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A study of serum zinc levels in febrile seizures

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Abstract

Febrile seizures are the most common cause of convulsions in children. However, the exact underlying etiology and the pathophysiological mechanisms are yet to be established. Various theories have been put forward regarding the role of trace elements as predisposing factors in causing the convulsions. Among them, Zinc is the most interesting trace element whose role in diarrhea and pneumonia is well proven. Serum Zinc levels has been long associated with the febrile seizures. The main reason is still unknown for febrile seizures. In this prospective study, we evaluated zinc level in children with the first FS attack. Our findings can help clinicians with a fair idea of serum zinc levels about the use of zinc supplements for preventing the recurrence of febrile seizures via regulation of some neurological functions.

Keywords: febrile, seizures, serum, zinc

Introduction

Febrile convulsion or now known as the febrile seizures, is the most common seizure that has been identified in children in our daily paediatric practice ^[1, 2]. Febrile seizures usually occurs between the six months and five years of age and rarely occurs before and after that ^[3]. It is a genetic related age-limited disorder, which only occurs with febrile illness ^[4]. It is important to exclude central nervous system infections and electrolyte imbalance before febrile seizures is diagnosed. Also, patients should have no history of afebrile seizures ^[4, 5]. FS is classified into two simple and complex groups. Simple FS is generalized, lasts for 10-15 minutes, and occurs once in 24 hours. Conversely, complex FS is characterized by prolonged focal seizures, which occur more than once in 24 hours ^[5].

The main mechanism of FS pathophysiology is not clear yet ^[2, 5]. Today, it is known that genetic factors play a major role in the occurrence of FS, although some environmental factors, such as trace elements (e.g., zinc), may be involved in the association of genetic changes with FS occurrence ^[5, 6]. Generally, zinc is an important trace element, which contributes to growth and development, neurological function, nerve impulse transmission, and hormone release ^[7]. It also stimulates the activity of pyridoxal kinase, as the enzyme modulating the level of gamma aminobutyric acid (GABA) ^[8]. In this prospective study, we evaluated zinc level in children with the first attack. Our findings can help clinicians make a about the use of zinc supplements for preventing the recurrence of febrile seizures via regulation of some neurological functions ^[6-11].

Aims and Objectives

Primary objective is to find the serum levels of zinc in febrile convulsions.

Materials and Methods

This study was done in the Department of Paediatrics, Kanachur Institute of Medical Sciences, Mangalore.

This study was done from June 2017 to June 2018

30 patients were selected who were admitted in the Department of Paediatrics.

Careful History was taken and the blood was collected and sent to the Department of Biochemistry for estimation of serum zinc levels.

Inclusion criteria

Confirmed cases of febrile seizures

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Exclusion criteria

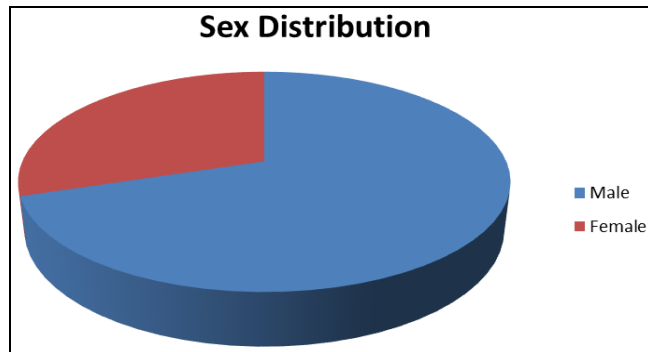
CNS infections.

Patients on multivitamin and minerals.

Results

Table 1: Mean age at admission

Sample size	Mean Age (Months)	Standard deviation
30	30.26 months	±2.74 months



Graph 1: Sex Distribution

Table 2: Temperature at Admission

Sample Size	Mean Temperature (Degrees)	Standard deviation
30	38.45	±0.28

Table 3: Mean Height and Weight

Sample Size	Mean Height (Cm)	Mean weight (Kg)
30	80.21 ± 09.21	11.42 ± 1.43

Table 4: Serum Zinc Levels

Sample size	Mean Serum Zinc Levels (µgm/d)	Standard Deviation
30	49.26	±11.85

Discussion

Limited numbers of studies have been conducted regarding the role of zinc in occurrence of febrile seizures. Burhanoglu M *et al.* reported that the average level of serum zinc in children affected with febrile seizure was less than control group [12]. Ehsani F *et al.* carried out study on 34 children with febrile seizure and 58 healthy children revealed that the serum zinc level in children with febrile seizure was lower than those in control group and the difference was significant, statistically [13]. Tütüncüoğlu S *et al.* reported that the serum zinc level among children with febrile seizure was considerably lower than those in control group [14]. In a study by Hamed SA *et al.*, it was shown that the trace elements such as zinc have crucial role in pathogenesis of seizures [15]. The study of Gündüz Z *et al.* on 102 children with febrile seizures indicated that the serum zinc level in the group affected with febrile seizures was significantly lower than those in control group [16]. In a very latest study by Mishra OP *et al.* on 20 children with febrile seizures and 48 children as control group, it was reported that the serum zinc level in children affected with febrile seizure was lower than those in control group, and the difference was significant [17]. In contrast to our study, Kafadar I *et al.* found no significant difference in serum Zinc concentration in children with febrile convulsion and

other two control groups. This may be due to the smaller sample size in their study [18]. The reason for reduction of serum zinc level in patients affected with febrile seizure is not clear. However, fever and acute infection may have some roles in developing such condition [19]. It is believed that the release of Tumor Necrosis Factor (TNF) and interleukin (IL) during fever or tissue injury may result in reduction of serum zinc level [13]. Izumi Y *et al.* proposed that the hypozincemia during fever trigger the NMDA receptor, one of the members of glutamate family of receptors, which may play an important role in the initiation of epileptic discharge during febrile seizures [20].

Conclusion

The mean serum zinc levels have been reported in this study and this study makes an attempt to be the base line study for comparison for further studies.

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