

ASSOCIATION BETWEEN RISK FACTORS AND RECURRENCE OF FEBRILE SEIZURES IN CHILDREN AGED 6 MONTHS TO 60 MONTHS

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ABSTRACT

Background. Febrile seizures are the most common neurologic disorder among infants and young children. Hence present study was conducted to estimate the various risk factors for recurrence of febrile seizures in children aged 6 months to 60 months admitted in our tertiary care hospital. **Methods.** In this prospective observational study, 223 children were diagnosed as having febrile seizure based on the clinical presentation and enrolled. All the children were followed up for 24 hours from the onset of fever. **Results.** 111 children (49.8%) had developed recurrent FS in the upcoming years. Age less than 1 year, male sex, duration of fever less than 24 hours, multiple re-febrile seizures, anemia, low serum sodium level at the time of presentation were having statistically significant relationship ($p < 0.05$). **Conclusions.** We concluded from the present study that age at first febrile seizure less than one-year, male sex, duration of fever less than 24 hours, multiple recurrent febrile seizure were having statistically significant relationship ($p < 0.05$) with recurrence of FS. Duration of seizure, family H/o FS, anemia, low serum sodium level at the time of presentation didn't have significant relationship with recurrence of FS.

Keywords: Children, febrile seizures, recurrence, risk factors.

INTRODUCTION

Febrile seizures are the most common neurologic disorder among infants and young children. They are an age-dependent condition, occurring in 2 to 5 percent of children younger than five years of age (1). Simple febrile seizures, defined as generalized seizures lasting less than 15 minutes and not recurring for 24-hour period. While they eventually recur in one-third of children during their early childhood, otherwise they are benign condition (2).

Febrile seizures which are focal, prolonged, multiple within the first 24 hours are defined as complex febrile seizures. Complex febrile seizures are a more heterogeneous cluster of phenomena, associated with a greater risk of recurrence during early childhood and an increased probability of afebrile seizures in the future (3). Incidence of febrile seizure is between 2 % and 5% amongst Caucasian children, 5 to 10% in India and 8.8% in Japan. About 3 to 4% of all children had at least one febrile seizure. The

Peak of occurrence of febrile seizure is between 12-18 months of age. Recurrence rate ranges from 21 to 29.3% in the third world. In the west the recurrence rate was 30 to 50% (4).

There were so many risk factors present for febrile seizure recurrence. There is need to investigate the effect of age, gender, temperature, past history of seizure, developmental and family history, duration, type and number of seizures on recurrence of febrile seizures (5). Hence present study was conducted to estimate the various risk factors for recurrence of febrile seizures in children aged 6 months to 60 months admitted in our tertiary care hospital.

MATERIALS & METHODS

The present prospective observational study was conducted at Department of Pediatrics, Pacific Medical College and Hospital, Udaipur. The study duration was June 2019 to May 2020. Children aged

6 months to 60 months with both simple and complex febrile seizures admitted in Pacific Medical college and Hospital, Udaipur. Institutional Ethics Committee Clearance was obtained before start of study and written and informed consent for the procedure was obtained from all the patients. Strict confidentiality was maintained with patient identity and data and not revealed, at any point of time.

Children with seizure suspected to have central nervous system infection (meningitis, encephalitis) on first day itself and also diagnosed following LP, children with seizure due to hypocalcemia and hypomagnesemia, children with at least one episode of a febrile seizure, seizure following trauma, drug or toxin intake and seizure in children with CSOM were excluded from the present study. After getting informed written consent from the parents or care givers, other etiologies causing fever with seizure were excluded by history, clinical examination and relevant investigations. Children with recurrent febrile seizures were reviewed with their old records. All children either first episode or recurrence were followed up fortnightly in specialty OPD during the study period. Missed children were followed up whenever they had come to OPD.

After exclusion by history, examination and investigation remaining children were subjected to Hb levels, Random blood sugar, Renal function test, Serum electrolytes, Brain imaging and EEG and CSF analysis. All the data was recorded on Microsoft excel spread sheet and data analysis was done at 10% alpha and 90% confidence interval using SPSS v16 software. Test of significance were applied on collected and organized data and p value less than 0.05 was considered as statistically significant association between study variables.

RESULTS

In present study, 223 children were diagnosed as having febrile seizures based on the clinical presentation and enrolled. 40 children (17.9%) were less than one year old and rest of them (82.1%) were more than one year old. 146 children (65.5%) were males and 77 children (34.5%) were females. The male female ratio is 1.9: 1. In this study, the prevalence of febrile seizures was 4.25% among total admission. Most of the children, 181 (81.2%) developed febrile seizure within the period of 24 hours from the onset of fever. Rest of them, 42 (18.8%) had experienced febrile seizure after 24

hours from the onset of fever. 201 (90.1%) had experienced simple febrile seizure and others , 22 (9.9%) had complex febrile seizure. Hence, simple febrile seizure is the most common type of febrile seizure. 160 patients (71.7%) experienced seizure lasting for less than 5 minutes and 63 patients (28.3%) had seizure lasting for more than 5 minutes. 111 children (49.8%) had developed recurrent febrile seizures in the upcoming years. Rest of the children (50.2%) did not have even one recurrence. (Table 1)

Table 1: Distribution of study subjects according to the study parameters.

		Frequency	Percent
Duration of Fever	<24 hour	181	81.2
	>24 hour	42	18.8
Type of Febrile seizure	Simple	201	90.1
	Complex	22	9.9
Duration of Seizure	< 5 mins	160	71.7
	> 5 mins	63	28.3
Recurrent FS	No	112	50.2
	Yes	111	49.8

In the present study, among 111 children with recurrent FS, age less than 1year while developing febrile seizure had a statistically significant association with recurrence of febrile seizure ($p = 0.0001$). Male children had a significant association with recurrence of febrile seizure statistically with the p value of 0.006. Duration of fever less than 24 hours prior to the seizure was a significant risk factor for recurrence of febrile seizure ($p = 0.01$). Multiple recurrent febrile seizure had itself increased the recurrence significantly ($p = 0.004$). Family history of recurrent febrile seizure did not have significant association with recurrent febrile seizure in the child ($p = 0.3$). Children with anaemia did not have statistically significant increased risk of recurrent febrile seizure ($p = 0.6$). Sodium level less than 135 did not have statistically significant increased risk of developing recurrent febrile seizure ($p = 0.2$). (Table 2).

Table 2: Distribution of study subjects according to the bivariate analysis for recurrent FS.

		Recurrent FS			Chi sq	P value
		Yes	No	Total		
Age at first FS	<1 yr	0	81	81	125.22	0.0001
	>1 yr	112	30	142		
Sex	Male	63	83	146	7.66	0.006
	Female	49	28	77		
Duration of fever	<24 hr	99	82	181	6.77	0.01
	>24 hr	13	29	42		
Recurrent FS number	1	68	47	115	6.82	0.004
	>1	44	64	108		
Association with family history	No	68	60	128	1.01	0.3
	Yes	44	51	95		

DISCUSSION

In the present study, it has been found that 49.8% of children with FS had experienced recurrence. Similarly, Anil Raj Ojha et al revealed that 51% of enrolled children had developed recurrence during the study period in their study (6). Ausi Indriani et al also found that 37.6 % had recurrent FS out of 154 patients with FS (7). In the study of Jyoti Agrawal et al, 1/3 of children had recurrent febrile seizures among 92 children (8). In our study, we included children aged 6 to 60 months with febrile seizure and found that children with age less than 12 months at first FS (73%) had increased incidence of recurrent FS. Likewise, Nadirah rasyid ridha et al, in their study, revealed that the children having first FS within 18 months of age were 71.37 times more prone for developing recurrent FS (9).

In a study by Ausi Indriani et al, they enrolled the children with FS who were 1 month to 7 years old. There was 43% of children with recurrent FS, who had first FS before their first birthday and 38% at 12 – 24 months, 9% at > 24 months (7). Jyoti Agrawal et al denoted that age less than 1 year at first FS had more recurrence with the p value of 0.04 in their study (8). KK Chan et al revealed that younger age was the most significant risk factor for the

development of recurrent FS in their study ($p < 0.001$) (10). In the present study, 74.8% children with recurrence were males and 25.2% were females. Similarly, Z.Habib et al, in their study, concluded that among children with recurrent FS, 57% were males and 43% were females. Males are 1.3 time more prone for recurrent FS than females (11). In the study of Yusra Fayyadh Alwan et al, they signified that 70.6% of male children had recurrent FS ($p= 0.009$) (12).

In this study, 73.9 % of children with recurrence had seizure within 24 hours of fever and rest of them (26.1%) , after 24 hours. Similar results were obtained in a study by Nadirah rasyid ridha et al, revealed that the children having FS within 12 hours of fever were 4.96 times more prone for developing recurrent FS (9). Ausi Indriani et al found that 46 % of children with recurrence had seizure within 24 hours of fever and 31 %, within 24 to 48 hours of fever in their study (7). Anil Raj Ojha et al, in their study, found that 60 % children had developed recurrent FS within 12 hours of fever ($p =0.026$). Hence, duration of fever less than 24 hours is a significant risk factor for FS recurrence (6).

In this study, among children with recurrent FS, only 45.9% had positive family history (1° relative). Berg

et.al found that 36% of children with positive family history had recurrence at one year and 20% , without family history (13). Nadirah rasyid ridha et.al, in their study, found that patients with positive family history of FS were 6 times more commonly affected with recurrence (9). Ausi Indriani et.al, in their study revealed that family history were positive in only 28 % of patients with recurrent FS and negative in 57 % of patients. Hence, family history of febrile seizure does not affect the risk of recurrence of febrile seizure (7).

In the present study, shown that 59.2 % of children with FS had anemia (Hb < 11 g / dl). Similarly, in a study by Mashaer Abidqader et al, found that 62.7% children with febrile seizure had anemia. Mean Hb was 9.98 ± 1.85 in cases and in controls, 11.14 ± 1.81 (OR 3.26, RR 1.4). Among children with recurrent FS, 57.7% had anemia and 42.3 % had normal hemoglobin level (≥ 11 g / dl). But, it may not be a significant risk factor for recurrent febrile seizure statistically (p = 0.6) (14). Among the children with recurrent FS in the present study, only 27 % had serum sodium level less than 135 meq / L (p = 0.2). In contrast, in the study by M. Kulandhaivel et. al, revealed that, among children with recurrent febrile seizures, the mean sodium (Na⁺) level was 132.50 meq / L (p = 0.0025. Hence, low serum sodium level may not be a significant risk factor for development of recurrent febrile seizure (15).

CONCLUSION

We concluded from the present study that age at first febrile seizure less than one-year, male sex, duration of fever less than 24 hours, multiple recurrent febrile seizure were having statistically significant relationship (p<0.05) with recurrence of FS. Duration of seizure, family H/o FS, anemia, low serum sodium level at the time of presentation didn't have significant relationship with recurrence of FS. The main limitation to this study was that it was a single hospital-based study. Hence, multicentric and community-based studies are needed to generalize the results in general population.

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