



# Evaluation of the Prevalence of Urinary Tract Infection in Children with Febrile Seizure

Behrang Kazeminezhad<sup>1</sup>, Hamid Taghinejad<sup>2</sup>, Milad Borji<sup>2,\*</sup> and Reza Seymohammadi<sup>3</sup>

<sup>1</sup>Shahid Beheshti University of Medical Sciences, Tehran, Iran

<sup>2</sup>Department of Nursing, Faculty of Nursing and Midwifery, Ilam University of Medical Sciences, Ilam, Iran

<sup>3</sup>Student Research Committee, Ilam University of Medical Sciences, Ilam, Iran

\*Corresponding author: Department of Nursing, Faculty of Nursing and Midwifery, Ilam University of Medical Sciences, Ilam, Iran. Tel: +98-9183404704, Email: borji\_milad@yahoo.com

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## Abstract

**Background:** Febrile seizure is the most common seizure disorder during childhood. Although its prognosis is appropriate, it may indicate a serious infection. Therefore, the present study aimed to investigate the prevalence of urinary tract infection (UTI) in children with febrile seizure.

**Methods:** This is a prospective cross-sectional descriptive study conducted in 2017 in 238 children from Ilam. Data were collected using a demographic questionnaire answered by the children. The patients' records and diagnostic test results were used in a survey on disease history, considering the description of febrile seizure, the cause of referral, the necessary tests performed, body temperature measured using the axillary method, and seizure days. Data were analyzed by the SPSS version 18 software using descriptive and analytical statistics.

**Results:** The findings showed that from among the 238 children studied, 143 (60.1%) were girls, 132 (55.5%) were aged 13 to 24 months, 145 (60.9%) had the first seizure on the first day of admission, and 92 (38.7%) had a fever with a body temperature between 37°C and 38°C. In addition, the findings showed that 28 (11.28%) children had UTI and 210 (88.2%) had no UTI. No correlation was found between UTI and seizure ( $P > 0.05$ ).

**Conclusions:** No correlation was found between UTI and seizure. Other studies among other children with febrile seizure should be performed.

**Keywords:** Prevalence, Urinary Tract Infection, Febrile Seizure

## 1. Background

Childhood is the stage of transition from infancy to adolescence. At this stage, growth mutations and physiological changes occur until adulthood. Childhood is a path toward the age of maturity (1). Over the past years, health has been recognized as a human right and social goal. The age group of 7 to 15 years, especially in the third-world countries, comprises a major population. Owing to the vulnerability of this population group, paying attention to their sanitation and health has an undeniable effect on the health of the community (2). The success of students at school is the main objective of any educational system, which can have a significant impact on the present and future lives of children and adolescents. Many factors contribute to students' school achievement (3), and illness in the child is an impeding factor to students' progress (4).

Urinary tract infection (UTI) is a pediatric disorder. The term is used for a wide range of clinical disorders, from asymptomatic bacteriuria to kidney infections and sepsis. When the infection affects the lower urinary tract, it is

known as cystitis, and when it affects the upper urinary tract, it is known as pyelonephritis (5-7). UTI is the second most common bacterial disease in children secondary to upper respiratory tract infections (8). According to estimates, approximately 150 million people get UTI each year (9). In terms of epidemiology, the prevalence of UTI varies with age and sex (10). UTI in younger children is usually diagnosed when the cause of the fever is examined. It is the most common bacterial infection that affects the human life (11). In fact, UTI is one of the most common diseases in the 2 to 6-year-old group, affecting approximately 3% to 5% of girls and boys (12). In UTI, *Escherichia coli* pathogens are common. A wide range of beta-lactamases produced by *E. coli* has become widespread worldwide (13). Considering the renal scars and complications of UTI, screening children with UTI for pyelonephritis and renal scars is strongly recommended (14).

Fever and seizure are the most common disorders during childhood. Although its prognosis is appropriate, it can indicate a serious underlying infection such as sepsis

or bacterial meningitis. For this reason, the cause of febrile seizure should be carefully examined (11). This seizure is divided into two simple and complex types. The complex type includes the cases of local seizure or those that last for more than 10 to 15 minutes or relapse within 24 hours (15). By definition, this complication occurs in children, aged 6 months to 5 years, having a fever with a body temperature higher than 38.5°C, and without any infection in the central nervous system or any factor that justifies the seizures. If the seizure time is more than 5 minutes, it is associated with complications such as mental disability, hemiplegia, and child death. The mechanisms for developing fever and seizures are unknown, but many contributing etiological factors have been identified. Hence, in these children, fever is a prerequisite but not enough to cause a seizure (16-18).

In fact, febrile seizure refers to a seizure without any other neurological disease (19). Seizures associated with fever are usually self-limiting and benign (20). However, the results of some studies have shown that 6% of children progressed to epilepsy, 10% were found to have neurological problems, and 5% had learning disabilities (21). A seizure can cause cognitive impairment in children (22), which leads to reduced learning and academic failure, poor social communication, and ultimately the lack of good employment (22). In a study by Ghotbi et al. in Sanandaj, with the aim of determining the cause of the seizure cases in a mental Hospital in Sanandaj, the findings showed that 57.7% of the seizure cases were due to fever (23).

The occurrence of febrile seizure can cause many abnormalities in family life, sleep, and social activities of parents, causing them great stress and anxiety (24). Admission and hospitalization of children with seizure incur high health-care costs every year. However, by adopting the necessary measures, this disease and its complications can be prevented (25). On the other hand, more than 30% of children who had a febrile seizure experienced the recurrence of seizure that required hospitalization. For this reason, it is important to pay attention to the prevention of febrile seizure (24).

## 2. Objectives

Considering the importance of children's health and the lack of research on this subject in Ilam, the present study was conducted to determine the prevalence of UTIs in children with fever associated with seizure, in Ilam in 2017.

## 3. Methods

This descriptive-analytical study was conducted after obtaining an ethical approval from the research ethics committee of Ilam University of Medical Sciences for the research. The study population consisted of children admitted to the Imam Khomeini hospital in Ilam City, which were selected from January to June 2017 by the census method. In this study, 238 children were enrolled. The inclusion criteria were the informed consent of the child's parents to participate in the study, febrile seizure diagnosed by a physician, age of 6 months to 5 years, and not using oral and injection antibiotics within 48 hours before referral to the hospital.

The researcher identified patients with febrile seizure among children in different working shifts (morning, evening, and night). At the first referral of the child, a demographic questionnaire, which included age and sex, was provided to their companions. Another questionnaire that contained information about the disease including the history of febrile seizure, the reason for the referral, necessary tests conducted, body temperature measured using the axillary method, and seizure days was completed by the researcher using the patients' records and diagnostic test results. The questionnaires were completed by parents. Although the sample collection by catheter or suprapubic aspiration is more accurate in terms of bacterial examination in urine, this method is uncomfortable for the patient, so all urine samples were collected during urination (midstream sampling) (26). The patient's genital area was washed before sampling and the initial urine flow was not collected. The complete urine test and urine culture requested for the child were recorded in the questionnaire. In this questionnaire, the criteria for fever and seizure were fever with a body temperature of more than 38°C, the seizure usually lasting for less than 15 minutes, and the fever and seizure occurring from 6 to 60 months of age, provided that the patient had no central nervous system infection or a metabolic disease and epilepsy. UTI was defined as the presence of certain types of bacteria in the urinary system, which has reached to a specific colony count in urine culture as determined on the basis of changes in the urine test and bacterial growth (cultures were considered positive if a microorganism was grown as  $10^5$  colonies) (11, 26, 27). All urine samples and childhood fever tests were analyzed in a laboratory. To examine the reliability of the laboratory results, 20 urine samples collected from two patients, whose names were changed, were sent to the laboratory, and the reliability of the laboratory indices was obtained as 0.99.

To observe the research ethics, the parents of the children in this study were ensured that the information ob-

tained from the study would be completely confidential and that the results would be reported generally. In addition, this study did not incur any cost to the patients. Data were analyzed by the SPSS version 18 software using descriptive and analytical tests.

#### 4. Results

The findings of this study showed that of the 238 children, 95 (39.9%) were boys and 143 (60.1%) were girls. Of these children, 48 (20.2%) were aged 6 to 12 months, 132 (55.5%) were between the ages of 13 and 24 months, and 58 (24.4%) were between the ages of 25 and 72 months. Regarding the time of the first seizure, 145 children (60.9%) had it on the first day of hospital admission and 93 (39.1%) had it on the second day. Moreover, 92 (38.7%) children had a body temperature between 37°C and 38°C, and 7 (2.9%) had a body temperature higher than 40°C (Table 1). The findings of this study showed that 28 (11.28%) children had UTI and 210 (88.2%) had no UTI.

**Table 1.** Frequency Distribution of the Demographic Characteristics of the Children Examined Based on the Presence or Absence of Urinary Tract Infections<sup>a</sup>

Variable	Without UTI	With UTI	Total
<b>Sex</b>			
Male	93 (44.3)	2 (7.1)	95 (39.9)
Female	117 (55.7)	26 (92.9)	143 (60.1)
<b>Age (months)</b>			
6 – 12	41 (19.5)	7 (25)	48 (20.2)
13 – 24	113 (53.8)	19 (67.9)	132 (55.5)
25 – 72	56 (26.7)	2 (7.1)	58 (24.4)
<b>Time of seizure</b>			
First day	127 (60.5)	18 (64.3)	145 (60.9)
Second day onward	83 (39.5)	10 (35.7)	93 (39.1)
<b>Body temperature (°C)</b>			
< 37	36 (17.1)	4 (14.3)	40 (16.8)
37 – 38	78 (37.1)	14 (50)	92 (38.7)
38 – 39	57 (27.1)	9 (32.1)	66 (27.7)
39 – 40	32 (15.2)	1 (3.6)	33 (13.9)
> 40	7 (3.3)	0 (0)	7 (2.9)

<sup>a</sup>Values are presented as No. (%).

According to the findings, of the children with UTI, 26 (92.9%) were girls, 19 (67.9%) were aged 13 to 24 months, 18 (64.3%) had seizure on the first day, and 14 (50%) had fever with a body temperature ranging from 37°C to 38°C. However, of the children who did not have UTI, 117 (55.7%) were girls, 113 (53.8%) were aged 13 to 24 months, 127 (60.5%) had

seizures on the first day, and 78 (37.1%) had fever with a body temperature ranging from 37°C to 38°C (Table 1).

#### 5. Discussion

The seizure has many different effects on patients. Its likely complications include the reduction of learning and academic failure, poor social communication, and ultimately, problems in recruitment and employment at older ages. It also affects the quality of life of children due to its physical effects including excessive fatigue that impedes effective social and learning activities. Among the emotional and psychological effects of a seizure, social isolation and learning disability can be mentioned. Therefore, paying attention to seizure in children is important (28-30). On the other hand, UTI is one of the most common infections in childhood that brings discomfort to the child, concern for parents, and permanent damage to the kidney. Approximately 15% of children with UTIs develop renal scarring 1 to 2 years after the infection. For this reason, the diagnosis of UTIs in children is highly important (9).

The findings of this study showed that most children had a seizure attack at a body temperature of less than 39°C. In the study of Feiz Alah Zadeh et al., 74 patients (15%) had an axillary temperature below 38°C, of whom 337 (78%) had an axillary temperature between 38°C and 39°C, and 89 (17%) had a temperature of higher than 39°C (31). In a study by Hassanpour Onji et al. in children referring to the pediatric neurology clinic of Hazrat Ali Asghar Hospital, the body temperature was lower than 37°C in 9 patients (8.75%), between 37°C and 38°C in 25 (24.5%), 38°C to 39°C in 48 (46.5%), from 39°C to 40°C in 15 (14.5%), and higher than 40°C in only 6 (5.75%) (32). These findings are consistent with the results of the present study that most children had seizure attacks at body temperatures of less than 39°C.

In the present study, the prevalence of UTI in children with febrile seizure was reported to be 11.28% (28 cases). In the study of Esmaeili et al. in a group of children with seizure, the prevalence of UTI was 8.2% (11). Another study showed that the prevalence of UTI in infants was 9% (33). In one previous study the prevalence of UTI in preschool children was reported to be 5.8% (34). In the study of Mahmoudi et al. in Hamadan primary school children, the prevalence of UTI was 12.8% (6), which are almost consistent with the results of the present study.

The findings of this study showed no significant correlation between UTI and febrile seizure, inconsistent with the results of the another study. In children hospitalized in Mashhad hospitals, which showed a significant relationship between UTI and febrile seizure. These results are discrepant (9). In addition, in a study by Lee et al. that aimed at investigating UTIs in children with a febrile seizure, the

findings showed that the prevalence of UTI in these children was 8%, and no association was found between UTI and seizure-induced fever (33). In the study of Teach et al. which investigated bacterial UTIs and meningitis in children with a febrile seizure, the findings showed no significant relationship between UTI and febrile seizure (34). Moreover, in the study of Momen et al., the findings showed that the prevalence of UTI in children with fever was reported to be 6.6% (35), consistent with the results of the present study that showed no association between UTI and febrile seizure. In the study of Hosseini et al., the prevalence of UTI in neonates with prolonged jaundice was 59.3% (36), which is not consistent with the results of the present study.

One of the strengths of this research was the sampling method. Considering this research used census sampling and prospective method, accurate information would be provided. One of the weak points of this study is the length of the research period; that is, given that this research was conducted over a period of 6 months, its findings cannot be generalized. For this reason, we suggest further research over a longer period to provide accurate and complete information.

### 5.1. Conclusion

UTI and seizure showed no correlation with each other, and further studies should be conducted in other children with febrile seizure.

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### Footnotes

**Conflict of Interests:** The authors declare that there are no conflicts of interest.

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