



ASSOCIATION OF FEBRILE SEIZURE WITH HYPONATREMIA- A PROSPECTIVE STUDY

Dr. Milind Suryawanshi

Assistant Professor ,Dept. of Pediatrics, Indira Gandhi Govt. Medical College,Nagpur.

Dr. Dipak Madavi*

Associate Professor, Dept. of Pediatrics, Indira Gandhi Govt. Medical College, Nagpur. *Corresponding Author

Dr. Pranay Gandhi

Assistant professor, Department of Community medicine, GMC, Chandrapur

ABSTRACT

Background & Objective-Febrile seizure is the most common seizure disorder in the pediatric age group and often recurs within the first twenty four hours. It has been observed that children have lower serum sodium levels was a risk factor for recurrence of febrile seizure. The study was conducted to ascertain the role of serum sodium level in the first episode of febrile seizure and as a predictor of seizure recurrence within the same febrile illness.

Material and methods- It was a prospective observational study conducted at Tertiary medical teaching hospital, in Department of Pediatrics. 55 Children of age 6 months to 60 months presenting with first episode of seizure with fever in our Hospital were selected for the study. Serum sodium levels were evaluated in all the children. **Results-** Sr. Sodium level reveals that in 72.73% of the children Sr. Sodium Level was ≤ 135 whereas in 27.27% it was > 135 and mean level was 133.49 ± 6.02 .

Conclusion- Measurement of the serum sodium in a child with febrile seizures helps in predicting seizure recurrence within the same febrile illness.

KEYWORDS : Febrile Convulsion, Sr.sodium.

INTRODUCTION-

Febrile seizure is the most common seizure disorder in childhood, generally having an excellent prognosis but may also signify a serious underlying acute infectious disease such as sepsis or bacterial meningitis. A simple febrile seizure is usually associated with core temperature that increases rapidly to ≥ 39 degree. It is initially generalized & tonic-clonic in nature ,lasts a few seconds & rarely up to 15 min. is followed by brief postictal period of drowsiness & occurs only once in 24 hr. Risk of recurrence in febrile

convulsion is 30–40 % and half of these go on to get a second recurrence. Convulsions in children generate a huge amount of fear in the parents or caregivers regarding the child's illness. One of the most frequently asked question is the probability of another convulsion during the febrile episode. During routine electrolyte studies in patients with febrile convulsions, some researchers found the serum sodium level to be lower in children with febrile convulsion hence we conducted this study to understand the association between febrile seizures and hyponatremia.

MATERIAL AND METHODS-

This was a hospital based observational study with prospective design in which 55 children were studied from July 2011 to October 2013 who satisfied the inclusion and exclusion criteria in the department of paediatrics in a tertiary teaching hospital in central india.

Inclusion criteria:

Children of age 6 months to 60 months presenting with first episode of seizure with fever.

Exclusion criteria:

1. Children with other neurological disorders like cerebral palsy, mental retardation, past history of meningitis with seizure.
2. Fever after episode of Seizure.
3. Patient on antibiotic for more than 48 hours before reporting our Hospital.

Informed written Consent was taken from the parents of the patient. The clinical evaluation of the selected patient included

detail history, examination and necessary investigations for the relevant problem for which they are admitted.

RESULTS-

A total of 55 patients were studied out of which 25.45% were male and 12.73% female children were in the age of 6-12 months, 14.55% of male and 7.27% of female children were in the age of 12-18 months and 18.18% males and 21.82% females were in the age group of 18-60 months respectively. Mean age of the male children was 20.40 ± 14.61 years and that of female children were 25.56 ± 16.21 years.

(table 1 comes here)

Distribution of children according to their Sr. Sodium level reveals that in 72.73% of the children Sr. Sodium Level was ≤ 135 whereas in 27.27% it was > 135 and mean level was 133.49 ± 6.02 .

(figure 1 comes here)

DISCUSSION-

Seizure activity can begin in a very discrete region of cortex and then spread to neighboring regions, there is a seizure initiation phase and a seizure propagation phase. Initiation phase is characterized by two concurrent events in an aggregate of neurons.

1. High-frequency bursts of action potentials and
2. Hyper synchronization.

The bursting activity is caused by a relatively long-lasting depolarization of the neuronal membrane due to the influx of extracellular calcium, which leads to the opening of voltage-dependent sodium channels which leads to an influx of sodium. In the case of hyponatremia due to deficiency of sodium ion, more calcium ion influx, and generation of repetitive action potential which will cause repetitive seizure initiation⁶⁻⁸. Fever plays an important role in causing disturbances in fluid and electrolyte imbalance. Hyponatremia has been thought to enhance the susceptibility to seizures associated with febrile illness in childhood.

Sodium levels are lower in those children with complicated convulsions in comparison with those having simple convulsions. The sodium concentrations are lowest in children with repeated seizures compared with children having simple or other complicated types of febrile seizures such as focal seizures¹⁰. The electrolytic modification of overall hyponatremia is probably due to the syndrome of inappropriate antidiuretic hormone³ may have a role in short-term relapses of febrile convulsions. Hyponatremia has been documented in some children with high fever, without seizures, it may be that hyponatremia in predisposed subjects lowers the threshold of neuromuscular excitability¹¹⁻¹⁶.

In our study found 40 (72.73%) patient with hyponatremia. The normal range for the method being 135-145 mmol/L². It is also minor risk factors for recurrence of febrile seizures.

In a study done by Rutter N et al(1977)³, Karimzadeh P et al(2008)⁴ and Nadkarni J et al(2011)⁵ were found 14 (8.5%),9 (2.9%) and 19 (27%) patient with hyponatremia respectively. Our finding in this study was higher as compared with following above various studies.

Table 3—Showing the summary of various studies of febrile seizures with low serum sodium level (%).

Authors	Low serum sodium level (%)
Rutter N et al (1977)	8.5%
Karimzadeh P et al (2008)	2.9%
Nadkarni J et al (2011)	27%
PRESENT STUDY	72.73%

CONCLUSION-

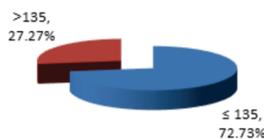
Febrile seizures may be extremely frightening events to parents and some may fear that their child is dying during the seizure. If the child through repeat convulsion, the parents are more worried about it. Measurement of serum sodium is a valuable investigation in the child with febrile convulsion. **The lower the serum sodium, higher the probability of a repeat convulsion.** This knowledge may be of practical value in deciding whether to admit the child or allow it to return home and in advising parents or caregivers the risk of a repeat convulsion. In addition, the hyponatremia in children with recurrent conclusion is due to inappropriate secretion of antidiuretic hormone. The inappropriate anti-diuretic hormone secretion is best treated by fluid restriction. It seems reasonable, therefore that if a child is admitted to hospital after a febrile convulsion and is not dehydrated, and then an excessive fluid intake should be avoided. Such a policy, however, might be dangerous in a child treated at home³. Febrile seizures are a common benign disorder with an excellent outcome. Considering the results obtained from data, we suggest that the serum sodium level examinations are needed for Febrile Seizure particularly.

Tables and charts:

Table 1: Age wise and Gender wise distribution of children

Age Group	Male	Female	Total	Percentage(%)
6-12 mth	14(25.45%)	7(12.73%)	21	38.18
12-18 mth	8(14.55%)	4(7.27%)	12	21.82
18-60 mth	10(18.18%)	12(21.82%)	22	40.00
Total	32(58.18%)	23(41.82%)	55	100.00
Mean±SD	20.40±14.61	25.56±16.21	22.56±15.37	mth
Range	6-60 mth	6-60 mth	6-60 mth	

Figure 1 : Showing Serum Sodium Level in children



Mean ± SD: 133.49±6.02
Range: 115-148

REFERENCES

- Mikati MA. Seizures in childhood. In: Behrman RE, Kliegman RM, Jenson HB, Stanson BF editors. Nelson textbook of pediatrics.19th ed. Philadelphia: Saunders Elsevier press; 2012. p. 2013-2025.
- Lo SF. Reference interval for laboratory tests and procedure. In: Behrman RE, Kliegman RM, Jenson HB, Stanson BF editors. Nelson textbook of pediatrics.19th ed. Philadelphia: Saunders Elsevier press; 2012. p. 2466.
- Rutter N, Smales OR. Role of routine investigations in children presenting with their first febrile convulsion. Arch Dis Child. 1977 Mar;52(3):188-91.
- Karimzadeh PFahimazad A, Poormehdi MS. FEBRILE CONVULSIONS: THE ROLE PLAYED BY PARACLINICAL EVALUATION. Iran j child neurology. 2008 Oct;21-24.
- Nadkarni J, Binaykiya I, Sharma U, Dwivedi R. Role of sodium levels in prediction of seizure recurrence within the same febrile illness. Neurology asia 2011; 16(3):195-197.
- Fallah R, Akhavan Karbasi S, Golestan M. Afebrile seizure subsequent to initial febrile seizure. Singapore Med J. 2012 May;53(5):349-52.
- Ganong WF. Review of medical of physiology. 21st ed. Place of publication: Lange; year chapter 32, circulation through special regions; p. 614-632.
- Ghai OP, Paul VK, Bagga A. Ghai Essential pediatrics. 7th ed. New Delhi: CBS Publishers & distributors; 2010. Chapter 17, Central nervous system; p. 519-565.
- M Kulandaivel et al, Serum Sodium levels and probability of recurrent febrile convulsion; International journal Of Scientific study 5(2), 5-8, 2017.
- Rutter N, O'Callaghan MJ. Hyponatraemia in children with febrile convulsions. Arch Dis Child 1978;53:85-7.
- Bavaister M. Relevance of a family history of seizures. Arch Dis Child 1983;58:404-5.
- Aderson RJ, Chung HM. Hyponatremia a prospective analysis of its epidemiology and the pathogenic role of vasopressin. Ann Intern Med 1985;102:164-8.
- Hauser WA, Annegers JF, Anderson VE, Kurland LT. The risk of seizure disorders among relatives of children with febrile convulsions. Neurology 1985;35:1268-73.
- Berg AT. Are febrile seizures provoked by a rapid rise in temperature? Am Med J Dis Child 1983;147:1101-3.
- Maytal J, Shinnar S. Febrile status epilepticus. Pediatrics 1990;86:611-6.
- Wolf SM. Controversies in the treatment of febrile convulsions. Neurology 1979;20:287-90.