

**ASSESSMENT OF IONIZED CALCIUM STATUS IN FEBRILE SEIZURES.**Jyoti Pande¹, Amit Shandilya²¹MS ENT, ²MD Pediatrics¹Medical College Kota, ²Medical College Bhilwara**ABSTRACT:**

Background- Epilepsy is one of the most common disorders of the brain. Methods- Hospital based Prospective, Analytical, Case – Control study.

Results- Mean ionized calcium level was 4.52 ± 0.24 mg/dl and 4.82 ± 0.28 mg/dl in study and control groups respectively and this difference was found statistically highly significant ($p < 0.001$).

Conclusion- The findings suggest that a considerable percentage of children having febrile seizures suffer from calcium deficiency.

Keywords: Hypocalcemia, Serum calcium, Febrile seizures

INTRODUCTION:

The terms convulsive disorder, seizure disorder and cerebral seizures are used synonymously with epilepsy. They all refer to recurrent paroxysmal episodes of brain dysfunction manifested by stereotyped alterations in behavior¹⁻².

Convulsion is sudden change in the dynamic or behavioral activity with limited time and results from the abnormal electrical activity of the brain³. Convulsions are common in the age group of children and one of the most common forms of convulsion in children are febrile seizures which occur in 2-5% of children aged between 6 months and 5 years^{4,5}. Based on the definition of American Academy of Pediatrics (AAP), febrile seizures occur in the absence of central nervous system infection, metabolic disorders and in absence of a history of prior afebrile seizures⁶. Febrile seizures usually have a good prognosis; however, due to the increase in recurrence of such convulsions and the risk of epilepsy in the future, they are considered as serious conditions⁷. Etiology of febrile seizures has not been precisely determined yet. Some of the conditions involved in the etiology of febrile seizures include the

family history of febrile seizures and alcohol and cigarette consumption by the mother during pregnancy^{8,9}. Prematurity, complications during childbirth and recent vaccination are among other risk factors of febrile seizures¹⁰. Febrile seizures occur because the electrical system of the brain has not been adequately evolved so as to struggle against the stress of body temperature increase¹¹.

A common biochemical abnormality causing seizures is hypocalcemia, which may manifest as muscle cramps, tetany, seizures and paraesthesia¹². During any acute febrile disease, disturbances in water and electrolytes occur frequently. It has been suggested that change in serum calcium might enhance the susceptibility to seizures.

MATERIALS AND METHODS**Study design**

Hospital based Prospective, Analytical, Case – Control study.

Study population

Infants and children aged between 6 months to 5 years.

Sample size

60 patients were enrolled in the study out of which 30 were cases which were febrile convulsion patients and 30 were control who was age and weight matched children.

Selection of control

The control group included the age and weight matched children suffering from a febrile illness without seizures, such as urinary tract infection, gastroenteritis and respiratory tract infection, coming to children hospital.

Sampling Method

Convenience sampling

Inclusion Criteria

Children aged between 6 months to 5 years with simple/complex febrile seizures (seizure occurring in developmentally normal child in association with a febrile illness in the absence of CNS infection or any other defined cause of seizures).

Exclusion Criteria

1. Children with previous history of established non febrile seizures

2. Neurological infections (meningitis, encephalitis)
3. Hereditary metabolic disorders
4. Developmental delay
5. Children with history of birth asphyxia
6. Persistent neurological deficits

Data Collection

Demographic data, seizure details, nature of febrile illness, complete developmental history, family history of epilepsy/febrile seizures, temperature at admission, general examination, Systemic examination and nutritional status were recorded (IAP weight for age classification was used to grade protein energy malnutrition) including the final diagnosis was recorded.

Data Analysis

Data was collected from eligible patients on a pre-structured pre-tested Proforma. For data analysis statistical software SPSS-22 version was used and data were analyzed with the help of frequencies, figures, proportions, measures of central tendency and appropriate statistical test.

RESULTS:

Table 1: Distribution of cases according to Ionized Calcium (mg/dl) level in both groups

Ionized Calcium (mg/dl)	Groups				Total	
	Study		Control			
	No.	%	No.	%	No.	%
Abnormal (<4.4)	8	26.67	0	-	8	13.33
Normal (4.4-5.54)	22	73.33	30	100.0	52	86.67
Total	30	100	30	100	60	100
Mean	4.52		4.82			
SD	0.24		0.28			
t	4.80					
p	<0.001					

According to above table, in study group, 8(26.67%) patients had abnormal (<4.4 mg/dl) range of ionized calcium level while in control group no patient had abnormal ionized calcium level.

Mean ionized calcium level was 4.52 ± 0.24 mg/dl and 4.82 ± 0.28 mg/dl in study and control groups respectively and this difference was found statistically highly significant ($p < 0.001$).

DISCUSSION

The present study was undertaken to assess the ionized calcium status in febrile seizures – a prospective case control study. In this Hospital based study 60 cases meeting the criteria were included and randomized equally into two groups: 30 cases and 30 controls. The control group included the age and weight matched children suffering from a febrile illness without seizures, such as urinary tract infection, gastroenteritis and respiratory tract infection coming to hospital.

Convulsions or seizures are one of the important pediatric health problems in developing and developed countries and febrile seizures are the most common seizure disorder in childhood, affecting 2% to 5% of children between the ages of 6 and 60 months¹. It is generally believed that FS is an age-dependent response of the immature brain to fever. This postulation is supported by the fact that most (80-85%) febrile seizures occur between 6 months and 3 years of age, with the peak incidence at 18 months. Although the mechanism of this increased susceptibility is unclear, animal models suggest that there is enhanced neuronal excitability during the normal brain maturation².

Mean ionized calcium level was 4.52 ± 0.24 mg/dl and 4.82 ± 0.28 mg/dl in study and control groups respectively and this difference was found statistically highly significant ($p < 0.001$) in our study.

In a study by Akbayrams et al¹³ where 48 children with febrile seizures were compared with age matched controls and found low serum calcium ($P = 0.001$). In literature there are inadequate studies relating serum calcium in children with febrile seizures.

CONCLUSION

The findings suggest that a considerable percentage of children having febrile seizures suffer from calcium deficiency.

BIBLIOGRAPHY

1. World Health Organization. Atlas: Epilepsy Care in the World. Geneva: World Health Organization; 2005:91.
2. Johnston MV. Seizure in childhood: febrile seizure. 17th ed. In: Nelson's text book of pediatrics, Behrman RE, Kliegman RM, Jenson HB, eds. Pennsylvania: Saunders; 2004. pp. 1994-5.
3. Fallah R, Golestan M. Role of laboratory diagnostic tests in first febrile seizure. J Pediatr Neurol. 2008; 6(2): 129- 132.
4. Miri-Aliabad G, Khajeh A, Fayyazi A and Safdari L. Clinical, epidemiological and laboratory characteristics of the patients with febrile convulsion. J ComprPediatr. 2013; 4(3): 134-7.
5. Graves RC, Oehler K, Tingle LE. Febrile seizures: Risks evaluation and prognosis. Am Fam Physician. 2012; 85(2): 149-53.
6. Kafadar İ, Akıncı AB, Pekün F and Adal E. The role of serum zinc level in febrile convulsion etiology. J Pediatr Inf. 2012; 6: 90-93.
7. Salehiomran MR, Mahzari M. Zinc status in febrile seizure: A case-control study. Iran J Child Neurol. 2013; 7(4): 20-23.
8. Miri-Aliabad G, Khajeh A, Arefi M. Iron status and iron deficiency anemia in patients with febrile seizure. Zahedan J Res Med Sci. 2013; 15(9): 14-17.
9. Mahyar A, Ayazi P, Fallahi M and Javadi A. Risk factors of the first febrile seizures in Iranian children. Int J Pediatr. 2010; 2010: 1-3.
10. Vestergaard M, Hviid A, Madsen KM, et al. MMR vaccination and febrile seizures: Evaluation of susceptible subgroups and long-term prognosis. JAMA. 2004; 292(3): 351-357.

11. Burhanoğlu M, Tütüncüoğlu S, Coker C, et al. Hypozincaemia in febrile convulsion. Eur J Pediatr. 1996; 155(6): 498-501.
12. Malhotra Y, Campbell D. Pediatric hypocalcemia, 2014. Available at: <http://www.emedicine.medscape.com/article/921844Overview/>
13. Akbayram S, Cemek M, Buyukben A, Aymelek F, Karaman S et al. Major and minor bio-element status in children with febrile seizure. Bratisl Lek Listy 2012; 113(7):421-3.