EVALUATION OF SERUM SODIUM LEVEL IN SINGLE AND RECURRENT FEBRILE SEIZURES

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ABSTRACT

Background

Febrile seizures are the most common form of childhood seizures. Its either simple (when it is single attack within next 24 hours, plus other characters) or complex (when is recurrent within same period plus other characteristics).

Objectives

This study was conducted to determine the role of low serum sodium levels in predicting single or recurrent febrile seizures among children.

Patients and Methods

In this study, 100 patients aged 6-60 months old were enrolled. The patients were divided into two groups: those with single, and those with recurrent febrile seizures. Then 100 children with febrile illness, but no febrile convulsion, taken as a control. For those 3 groups serum sodium levels were studied.

Results

Among the patients, male gender was predominant. Among those with 12-24 months old, positive family history of febrile seizures was significant. The mean serum sodium of patients with single febrile seizure was (137.91), while the mean serum sodium level of patients with recurrent febrile seizures was (139), and the mean serum sodium of control group was (141.42). The P-value of comparison between control and those with single febrile seizure was significant (0.002), but the P-value of comparison between control and those with recurrent febrile seizures was not significant (0.813). There was no significant role of the serum sodium found during admission of the patients.

Conclusion

We found in present study: there was no significant role for the serum sodium during single or recurrent F.S.s. These findings reaffirm the recommendation of the American Academy of Pediatrics not to routinely obtain serum electrolytes in febrile seizures unless clinically indicated.

Keywords: *Febrile seizures, Single and recurrent, Serum Sodium level.*

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INTRODUCTION

febrile seizure is the most common form of childhood seizures. It is a common cause of pediatric admission and parental concern. The reported incidence of FS is varied, ranging from 0.35%–1.5% in China [1] to 14% in Guam [2]. Febrile seizure is defined by the international League against epilepsy as a seizure occurring in association with a febrile illness in the absence of central nervous system infection or acute electrolyte imbalance without prior afebrile seizures [3] in children older than 1 month. While according to Berg, Febrile seizures are defined as seizures occurring between 6m and 6y of age [4]. They are classified as simple, or complex. Febrile seizure is complex if its focal or focal findings are present during the post-ictal period, lasting 10-15 minutes or multiple occurrence of more than one seizure in the same febrile illness [4]. Approximately 30-50 % of children with febrile seizure will have recurrence with later episodes of fever [5, 6].

The American Academy of pediatrics practice parameter does not recommend serum electrolytes be obtained routinely in evaluation of a child with a febrile seizure unless clinically indicated [7]. Two studies in Europe have demonstrated a relationship between serum sodium level and an increase risk of developing recurrent seizures within the same febrile illness. One study by Kiviranta and Airaksinen (1995) reported that sodium levels were significantly lower in children with recurrent febrile seizures as compared with simple febrile seizure without recurrence [8]. They concluded that relative hyponatremia may increase the risk of multiple seizures during the same febrile illness. More over a prospective study Published by Hugen et al (1995) concluded that the probability of a repeated episodes of febrile seizures within the same febrile period, appeared to be related to the lower serum sodium level [9]. In another study done by Mukhalad Abdulkareem Ghani (2014) in Erbil, Kurdistan, Iraq, found that the age of children and hyponatremia were risk factors for febrile seizures development within next 24 hours period [10]. If hyponatremia is a risk factor for febrile seizures recurrence within next 24 hours, this will have potential impact on the approach to the role of serum sodium and hyponatremia in prediction of both single and recurrent febrile seizures among our children.

PATIENTS AND METHODS

In a prospective study in Sulaymani Pediatric Teaching Hospital, serum sodium of (100) children measured whom admitted to the emergency unit, between 1st of March 2015 to 1st of September 2015, with final diagnosis of febrile seizure between the age of 6-60 months old. We followed up them for the next 24 hours. Blood samples were taken by nurses and serum sodium was measured in the laboratory by i-Smart (Mod2013), body temperatures checked by residents (Junior doctors) through axillary rout, corrected and recorded in Celsius (°C), any body temperature in Celsius equal or smaller than (0.5) regarded as (minus) , for example; (38.4) recorded as (38) only. Whether any temperature increment larger that (0.5) to the number regarded as 1+ to the number, for example; (38.6) recorded as (39) Celsius, to avoid errors in reading.

Among these 100 cases, 61 of them got single febrile seizure during first 24 hours of admission, while 39 cases of them got another attack of febrile seizure in such a period. Questioners were designed by researcher and answers recorded, which included: age of patients in months, sex, degree of body temperature on admission, family history of febrile seizure or epilepsies among those children, with duration of fever which felt by parents before the febrile seizure, like any febrile illness which induced the seizure, as upper respiratory tract infections, urinary tract infection …etc.

We excluded acute and chronic diarrheal diseases, endocrine disorders and renal impairments. On the other hand an equal number of children (100) with the same age, taken as a control group. They were visiting hospital for other purposes like; vaccination, surgical operations or the same febrile illnesses without febrile seizures to compare between their serum sodium and the serum sodium of patients, who had single or recurrent febrile seizures. We used the statistical package for social science (SPSS, version 14) and t-test used to compare between the two means. Chi-square test used for categorical variables, P-value of ≤ (0.05) considered significant [10, 11].

RESULTS

In our study which includes 100 cases and equal number of controls, both were at the same age (6 – 60 months), we found that 61 patients had single febrile seizures and (39) cases had recurrent febrile seizures within first 24 hours of admission to the hospital. Among them larger group of cases was those between the age of (12–24 months) old, they were 26/43 of cases with single and 17/43 with recurrent febrile seizures, while those aged (24 – 60 months) old, also had the same incidence, 25/44 with single and 19/44 with recurrent seizures. Those

less than 12 months old were 10/13 with single and 3/13 with recurrent seizures. P-value was not significant for this correlation 0.424 (Table 1).

Regarding the gender, larger number was males with both single 39/63 and recurrent 24/63 of cases with febrile seizure, while females where 22/37 with single and 15/37 with recurrent febrile seizures, again P-value was not significant, which was 0.809 (Table 1).

Family history of epilepsy was found only in 8 cases with either single or recurrent F.S.s. The majority of the others had negative family history 53/84 of cases with single and 31/84 with recurrent seizures, also P-value was not significant, equal to 0.239 (Table 1).

Regarding the body temperature of the patients on admission, we found that those who had body temperature (39 – 40 ^{o}C) was the major group in both variance; 48/77 patients with single and 29/77 patients with recurrent seizures. The least number of patients had body temperature above 40 ^{o}C, which were 4 cases for single and (none) for recurrent seizures. P-value was not significant, 0.929 (Table 1).

When family history of febrile seizures taken from the parents, we found that 19/40 patients with single and 21/40 of patients with recurrent seizures had positive family history. Although 42/60 of cases with single and 18/60 with recurrent seizures had negative family history of this condition, but P-value was significant and equal to 0.024.

About duration of the febrile illness which induced the seizure in days, majority of cases got their seizures within first day of the illness 50/81 cases with single and 31/81 cases with recurrent seizures. Only 11/19 cases with single and 8/19 cases with recurrent seizures, got the problem in the next day of their febrile illness. During analysis P-value was not significant (0.758).

In comparison between the mean of serum sodiums of both genders among patients, we found that 63 cases were males from both groups (those with single and those with recurrent seizures) had mean serum sodium 138.1 meq/L and females were 37 cases with the mean serum sodium 139.7 meq/L, P-value was not significant, 0.260 (Table 2).

While in comparison between the mean of serum sodium of those with single seizures was 137.91 meq/L to the control group which was 141.42 meq/L, P-value was significant 0.002 (Table 3).

The mean serum sodium of the patients with recurrent F.S.s was 138.74 meq/L, P-value was not significant 0.490 (Table 4).

Table 1. Clinical characteristics of the patients.

Variables	Patient with single FS	Patient with recurrent FS	Total	P- value
Age in months				
06-12	10	3	13	
12-24	26	17	43	
24-60	25	19	44	0.424
Total	61	39	100	
Sex				
Male	39	24	63	
Female	22	15	37	
Total	61	39	100	0.809
Body temperature				
38-39 °C	9	10	19	
39-40 °C	48	29	77	0.129
> 40 °C	4	0	4	
Total	61	39	100	
Duration of fever in days				
1>	50	31	81	
1<	11	8	19	0.758
Total	61	39	100	
Family history of epilepsy				
Positive	8	8	16	
Negative	53	31	84	0.239
Total	61	39	100	
Family history of FS				
Positive	19	21	40	
Negative	42	18	60	
Total	61	39	100	

F.S: febrile seizure.

Table 2 .Comparison between the mean of serum sodium and sex in cases groups (single and recurrent febrile seizures).

Groups	Number	Mean serum sodium	P-value
Male	63	138.1	0.26
Female	37	139.7	

Table 3 .Comparison between the mean of serum sodium of patients with single febrile seizure and control group.

Groups	Number of cases	Mean serum sodium	P-value
Control	100	141.42	0.002
Patients	61	137.91	

Table 4. Comparison between the mean of serum sodium control group and patients with the recurrent febrile seizures.

Groups	Number	Mean	P-value
Control	100	141.42	0.813
Patients	39	139	

DISCUSSION

This study showed that febrile seizures were more in boys which support other study [11]. Also its found that about 3rd of febrile seizures were complex type. Which agreed with Berg et al (1996) result [12].

Also we found that febrile seizures incidence was more between the age of 12-24 months (43% of cases) which support the belief that the greatest incidence occurs during such ages with peak at 18 months globally [13, 14]. Although the p-value for both age and gender for this purpose were not significant.

Family history (FH) of epilepsy among patients was not significant ,just like studies done by berg et al [15] and Laditan A A[16] .

This not agreed with studies done by Martin-Fernandez JJet al [17], Offringo etal [18], Berg et al [12], Al Eissa YA et al [19], Kmdesen FU [20], perhaps genetics factors play a role among those communities or there was weak relationship between febrile seizure and epilepsy syndromes.

Family history of febrile seizures among patients was significant and its p-value also. This is in agreement with what mentioned about it in major textbooks which regard febrile seizure as an either autosomal dominant or has a genetic inheritance pattern [21]. In addition to studies done by Bassissco MS et al [22]. Tsubai [23] they elicited positive family history of febrile seizure among 17-22% of cases but in our study it was 40% positive. It may be due to strong genetic background of the families in our community .

Also we found that the body temperature of (39-40 ^{o}C) was a risk factor for inducing febrile seizure because majority of patients got seizures at such degree. This finding was in agreement with other studies done by AL- eissa YA[19] , Van Stuijvenberg Aa et al [21], Offringo et al [18] Alough there are studies which denied this, done by Berg At et al [12], offringo et al [18], El-Radhi[24].

Majority of cases got seizures during first 24 hours of getting febrile illnesses which was consistent with a study done by Bessissco et al [22] who found that 75% of their cases got seizures during first 24 hours of febrile illnesses , were close to our result which was 81%. About serum sodium level of patients, we found that there was no relation between hyponatremia and predication of single and recurrent seizures. Similar result gained by Thomas et al (2004) [24], although he proved that there was no role for hyponatremia to induce febrile seizure recurrence when compared with cases with afebrile seizures.

In contrary there are studies that do not support our ideas [8], but any how still we couldn't confirm the association between hyponatremia and single or recurrent febrile seizures during this study. This supports and reaffirm the recommendation of the American Academy of Pediatrics 2011 guidelines [25] on neurodiagnosis which state not to routinely obtain electrolyte in children with febrile seizures unless clinically indicated.

Lastly in comparison between the mean of serum sodium of patients with their gender there was no significant difference found between them (table2). Regarding the differences between the (serum sodium of patients, with single febrile seizures and the control group, in spite of being both of them isonatremic , it was statistically significant, perhaps the group was having higher serum sodium before they get seizures. Inversely the difference in the mean serum sodium between the recurrent febrile seizures patients and the control groups wasn't significant. This fact needs more studies and taking larger samples.

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