

Research Article

Zinc levels in Febrile Seizure: A Case-Control Study

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Abstract

Objective: Febrile seizure is the most common type of seizure in children. Their incidence is 2-5%. There are different hypotheses about relationship between neurotransmitters and trace elements (such as zinc) and febrile seizure. Zinc, as a major element of some enzymes, plays an important role in the central nervous system (CNS) and can affect some inhibitory mechanisms of CNS. The aim of the present study was to determine whether there were any changes in serum zinc level in children with febrile seizure in comparison with febrile children without seizure.

Materials & Methods: This case-control study was performed on 100 patients aged 6 months to 6 years. This study was conducted between October 2011 to October 2012, on 50 children with febrile seizures (case) and 50 febrile children without seizures (control) that were referred to KS Hegde hospital, Mangalore. Two groups were matched for age and sex. The serum zinc levels in the both groups were determined by atomic absorption spectrophotometry method.

Results: The mean Zinc levels were 132.04 ± 14.7 $\mu\text{g/dl}$ among the cases and 155.09 ± 17.57 $\mu\text{g/dl}$ among the controls, with a p value of 0.264. The mean serum zinc level was significantly lower in the febrile seizure group compared to the control groups but however the value was not statistically significant.

Conclusion: Our findings r The mean serum zinc level was significantly lower in the febrile seizure group compared to the control groups but however the value was not statistically significant. It can emphasize the hypothesis that there is no relation between serum zinc level and febrile seizure in children.

Keywords: Seizures; Febrile; Zinc; simple

1. Introduction

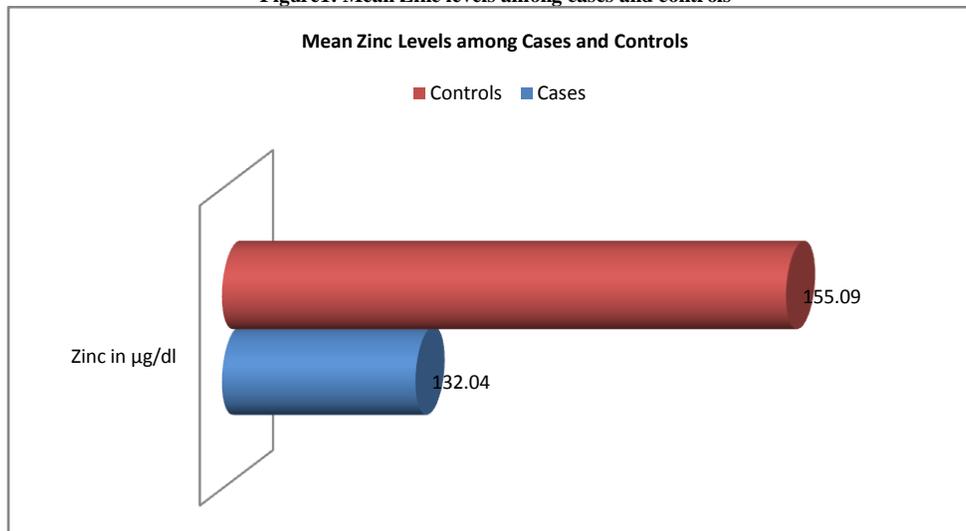
Febrile seizure is the most common seizure in children¹. It occurs in children aged 6 month to 6 years^{2,3}. Their incidence is 2-5% or 4.8/1,000 person-year.⁴ A family history of febrile convulsion (FC), head injury, maternal smoking and alcohol consumption during pregnancy, features of the acute underlying diseases accompanying the FC, and temperature peak have been associated with febrile seizures^{5,6}. To date, pathophysiology of febrile seizure remains unknown, but genetic factors or electrolyte disturbance may have a role in its occurrence or recurrence^{7,8}. Gammaaminobutyric acid (GABA) is an important inhibitory neurotransmitter. Zinc has a regulatory effect on glutamic acid decarboxylase and the synthesis of GABA^{2,7}. Lee *et al.* reported that there is an association between serum zinc level and febrile seizure⁹. In another study by Heydarian *et al.*, it was reported that the serum level of zinc was significantly lower in children with simple febrile seizure compared to febrile children without seizure¹⁰. Garty *et al.* reported that there was no relation between CSF zinc level and febrile seizure¹¹. Considering the above-mentioned findings, we decided to design a study to investigate the serum zinc level in patients with febrile seizures in comparison with febrile children without seizure.

2. Material & Methods

In this case-control study, 50 children aged 6 months to 6 years with febrile seizure (case), and 50 children with fever without seizure (control) admitted to the KS Hegde Hospital, between October 2011 to October 2012, were enrolled in this study. This study was approved by the Ethics Committee of KS Hegde medical academy. A febrile convulsion (FC) was defined as a seizure occurring in a child with documented temperature of at least 37.8°C. One single generalized seizure in 24 hours of fever period with duration less than 15 min and without focal features was defined as a simple FC. Whereas seizures were defined as complex if they lasted more than 15 min, had focal features, or occurred more than once in 24 hours¹². Children with a history of seizure, being younger than 6 month or older than 6 years, having zinc intake, having a history of febrile seizure, electrolyte disorder, structural brain damage, failure to thrive, or acute meningitis were excluded from the study, and children with simple febrile seizure, 6 months to 6 years old, a single generalized seizure, one seizure attack during illness, seizure duration less than 15 min and normal growth, were enrolled in the study. An age, sex matched control group (50 children) were selected among hospitalized children with a febrile illness (such as upper or lower respiratory tract infections, gastroenteritis, or urinary tract infection) without seizure. One mL blood sample was taken from all children at the first 6 hours of admission. All blood samples were centrifuged and separated serum was stored at -8°C. Serum zinc levels were measured by atomic absorption spectrophotometry method. The Zinc level 70-120 $\mu\text{g/dL}$ was considered as a normal range and anything below 70 $\mu\text{g/dL}$ was considered as hypozincemia. Data were analyzed by t-test, χ^2 , ANOVA, and kolmogorov- Smirnov test using SPSS version 18. A p-value less than 0.05 was considered as significant.

3. Results

Figure1: Mean Zinc levels among cases and controls



In the present study, mean Zinc levels were 132.04 ± 14.7 µg/dl among the cases and 155.09 ± 17.57 µg/dl among the controls, with a p value of 0.264.

4. Discussion

Zinc is a fundamental component of body enzymes that modulates CNS activities. CSF hypozincemia activates N Methyl- D-aspartate receptors or disinhibits GABAergic action, thus resulting in febrile convulsion. In our study a low serum zinc level was found in patients with febrile convulsion as compared to the controls i.e. Mean Zinc levels were 132.04 and 155.09 mcg/dl among cases and controls respectively. Similar findings were noted by others. Papierkowski *et al* found that the mean serum concentration of magnesium and zinc were significantly lower in the children with febrile convulsion. In another study by Tutuncuoglu *s et al*, researchers have shown that children with febrile convulsion had significantly higher plasma IL-1 beta and prostaglandin levels and lower serum zinc levels during the acute phase. They concluded that these changes may be responsible for the pathogenesis of febrile convulsion. In the present study mean zinc levels were comparatively lower in FS group compared to FI group, but however it was statistically insignificant.

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