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SERUM ZINC LEVELS IN FEBRILE SEIZURES AMONG CHILDREN

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ABSTRACT **Objectives:** To find the association of low serum zinc levels in children presenting with febrile seizures. Materials and **Methods:** The study was carried out over two year period in a tertiary care teaching hospital between age group of 6-60 months presenting with febrile seizures. A detailed history, physical examination along with relevant investigations had been done .One time serum zinc level of all study population was measured and documented. Results: total number of children in study group was 109 with incidence of low serum zinc level was25.6%.Majority was in age group 6-24 months 51.3%. **Conclusion:** a low level of serum zinc was observed in children with febrile seizures.

KEYWORDS : febrile seizures, serum zinc level, convulsion.

Serum zinc levels in febrile seizures among children

Febrile seizures are seizures that occur between the age of 6 and 60 months with a temperature of 38* C or higher ,that are not the result of central nervous system infection or any metabolic imbalance and that occur in the absence of a history of prior afebrile seizures.

They are classified as simple (duration <15min and no recurrence within 24 hours period) or complex febrile seizure (prolonged >15 min or recur within 24 hours period).

It is most common convulsive event in children younger than 5 years of age and occurs in 2-5% all children worldwide .Data from United States found an incidence of one half million febrile seizure events occurring per year. Reported incidence of febrile seizures in home based survey from a south Indian state was up to 10%. [1]

Zinc is important for the cognitive function of children due to its role in myelination as well as for release of neurotransmitters Gamma aminobutyric acid and glutamate which are key modulators of neuronal excitability. Zinc plays an important role in cell mediated immunity and oxidative stress.[2]

Apart from genetic factors, abnormalities of trace elements in children have been associated with genesis of febrile seizures .Iron being widely studied till now. We carried out this study to know serum zinc levels among febrile seizures in our area.

METHOD AND MATERIALS

The study was carried out on children of age 6-60 months in tertiary care teaching hospital in Karnataka from January 2015 to December 2017. The study included 109 children with febrile seizures, satisfying the AAP criteria of febrile seizures. The detailed history and examinations were recorded on proforma .The necessary blood and CSF analysis were carried out in the children wherever it was found necessary as per AAP guidelines on febrile seizures. The children who were on zinc supplementations in the past 8 weeks, developmental delay ,Past history of afebrile seizures, malnourished children(moderate/severe), epilepsy, CNS infection were excluded. The blood sample for zinc collected at 6 hours of admission and auto analyzer was used to measure. The normal zinc levels was considered as 60-150µg/dl. The institutional ethical committee permission was taken. Parental and immediate caregivers consent before enrolling for study was taken.

RESULTS

The total number of children with febrile seizures in study was 109 out which boys 73(66%) and girls 36(33%). The incidence of reduced serum zinc level found in 28(25.6%) children. The main cause of fever among study was upper respiratory Tract infections (URTI) 45 followed by Viral exanthema 25(23%). The majority of children with febrile seizures belonged to 6-24months age group 56(51%) ,least in 49-60months 19(17.4%).

Causes for Fever	Number (%)
URTI	45(41%)
Viral exanthema	25(23%)
Acute Bronchiolitis	19(17.4%)
Pneumonia	13(12%)
Urinary Tract Infections(UTI)	7(6.4%)

Age wise distribution of children (months)	Number (%)
6-24	56 (51%)
25-48	34 (31%)
49-60	19 (17.4%)

DISCUSSION

Zinc in body plays vital role in the release of neurotransmitters like gamma aminoibutyric acid and glutamate hence in cognitive function of the child. Zinc also has role in cell mediated immunity and reduction in oxidative stress hence acts as anti inflammatory agent. The discovery of trace element iron supplementation in prevention of recurrence of febrile seizures had generated interest in the role of other trace elements and minerals in genesis of febrile seizures among children.

The incidence of reduced serum zinc levels in our study was 25.6%. This is similar the study from Pakistan with incidence of 26%.[3] In Febrile seizure, serum zinc levels were significantly lower as compared to control (p>,0.05)[4]. This observation is consistent with previous studies by Ehsanipour et al [5] and Ganesh & Lalitha .[6] The mechanism underlying febrile convulsion, which have multiple etiologic factors, are yet not clear. Some changes in levels of proinflammatory cytokines and zinc in serum and cerebrospinal fluid have been suggested to be responsible for pathogenesis of febrile convulsion .The reason for reduction of serum zinc levels in patients affected with febrile seizure is not known. However, fever and acute infections may have some role in developing such conditions. It is believed that the release of tumour necrosis factor (TNF) and interleukin during fever or tissue injury may result in reduction of serum zinc level. Izumi et al (1990) proposed that hypozincemia trigger the NMDA receptor which is one of the members of glutamate family receptor, may play an important role in initiation of epileptic discharge.[4]

A significant proportion of free Zn2+ in the brain is found co localized with glutamate in synaptic vesicles. These synaptic Zn2+ vesicles are present primarily in cortical and limbic structures and is enriched in the hippocampus (Frederickson et al)[7], a brain region frequently implicated in febrile seizures. These Collective data implicate low synaptic Zn2+ as a susceptibility factor in febrile seizures.[8]

Our study had following limitations like not being case control study, no underlying basic serum zinc levels among children of study population and including cases such as respiratory illness like pneumonia.

CONCLUSION

Children with genetic susceptibility for febrile seizures, low serum levels of zinc may play role in developing febrile seizures. Further

multi centre prospective case control studies are needed in such direction.

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