RESEARCH ARTICLE

SIMPLE FEBRILE SEIZURE: THE ROLE OF SERUM SODIUM LEVELS IN PREDICTION OF SEIZURE RECURRENCE DURING THE FIRST 24 HOURS

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Abstract

Objective

Simple febrile seizures are the most common form of childhood seizures, often recurring within the first twenty-four hours. This study was conducted to determine the probable role of low serum sodium levels in predicting seizure recurrence in febrile children.

Materials & Methods

For the study, 226 patients with seizures, aged between 6 months to 5 years, were divided into 3 groups of simple febrile seizure, simple febrile seizure with recurrence, and the control group of afebrile patients with seizures. For all groups, serum sodium levels were evaluated.

Results

The mean age of our cases, predominantly male, was 22 months. No significant difference was observed in the serum sodium levels between the simple febrile seizure and the simple febrile seizure with recurrence groups (P value 0.465); however a significant relative hyponatremia was observed in the simple febrile seizure group as compared to the afebrile seizure control group (P value: 0.016).

Conclusion

Based on the findings, although serum sodium levels cannot assist in prediction of recurrence of simple febrile seizures in children, relative hyponatremia may predispose the febrile child to occurrence of simple febrile seizure.

Key words: Simple febrile seizure, children, serum sodium levels.

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Introduction

Febrile seizure is the most common form of seizure in pediatrics. Two to five percent of children experience febrile seizure, of which 65-90% are simple febrile seizure (1, 2, 3), seen more commonly in males (4). The Simple febrile seizure is single, generalized seizure that lasts less than 15 minutes in children from six months to five years old, and occurs more commonly in some families (5, 6).

Controversies exist regarding the role of relative hyponatremia in prediction of febrile seizure recurrence within first 24 hours.

In an American study of 175 patients, findings showed no difference between serum sodium levels of the simple febrile seizure group and the recurrent simple febrile seizure group (7); they did however show a statistically significant difference in serum sodium levels of the afebrile and febrile groups, in that the serum sodium levels of the latter were lower than those of the former.

In another study (8) conducted on 69 patients with febrile seizures, the researchers found low serum sodium levels in the case group, compared to the controls which included afebrile children and febrile children without seizure suggesting the role of relative hyponatremia in recurrence of simple febrile seizures. Another European study (9) also showed that low serum sodium levels in patients with simple febrile seizure can predict seizure recurrence during the first 24 hours.

Considering the contradictory reports and the importance of pediatric febrile seizures and their possible recurrence within the first 24 hours, we conducted this study to investigate the role of serum sodium levels in predicting the recurrence of simple febrile seizure during first 24 hours, since at that stage, detection of relative hyponatremia as a predicting factor may be helpful in the evaluation of simple febrile seizure patients at hospitalization.

Materials & Methods

This study, conducted in the Ghaem and Dr. Sheikh hospitals in Mashhad, from October 2006 until December 2007, included 266 patients, aged 6 months to 5 years, admitted for seizure attacks; they were divided into three groups, i.e. the simple febrile seizure group (151 patients), the simple febrile seizure with recurrence group (50 cases) and the control group of 61 patients with a first episode of afebrile seizure. All relevant data was collected by pediatric resident using specific questionnaires.

The first group included those who had a single, generalized seizure of less than a 15 minute-duration and a fever of 38.C or over (simple febrile seizure group); the second group, similar to the first, had in addition a recurrence of seizure within the first 24 hours (simple febrile seizure with recurrence group), and the third group, or controls, consisted of afebrile cases with a generalized seizure episode of less than 15 minutes.

Exclusion criteria were neurodevelopment delay, meningitis and encephalitis, focal seizures, malabsorption syndrome and severe malnutrition. Data was analyzed with SPSS 13.5. Sodium level comparisons of the three groups were analyzed using one way analysis of variance, and the Bonferroni's test was used to detect differences between groups. Confidence Interval (CI 95%) was calculated for mean serum sodium levels of the three groups, and P value< 0.05 was considered statistically significant.

Results

Mean age of participants was 22.54 months, with a male predominance. Age distribution is shown in figure 1. In the group with simple febrile seizure, there were 155 patients (90 males), mean age 23.15 months. In simple febrile seizure with recurrence group, 50 cases (30 males, rest females); mean age was 22.74 months. The control group consisted of 61 cases (34 males and 27 females), mean age 20.85 months.

Mean serum sodium level of the simple febrile seizure group was 133.39(SD10.50), being 134.40(SD04.05) in the simple febrile seizure with recurrence group, and 136.50 (SD04.13) in the control group (Table 1).

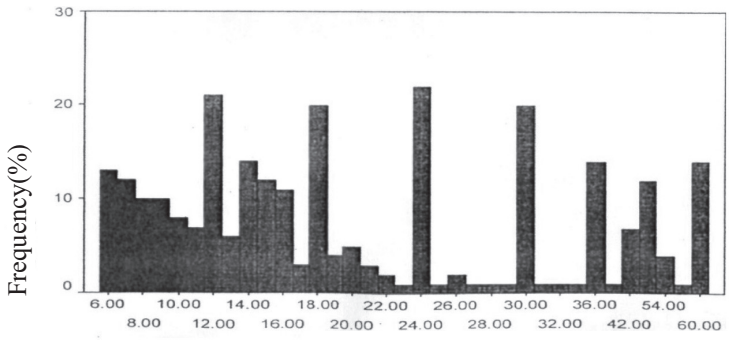

Fig.1: Age distribution in our Patients

Table 1: Mean serum sodium levels in 3 studied groups(meq/L)

Group	Number	Mean serum Sodium levels	SD	Minimum of mean levels	Maximum of mean levels	P value
Simple febrile seizure	155	133.39	10.50	131.72	135.06	0.016
Afebrile seizure	61	136.50	4.13	135.44	137.56	0.193
Simple febrile seizure with recurrency	50	134.40	4.05	133.24	135.55	0.053

No significant differences were seen between the mean serum sodium levels of the simple febrile seizure and the simple febrile seizure with recurrence groups, P value 0.465; nor were any statistically significant difference observed between the serum sodium levels of the simple febrile seizure with recurrence group and the control group, P value 0.193. However statistically significant differences were found between the mean serum sodium levels of the simple febrile seizure group as compared to the control group, P value 0.016.

Discussion

The aim of this study was to determine the role of serum sodium levels in prediction of recurrence of simple febrile seizure within the first 24 hours.

Based on previous studies, Hugen et al. (8), and Kiviranta et al (9), reported that low serum sodium levels played a significant role in recurrent simple febrile seizures during the first 24 hours following a seizure.

Contradictory to earlier European studies, Thoman et al (7) did not find any difference between serum sodium levels of patients with simple febrile seizure and cases with recurring simple febrile seizure within the first 24 hours. In our study, both febrile groups had relative hyponatremia, but with no statistically significant difference. Similar to Thoman et al, we also had three groups of patients including simple febrile seizure, simple febrile seizure with recurrence, and the control group, consisting of afebrile seizure cases, albeit with more patients in each group.

Compared to the European studies, our study had some differences that could possibly, to some extent, explain the differences in results. First, our control group consisted of the afebrile seizure cases, while the Kiviranta study had no controls and the Hugen study control group consisted of feverish patients without seizure. Also, the total number of patients, in all the European study groups was smaller than ours.

However, similar to the findings of Thoman et al (7) we also found significant relative hyponatremia in the simple febrile seizure patients, but normal serum sodium levels in the afebrile seizure group. This finding may be due to mildly raised ADH during acute febrile infection and, as a result, fluid retention; relative hyponatremia may decrease the threshold of febrile seizure. Also, excessive intake of fluids can aggravate hyponatremia and promote febrile seizure. It is recommended that serum sodium levels of children, aged between 6 months to 5 years, admitted to hospital with acute febrile illness, be evaluated. In case of hyponatremia, it would be reasonable to limit the intake of fluids, unless the patient is dehydrated. Also, simultaneously use of drugs reducing urine output, should be avoided

This study showed no statistically significant relative hyponatremia in patients with recurring simple febrile seizures, demonstrating that serum sodium levels cannot predict recurrence of seizures during the first 24 hours.

Limitations of the current study include estimation of seizure length by parents at home and description of type of seizures that occurred before hospital admission. Also it would have been better to evaluate an additional group

including febrile patients without seizures.

Based on the findings of this study, although serum sodium levels cannot assist in prediction of recurrence of simple febrile seizures in children, relative hyponatremia may predispose the febrile child to occurrence of simple febrile seizure. There seems to be no need to evaluate serum sodium levels in patients with simple febrile seizures.

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