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Research Article

Epidemiological Characteristics of Febrile Convulsions in Children Referred to the Pediatric Ward of One of the Educational Hospitals in Birjand in 2015-2020 -

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ABSTRACT

Background: Febrile convulsions are the most common type of childhood seizure in children, occurring in 2-5% of children between 6-60 months of age at temperatures above 38°C. This study aimed to investigate and describe Febrile Convulsion's demographic, clinical, and laboratory characteristics in children admitted to the pediatric ward of one of the educational hospitals in Birjand from 2015 to 2020.

Methods: In this cross-sectional study, 589 children with febrile convulsion referred to the pediatric ward of one of the educational hospitals in Birjand from 2015 to 2020 participated. The checklist was completed according to the patients' files. Data were collected in SPSS software (version 16) and analyzed by chi-square and Mann withney U tests at a significance level of $\alpha = 0.05$.

Results: The mean age and birth weight of the children were 24.16 ± 13.14 months and 3021.82 ± 576.8 g, respectively. The mean hospital stay was 2.14 ± 1.43 days. The majority were in the age group of 1 to 2 years and were male. 21.5% had a family history of Febrile Convulsion. Most patients had simple seizures. There was a statistically relationship between the type of seizure and birth weight and blood calcium levels ($p < 0.05$). There was no statistically relationship between Type of seizure with the age and sex of the child, type of delivery, history of hospitalization, previous history of Febrile Convulsion and other laboratory markers in children ($p > 0.05$).

Conclusion: Since most patients with febrile convulsion were in the age group of 1 to 2 years and were male and had a positive family history, it is recommended to be educated about the importance of Febrile Convulsion and the need for prompt referral and additional examinations in health centers.

Keywords: Febrile convulsion, Epidemiology; Birjand; Children

INTRODUCTION

Febrile Convulsion (FC) is the most common type of seizure and childhood neurological problem in children, occurring in 2-5% of children between 6-60 months of age at temperatures above 38°C, in which there is no CNS infection, acute electrolyte disturbance or previous history of seizure without fever [1-3].

There are clinically two types of febrile convulsions: Simple FC, which lasts 10-15 minutes and is generalized as a tonic-clonic and does not occur more than once in 24 hours and Complex FC, which is focal and lasts more than 15 minutes and is accompanied by neurological symptoms after the end of seizure attack and is repeated within 24 hours [4,5].

The prevalence of febrile convulsion varies in different countries and even cities, which indicates the influence of genetic factors and other climatic conditions on the incidence of FC [5]. In our country, the prevalence of febrile convulsion has been reported differently from other causes of seizures in different geographical locations; so that its prevalence in the center was 40.03%, in the east 59.4%, in the south 44.1%, in the west 57.5%, and the lowest prevalence in the northern regions of Iran was equal to 33% [6].

Although its clinical presentation can be very worrying for families, the disease is self-limited and benign and may progress to epilepsy in rare cases. 30-50% of children with FC experience recurrence of the disease. Risk factors for recurrence of FC include age less than one year, family history of FC, seizures at temperatures below 40°C, FC in the early hours of fever, family history of epilepsy, male gender, and complex FC [7].

Children prone to this disease seem to have common characteristics that further study and knowledge of these characteristics will help prevent febrile convulsion.

Previous studies have shown that FC was more prevalent in boys in the first two years of life and in winter, with a higher incidence of complex FC in children born by cesarean section [8] and in children with a family history of FC [9].

The issue of febrile convulsion is one of the topics that, despite the studies, there are always many contradictory disagreements about it; the risk factors for febrile convulsion are not well known, although genetic and environmental factors in its occurrence are essential. Therefore, it is necessary to conduct regional and comprehensive studies to evaluate the characteristics of febrile convulsion to identify at-risk patients through its demographic characteristics such as age,

sex, family history, type of seizure and time from fever to seizure, to take additional measures for preventing recurrence of the attacks. In addition, by informing the families, their worries are reduced, and with the proper training, the correct reaction will be done in re-attacks. In addition, scientific and climate-friendly guidelines should be provided for health care providers and physicians.

To our knowledge, no comprehensive study has been conducted in this hospital. This study aimed to investigate and describe febrile convulsion's demographic, clinical, and laboratory characteristics in children admitted to the pediatric ward of one of the educational hospitals in Birjand in 2015-2020.

MATERIALS AND METHODS

In this cross-sectional (descriptive-analytical) study, 589 children with Febrile Convulsion were referred to the pediatric ward of one of the educational hospitals in Birjand (Vali -Asr Hospital) from 2015 to 2020.

Children whose diagnosis of Febrile Convulsion was confirmed and recorded in medical profile by a pediatrician or neurologist, included the study.

This study was performed at the Birjand University of Medical Sciences, with the following ethics code.BUMS.REC.1399.277.

The data were collected using a questionnaire consisting of the patients' demographic characteristics (age, sex), type of delivery, type of seizure, family history and previous history of febrile seizures, hospitalization history, days of hospitalization, child weight, and results of laboratory tests.

The patient's file was requested from the hospital archives. The questionnaire was completed based on the patients' files.

Data entered in SPSS software and analyzed using chi-square, and mann withney U tests and $\alpha=0.05$ was considered as the significance level.

RESULTS

In the present study, 589 patients participated. The mean age and birth weight of the children were 24.16 ± 13.14 months and 3021.82 ± 576.8 g (700-5000) respectively. While most of them were male 346 patients (58.7%) and were in 1 to 2 years' age group 238(40.4%).

The mean hospital stay was 2.14 ± 1.43 days, ranging from 1 to 12 days. Most visits were in the fall 225(38.3%) (Table 1).

Most patients had simple seizures. 91(16.2%) cases had complex seizures.

The most complex seizures were in the 2 to 3 years' age group and the lowest in the age group of more than three years. There was no significant difference in the type of seizure (simple-complex) with age in the studied children ($p = 0.25$).

Complex seizures were more common in boys than girls, but this difference was not significant ($p = 0.43$).

Most cases of complex seizures were in the fall and spring. But there was no significant difference in the type of seizure with the season of its occurrence ($p = 0.45$).

The frequency of seizures was not significant according to the history of hospitalization and previous history of febrile seizures in children with febrile convulsion ($p > 0.05$).

The frequency of complex seizures in infants born with a vaginal delivery was significantly higher than in cesarean section ($p = 0.02$).

The frequency of complex seizures was higher in infants weighing less than 2500 g than in infants weighing more than 2500 g, but this difference was not significant ($p = 0.92$) (Table 2).

Among the laboratory tests performed in children with febrile seizures, only blood calcium was significantly higher in patients with complex FC than in patients with simple FC ($p = 0.01$).

Other laboratory tests did not differ significantly between the complex and straightforward FC groups (Table 3).

DISCUSSION

The present study, which aimed to determine the epidemiological characteristics of FC, showed that most cases were in the age group of 1 to 2 years and were male.

FC prevalence before six months and after six years is rare, and its highest prevalence has been reported between 14 and 18 months of age [10].

In the studies of Ardabil and Tabriz, the highest prevalence of FC in the second year of life [2,11] and Abbaskhanian study [10] in Mazandaran, the most common age group was 1 to 2 years old. In Stelzle's study in an urban Tanzanian population, most febrile seizures occurred before the age of two, too [12].

In the present study, the majority of patients were boys. In the studies conducted in Sari, Isfahan, Tehran, Sanandaj, Ardabil, and Tabriz, the majority were male [2,3,8,10,11,13].

Table 1: Characteristics of children with febrile convulsion referred to the pediatric ward of Vali -Asr Hospital.

Characteristics	Number	Percent
Age groups	≤1 year	107 18.2
	1-2 year	238 40.4
	2-3 year	184 31.2
	≥3year	60 10.2
sex	boys	346 58.7
	girls	243 41.3
Season	Spring	154 26.2
	Summer	100 17
	autumn	225 38.3
	winter	108 18.4
Type of delivery	NVD	335 59.4
	Cesarean section	229 40.6
Birth weight	<2500 gr	78 14.9
	>2500 gr	444 85.1
History of hospitalization	87	15.1
History of FC	167	28.8
Family history of FC	124	21.5

Table 2: Comparison of the type of seizure (simple-complex) in children with FC according to the characteristics of the participants.

Characteristics	Simple	Complex	p value*
	N (%)	N (%)	
Age groups	≤ 1 year	90(84.9)	0.25
	1-2 year	199(86.1)	
	2-3 year	137(79.2)	
	≥ 3year	45(86.5)	
Sex	boys	269(82.8)	0.43
	girls	202(85.2)	
Season	Spring	126(85.7)	0.45
	Summer	81(87.1)	
	autumn	177(80.8)	
	winter	87(84.5)	
Type of delivery	NVD	260(81)	0.02
	Cesarean section	192(88.1)	
Birth weight	< 2500 gr	62(83.8)	0.92
	≥ 2500 gr	358(84.2)	
History of hospitalization	Yes	63(79.7)	0.30
	No	400(84.4)	
History of FC	Yes	125(82.8)	0.69
	No	345(84.1)	

*chi-square test

In terms of demographic characteristics, the participants in this study are similar to other studies conducted in the country. Still, since we examined only one center, patients referred to this center do not represent all patients with FC. There is a need for multicenter studies with larger populations.

Differences in studies can be due to how the study population was selected in various studies.

In the present study, most patients had referred in autumn. In studies in Isfahan and Sari, Febrile convulsion was more common in winter [8,10].

Because the rate of viral and bacterial infections that lead to high fever in children is higher in the cold seasons of the year, more febrile seizures are expected in autumn and winter.

Most patients had simple seizures in the present study, and 16.2% of cases had complex seizures. Simple fever convulsions account for 70-75% of all febrile convulsions [14]. In studies conducted in Ardabil [11] and Mazandaran [10], the most common type of FC was simple type.

The type of seizure in children with febrile seizures was insignificant in terms of age. Complex seizures were more common in boys than girls, but this difference was negligible.

In a study in Isfahan, there was no significant relationship between age, sex, and type of FC [8] which is consistent with our results.

21.5% of patients had a family history of febrile convulsion in the present study. Several studies indicate the role of genetics in the development of febrile seizures. The prevalence of family history of febrile convulsion is 26.4% in Isfahan and 35.5% in Tabriz [2,8].

In a study in Tehran, there was a history of first-degree familial seizures in 21.4% of children. 28.9% of children reported a history of recurrent seizures, and recurrent seizures were more common in children with a positive family history [13].

One of the reasons for different family history in studies can be due not remembering seizures in childhood or refraining from expressing their seizure history due to cultural and personal issues.

Table 3: Comparison of laboratory indices in children with FC by type of seizure.

Tests	Simple FC		Complex FC		p value ^a
	Mean ± SD	Median (Q1-Q3)	Mean ± SD	Median (Q1-Q3)	
WBC(count 10 ³)	11.52 ± 5.44	10.3(8.1-14.9)	11.58 ± 4.91	10.4(7.4-14.5)	0.62
Hb(mg/dl)	11.7 ± 5.42	11.5(107-12.2)	11.34 ± 1.29	11.5(10.5-12.1)	0.29
HCT	33.83 ± 3.75	34(32-35)	34.02 ± 3.37	34(31-36)	0.94
PLT(count 10 ³)	298.48 ± 100.42	281(230-350)	269.20 ± 106.99	265(230-343)	0.64
BS(mg/dl)	116.31 ± 33.12	110(95-130)	125.58 ± 54.53	107(92-146)	0.94
Na(mg/dl)	136.42 ± 5.94	136(135-138)	137.17 ± 4.17	137(135-139)	0.62
K(mg/dl)	4.36 ± 0.56	4.3(4-4.7)	4.35 ± 0.41	4.3(4.1-4.7)	0.87
Ca(mg/dl)	9.58 ± 0.68	9.6(9.2-10)	9.36 ± 0.97	9.4(8.9-10)	0.04
Urea(mg/dl)	25.73 ± 8.1	25(20-30)	25.96 ± 13.35	24(18-31)	0.26
Cr(mg/dl)	0.54 ± 0.09	0.5(0.5-0.6)	0.54 ± 0.14	0.5(0.5-0.6)	0.14

The frequency of complex seizures in infants born with a vaginal delivery was significantly higher than in cesarean sections. In a study in Isfahan, 66% of children with febrile seizures were born by cesarean section [8]. Differences in studies can be attributed to the number of cesarean sections performed in different places, especially the number of elective cesarean sections without indication. In Mahmood NS study, vaginal delivery was significantly associated with complex seizures, and no relationship was observed between other factors such as anemia, family history, previous history, birth weight, and type of seizure [15], which is consistent with our results.

Among the laboratory tests performed in children with febrile seizures, only blood calcium was significantly higher in patients with complex FC than in patients with simple FC. In a study in Isfahan, there was no significant relationship between serum potassium, calcium, and sugar levels with fever and seizures [8].

Also, in a study in Sanandaj was observed no statistical relationship between the type of seizure and the serum level of electrolytes [3].

There was no significant relationship between blood hemoglobin level and type of seizure, and the hemoglobin level of patients with febrile seizures was in the normal range. This is similar to the results of the Abbaskhanian, et al. [16] study.

Some studies have shown that anemia can be a risk factor for the onset and recurrence of febrile convulsion [10,17].

In the Razaq M study [18], the mean hemoglobin, hematocrit, and Iron in children with Febrile Convulsion were significantly higher than in the control group.

Since anemia and growth disorders can affect the function of the nervous system and affect the incidence of this disease in children, and inconsistent results in various studies, there is a need for further studies in this field.

CONCLUSION

Because most patients with febrile convulsion were in the age group of 1 to 2 years and were male and had a positive family history, it is recommended to be educated about the importance of febrile seizures and the need for prompt referral and additional examinations in health centers. It is also suggested that more studies be done about FC risk factors in different communities.

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