptive study, we evaluated 137 children who had been admitted to the Golestan Hospital from March 2004 to Feb 2007 because of FC. The data, including age, sex, family history, type of FC, white blood cell (WBC) count, method for urine sampling, and urine culture findings were obtained from medical records of the patients and were recorded in a questionnaire. Only 1 questionnaire was filled for patients who had been admitted to a hospital more than once due to FC.

Samples were taken by a non-randomized and targeted method. Descriptive statistics and the Statistical Package for the Social Sciences (SPSS) 16.0 were used for data analysis.

### Results

We evaluated 137 patients (82 boys [59.9%] and 55 girls [40.1%]) mostly between 1 month and 5 years of age (Table 1). FC had occurred in 108 patients for the first time, 25 patients for the second time, and 4 patients for more than 2 times. No symptoms of UTI were seen in 125 children (91.3%). One patient (0.7%) had complained of dysuria, 1 (0.7%) of frequency, 6 (4.4%) of vomiting, and 4 (2.9%) of abdominal pain. Three patients had a history of UTI before admission because of FC. Only 1 patient had a history of head trauma. Positive family history of FC epilepsy was seen in 33 (24.1%) and 19 (13.9%) patients for epilepsy, respectively. Parents of 44

patients (32.14%) were consanguineous. At the time of admission, 10 of 137 patients (7.3%) had abnormal levels of consciousness and 6 of 82 boys (7.3%) had not been circumcised. Three patients (2.2%) had developmental delay. Among the children, 115 (83.9%) had simple (typical) FC and 22 children (16.1%) had complex (atypical) FC. Table 2 shows patients' temperatures recorded at the time of admission.

The WBC count was in 4000–10000/mm<sup>3</sup> in 40 patients (29.2%), 10000–15000/mm<sup>3</sup> in 52 (38%), more than 15000/mm<sup>3</sup> in 43 (31.4%) and 2 children did not include blood test data.

Urinalysis showed abnormal results in 24 patients (17.5%), but the urine culture test performed using the suprapubic method, was positive in 9 patients (6.6%). Five children with FC and UTI (55.6%) were between 7 and 12 months of age (Table 3). Eight of 9 samples tested positive for *Escherichia coli* and 1 sample for *Proteus spp.* Urine culture results were positive in 3 boys and 6 girls admitted because of FC. In this study, 66 boys patients had simple FC, and of them, 3 (4.5%) had UTI. Among the 55 girls, 49 had simple FC and 6 (12.2%) had UTI. Twenty-two (16 girls and 6 boys) patients had been admitted with atypical FC, and none of them had UTI. Two of 3 boys with UTI and FC had not been circumcised.

The results of lumbar puncture (LP) were normal in 131 patients (95.6%). Three patients (2.2%) were traumatized, and 3 patients (2.2%) did not have parents' permission to undergo LP. Electroencephalography was performed in only 35 of 137 patients, of whom, 27 (19.7%) showed no abnormality and 8 (5.8%) showed mild abnormality in their electroencephalograms.

### Discussion

In our study, 6.6% of children with FC had UTI. Out of the 137 patients admitted because of FC, 82 were boys and 55 were girls. Among the 6.6% children who had UTI, 2.2% were boys and 4.4% were girls. All patients with UTI had simple FC. Most children with FC and UTI were between 7 and 12 months of age (Table 3). The most frequent pathogen causing UTI was *E. coli*. Among the patients with FC, 2.2% had developmental abnormalities. Levin and colleagues and Teach and Geil have, respectively, reported that 9% and 10% of

children with FC had UTI (6, 7). However, McIntyre and colleagues and Lee and Verrier have, respectively, reported that 2% and 3.9% of patients with FC had UTI (8, 9). The reason for the lower incidence of UTI in their patients could be that they had not performed urine culture tests for all the patients with FC.

In 2005, Hiraoka evaluated 97 children aged 1–24 months with UTI; the results showed that 21 children (21.6%) had FC (10). In this study, most of the FC patients were girls; while this finding was similar to those of McIntyre and colleagues study and Trainer and colleagues', it was different from that of Levine (6, 8, 11). The reason for this may be the higher number of uncircumcised boys in the US than in Iran. Circumcision has been known to prevent UTI; this might explain why cases of UTI were more frequent in the US (6, 9, 8). In our research, most of the patients (75, 59.8%) were

between 6 months and 3 years of age (Table 1). In other studies, most of the patients at risk were less than 2 years of age. In our study, most boys with concomitant FC and UTI had not been circumcised; this finding was similar to that of other studies (6).

In conclusion, because of a relatively high frequency of UTI among children with FC (6.6%), we recommend that every child with FC be diagnosed for UTI by performing urinalysis and urine culture tests.

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**Table 1:** Age distribution of patients

Age	1–6 months	6–12 months	12–36 months	3–5 years	>5 years	Total
No* (%)	1 (0.7%)	21 (15.3%)	75 (59.8%)	30 (21.9%)	10 (7.3%)	137 (100%)

\*Number

**Table 2:** Patients' temperature at the time of hospital admission

Temperature (Auxiliary) °C	<37.5	37.5–38	38–40	>40	No record	Total
No. of patients	23	22	87	4	1	137
%	16.8	16.1	63.5	2.9	0.7	100%

**Table 3:** The frequencies of urinary tract infection in patients of different age groups with febrile convulsion

Age (month)	No. of UTI cases	Percentage
1–6	1	11.1%
7–12	5	55.6%
13–36	3	33.3%
Total	9	100%

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