IRON DEFICIENCY AS A RISK FACTOR FOR FIRST EPISODE OF FEBRILE SEIZURE

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ABSTRACT
Iron Deficiency Anaemia was more frequent among children with Febrile Seizure than those with febrile illness alone. Iron Deficiency Anaemia may be a risk factor for First Febrile Seizure. Screening for Iron Deficiency Anaemia should be considered in children with First Febrile Seizure. All the investigations carried out to evaluate iron deficiency anaemia were significantly lower in cases as compared to controls. This suggests that iron deficient children are more prone for febrile seizures.

KEYWORDS
Iron Deficiency Anaemia, Febrile Seizure.


INTRODUCTION
Febrile seizures are the most common seizure disorder in childhood that occur between the age of 6 and 60 months with a temperature of 38 degree Celsius (100.4 F) or higher, that are not the result of CNS infection or any metabolic imbalance, and that occur in the absence of a history of prior a febrile seizures. Between 2 and 5% of neurologically healthy children experience at least 1, usually simple febrile seizure.¹

Iron deficiency is the commonest micronutrient deficiency worldwide, and is a preventable and treatable condition². Iron deficiency causes altered development of neurons in the hippocampus that encodes memories, impaired energy metabolism, delayed maturation of myelin, and slowed visual and auditory evoked potentials.³

Iron deficiency has also been associated with alterations in synaptic neurotransmitter systems including norepinephrine, dopamine, serotonin, glutamate and gamma-aminobutyric acid (GABA). Several studies provide evidence that iron deficiency alter the seizure threshold and is a risk factor for febrile seizures in children.⁴⁻⁷⁻⁸⁻⁹⁻¹⁰⁻¹¹ Studies from Kobrinsky et al.¹² Yousefichaijan et al.¹³ postulate that iron deficiency increases the threshold of neuronal excitation in fever and thus provoke febrile convulsion in children.

In view of conflicting studies, we intend to study the association between iron deficiency and febrile seizures and whether iron deficiency is a risk factor for febrile seizures in children.

AIMS & OBJECTIVES
The purpose of this study was to determine the association between IDA and first FS. Estimation of iron status in children with first febrile convulsion. by the following parameters:
- Hemoglobin.
- Serum ferritin.
- Serum transferrin.
- TIBC.

MATERIAL & METHODS
The study will be a case control prospective study conducted on all children with first febrile seizures and febrile illnesses in Pediatrics Intensive Care Unit and Pediatrics Wards of Yashoda Superspeciality Hospital, Malakpet, Hyderabad from June 2014 to June 2015, after taking consent from parents of cases and controls and also clearance from ethical committee of Yashoda super specialty Hospital, Malakpet Hyderabad.

Cases and Controls comprised of children fever with FS and children with febrile illness, respectively. The blood samples from the 50 children comprising the cases and 50 children comprising the controls constituted the material for the study.

Inclusion Criteria
- Aged between 6months to 6years with First Febrile Seizure.

Exclusion Criteria
- Children with previous febrile seizures, Neurological infections, Developmental delay&Children on Iron therapy.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Cases</th>
<th>Controls</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin</td>
<td>8.82±1.08</td>
<td>9.65±0.98</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Plasma Ferritin</td>
<td>45±63.11</td>
<td>53.91±24.02</td>
<td>&lt;0.03*</td>
</tr>
<tr>
<td>Serum Iron</td>
<td>76.96±45.71</td>
<td>94.90±38.10</td>
<td>&lt;0.037*</td>
</tr>
<tr>
<td>Serum Transferrin</td>
<td>248.57±63.93</td>
<td>290.39±50.02</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>TIBC</td>
<td>435.06±124.98</td>
<td>353.14±103.09</td>
<td>&lt;0.001**</td>
</tr>
</tbody>
</table>

Table 1: Mean values of various blood parameters

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DISCUSSION
Iron deficiency is one of the commonest prevalent nutritional problem in the world today, especially in developing countries, with an average of 5 billion people affected.14 and iron deficiency anaemia is a prevalent nutritional problem among infants, especially between 6 and 24 months.15,16 In developing countries 42–64% of children under 4 years are anaemic, with half of them are suffering from iron deficiency anaemia. In the US, the prevalence of iron deficiency has decreased in infants in the past 30 years, but poor, immigrant infants and toddlers remain at risk. In developing countries the foods rich in iron availability is decreased in poor families.

The important biological effects of iron is it for neurological functioning.17,18 The role of iron in neurotransmitter metabolism.19 myelin formation.20 and brain energy metabolism.21,22 Strong explanations include fundamental changes to early pre oligodendrocyte and oligodendrocyte populations and altered regulation of oligodendrocyte iron uptake via transferrin and transferrin receptors.23,24

A set of analysis for iron deficiency as a risk factor for febrile convulsion was done in the present study, results of which were obtained by biochemical and hematological investigations. In present study mean Hb and plasma ferritin level and serum Iron are low in children with febrile seizures when compared to children without febrile seizures (Controls). Plasma Ferritin is a sensitive, specific and reliable measurement for determining iron deficiency at an early stage, and it may be the best indicator of total body iron status.

Vasvani et al observed significant low serum ferritin levels in children with FFS than in controls. Similar results were observed by Pisacane etal. Kumar IP Letal found highly significant association between iron deficiency and simple FS. Present study there is significant decrease in Hb, serum transferrin levels in cases when compared to controls. There is significant increase in TIBC in cases when compared to controls.

Srinivas Reddy et al,25 did a prospective cohort study recruiting 108 cases with simple febrile seizures and 100 controls with febrile illness without any seizures. This study concludes that Patients with febrile seizures were 1.847 times more likely to have iron deficiency anaemia compared to febrile patients without seizures.

CONCLUSION
Iron deficiency anaemia is more prevalent in children with febrile seizures than those with febrile illness alone. Iron deficiency is a modifiable risk factor for simple febrile seizures in Indian children of age group 6 months to 5 years. Early detection may be helpful for prevention of simple febrile seizures in children of this group. Supplementation of iron can be studied as a preventive approach for febrile seizures, which is a cost effective strategy, especially in a developing country like India.

REFERENCES