Febrile seizure (FS) is the commonest type of fits in children, occurring in 2-5% of children from 6 months to 6 years of age who are otherwise neurologically normal. Febrile seizures are defined as seizures taking place in children classically 6 months to 5 years of age having temperature more than 38°C, and not having any evidence of brain pathology (e.g., meningoencephalitis, head injury, and epilepsy) or any known cause of seizure (e.g., electrolyte imbalance, hypoglycemia, drug use, or drug withdrawal), or a previous history of a seizure without fever. Febrile seizures are prevalent worldwide but frequency is more in Asian children.

Iron deficiency is a very common micronutrient deficiency affecting more than one-third of the world population and involves all age groups. Most children with iron deficiency may present with anaemia but iron deficiency also involves other organs and systems of the body as well. Iron deficiency in children is associated with decreased attention span and poor school performance. Iron deficiency may affect the developing brain and may result in altered development of many brain tissue like hippocampus neurons, brain myelination etc. It also results in disturbances in energy metabolism, weak visual and auditory evoked potentials and alterations in synaptic neurotransmitter systems including Norepinephrine, Dopamine, Glutamate, Gamma-Amino Butyric Acid (GABA) and serotonin. The bad effects of iron deficiency on central nervous system are further aggravated by high temperature.

A lot of work has been done to find out association between febrile fits and iron deficiency and results are conflicting. In most researches done in the past, iron levels were compared in those who were having and not having febrile fits. A recent study revealed that iron deficiency anaemia was 22% in children with febrile seizure, while two other studies recorded 31.2% and 15%. A local study conducted in Faisalabad.

### Abstract

**Objective:** The objective of the study was to find out the frequency of iron deficiency anaemia in children presenting with febrile seizures in Services Hospital, Lahore

**Methods:** This observational study was conducted in department of Pediatrics Services Hospital Lahore from May 2018 to November 2018. A total of 310 children fulfilling the inclusion and exclusion criteria admitted in Pediatric Unit-1 of Services Hospital, Lahore were enrolled. Informed consent from parents of children was taken to include their data in the study. Demographic profile age, gender, was recorded. From every patient, 5 cc blood was drawn and sent to the laboratory to determine the serum iron level. Data was recorded on pre-designed proforma. The collected data was analyzed through SPSS version 16.

**Results:** In our study, out of 310 cases, 34.84% (n=108) were between 6-30 months of age while 65.16% (n=202) were between 31-60 months of age, mean +SD was calculated as 36.14+12.99 month, 42.90% (n=133) were male and 57.1% (n=177) were females. Frequency of iron deficiency anaemia in children presenting with febrile seizures in services hospital, Lahore was found out to be 14.84% (n=46).

**Conclusion:** Frequency of iron deficiency anaemia is 15% in children with febrile seizures

**Keywords:** Febrile seizures, iron deficiency anaemia, Pakistani Children


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showed that only 5.3% of the patients with febrile seizures are iron deficient while another study done in Rawalpindi showed a statistically significant relationship between febrile fits and low serum ferritin (P-Value 0.028). The rationale of the present study is that there is a need to conduct further studies on this topic as previous studies have shown considerable variation in results (ranging from 31.2% to 5.3%) so that the relationship of febrile seizures and iron deficiency anemia can be better evaluated. This study can provide evidence-based information so that further strategies in management of febrile seizures can be established. The study from Faisalabad has shown a very low incidence which demands further exploration as iron deficiency is presumed to be higher in developing countries.

Methods
This cross-sectional study was conducted in Department of Pediatrics, Services, Hospital, Lahore from May 2018 to November 2018 Ethical approval was taken from the institutional review board. Diagnosed cases of febrile seizures of both genders from 6 months to 60 months were included in the study. However, all diagnosed cases of previous febrile seizures, those on treatment of iron deficiency anemia (on history and medical record), those with CNS malformation (on previous medical records) or CNS infection by CSF examination (on lumbar puncture), having history of premature birth (<37 wks) or low birth weight (2.5kg), and malnourished and developmentally delayed children were excluded from study. By using the Non-probability consecutive sampling technique, a total of 310 cases meeting the inclusion and exclusion criteria were included. Informed consent of the parents of children was obtained to include their data in the study. Demographic profile age, gender, was recorded. A 5-cc blood in a sterilized syringe was taken from each child with the help of paramedical staff and sent to the hospital laboratory and to another private lab to determine the iron deficiency anaemia, and on receiving the laboratory reports presence/absence of Iron deficiency anaemia was recorded on a pre-designed proforma. Iron deficiency anaemia was diagnosed on the basis of hemoglobin and iron levels. The data was analyzed through SPSS version 16. Mean and standard deviation were calculated for age. Frequency and percentage were calculated for categorical variable i.e. gender and presence/absence of iron deficiency anaemia. Data was stratified for age and gender, breast fed/formula fed, economic status (monthly income <10,000 11,000-20,000 >20,000). Chi-square test was used. P-Value < 0.05 considered as significant.

Results
Age distribution of the patients was done, 34.84% (n=108) were between 6-30 months of age while 65.16% (n=202) were between 31-60 months of age, with a mean+SD age of 36.1±13.0 months. There were 42.9% (n=133) male while 57.1%(n=177) were females. Frequency of iron deficiency anemia in 310 children presenting with febrile seizures in services hospital, Lahore was recorded in 14.84%(n=46) while 85.16% (n=264) had no findings suggestive of iron deficiency. (Fig 1)

Figure 1: Frequency of Iron Deficiency Anemia Among Children with Febrile Seizures
Stratification for iron deficiency anemia in children presenting with febrile seizures with regards to age, gender, milk feed and Income were recorded and presented in Table 1. The gender, age, milk feeding practice group had no difference for frequency of iron deficiency anemia while Income groups had significantly different frequency of IDA with p-value < 0.001. The lower the income higher the prevalence of iron deficiency anemia was recorded.

Table 1: Relationship of Iron Deficiency Anemia with Various Factors Among Children with Febrile Seizures

<table>
<thead>
<tr>
<th>Factors</th>
<th>Categories</th>
<th>Iron deficiency Anemia</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes (n)</td>
<td>%</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>19</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>27</td>
<td>15.3</td>
</tr>
<tr>
<td>Age</td>
<td>6 – 30</td>
<td>14</td>
<td>13.0</td>
</tr>
<tr>
<td></td>
<td>31 – 60</td>
<td>32</td>
<td>15.8</td>
</tr>
<tr>
<td>Milk feed</td>
<td>Breast fed</td>
<td>12</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>Formula Fed</td>
<td>34</td>
<td>16.0</td>
</tr>
<tr>
<td>Income</td>
<td>&lt;10000</td>
<td>24</td>
<td>43.6</td>
</tr>
<tr>
<td></td>
<td>11000-20000</td>
<td>16</td>
<td>23.2</td>
</tr>
<tr>
<td></td>
<td>&gt;20000</td>
<td>6</td>
<td>3.2</td>
</tr>
</tbody>
</table>
Discussion

Worldwide the febrile seizures and iron deficiency anaemia are two very common diseases in children so as in our country. Iron insufficiency can cause many neurological symptoms e.g. behavioral changes, learning deficits and poor attention span in children. Hence it can also be related to other neurological disorders like febrile seizures in children.

The findings of this study regarding frequency of iron deficiency anaemia in children suffering with febrile seizures are found 14%, which are lower than a recent study, 1 revealed that iron deficiency anemia was 22% in children with febrile seizure. While in another study, it has concluded that its association is about 31.2%11, which was also higher than reported in our study. On the other hand, a local study conducted in Faisalabad10 showed that only 5.3% of the patients with febrile seizures were iron deficient while another study done in Rawalpindi showed a statistically significant relationship between febrile fits and low serum ferritin (P-Value 0.028).12 These findings are also in contrast with our results. Sharif et al advocated that iron-deficiency anaemia increases the onset of febrile seizure.13 Whereas Saha et al. disclosed that Serum Ferritin levels were lower in those patients significantly who have suffered with a first febrile seizure, as compared to in those patients who have febrile illness without convulsions.14

Khan et al. also stated in his study a strong association between iron-deficiency anaemia in children and the febrile convulsions.15 As compare to previously mentioned studies Lal and Hanif described no relationship between the two variables which are iron-deficiency anaemia and occurrence of 1stfebrile convulsion in children less than 5 years of age.16

In another study conducted in Iran by Bidabadi and Mashouf. They reported that iron-deficiency anaemia found to be less frequent in the patients who have febrile seizure than in controls.17

In view of the above findings and comparison, we have concluded that the iron deficiency anaemia has association with febrile seizure in young children. However, our population is prone to this morbidity for 15% of the cases. The study from Faisalabad has shown a very low incidence which is not supported with our study.

Our study provides evidence based information of having iron deficiency anaemia with febrile seizures. This may guide for further strategies in management of febrile seizures like iron therapy. This study also gives an insight for further studies to determine association of iron deficiency anaemia with febrile seizures and its frequency after iron therapy.

Conclusion

We concluded that in young children who presented with febrile seizures in Services Hospital, the frequency of iron deficiency anemia was found to be 15.0%.

Conflict of Interest

None

Funding Source

None

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Authors Contribution

M.A.S.: Conceptualization of Project
S.K.: Data Collection
S.S.: Literature Search
M.A.F.: Drafting, Revision, Writing of Manuscript