

Evaluation of Iron Status in Children Presenting with Febrile Seizure in a Tertiary Health Care Facility

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Abstract

Background: Febrile seizures are one of the most common forms of seizure in children and affect 2% to 5% children below the age of 5 years. According to clinical analysis, febrile seizures occur between the age of 6 months to 5 years with the temperature of 38 degree or higher. These are not caused due to central nervous system infection or any metabolic cause or without any history of prior afebrile seizure but influence the growth of brain. In addition to this, the fall in serum ferritin level provides the information related to deficiency of iron and can be seen prior to anaemia. The serum ferritin provides the information related to the iron store in the human body and helps to analyze the health condition of the individual.

Aim: The study aims to evaluate iron status in children presenting with febrile seizure in a tertiary health care facility.

Method: The current study is conducted using a cross-sectional approach. The study was conducted at GS Medical College and Hospital, Pilakhuwa, Hapur, Uttar Pradesh over the period of 4 months from March 2022 to June 2022 and approved by the Ethical committee. The researcher has followed the guidelines proposed by the committee to maintain the standards of the study. The written informed consent from was submitted to the committee to enrol in the subject study.

For the current study, total of 100 children were selected from pediatric outpatient department and admitted to pediatric ward. For the selection of sample, consecutive method was used. The children enrolled for the study were aged between 6 months to 5 years having the history of seizures with fever. Moreover, children with iron deficiency were also selected for the study those have the problem related to the hematological other than iron deficiency.

Results: Children from different age groups were considered, 80% were 6-24 months 12% 25-42 months and 8% 43-60 months for group 1. Group 2 has 24% 6-24 months, 20% 25-42 months and 40% 43-60 months. The current study involved 84% male and 16% female for group 1 and 48% male and 52% female for group 2. In Group 1 (febrile seizure) 44% subject had anemia while 56% had no anemia. In group 2 only 30% of subject had anemia. Moreover, there was significant difference found in both groups. In Group 1, 61.7% of subjects had iron

deficiency and 38.3% has normal iron level. Apart from this, 23.3% in group 1 had low serum ferritin level and 43.3% had normal level and 33.4% had high serum ferritin level.

Conclusion: Iron deficiency is common in febrile seizure and had the positive association with serum iron. Therefore, early detection and replenishment of iron store in children using the iron therapy can be helpful for increasing the iron level and decreasing the frequency of febrile seizure.

Keywords: Febrile Seizures, Serum Ferritin, Anaemia, Iron

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Background

There are various types of issues that influence the health of the children and affect their physical and mental health. Febrile seizures are one of the most common forms of seizure in childhood and affect 2% to 5% children below the age of 5 years [1]. According to clinical analysis, febrile seizures occur between the age of 6 months to 5 years with the temperature of 38 degree or higher [2]. However, these are not caused due to central nervous system infection or any metabolic cause or without any history of prior afebrile seizure but influence the growth of brain [3]. This kind of health problem is having a significant impact on the emotional, physical, psychological, and mental stress to parents and affects the lifestyle of the family [4]. In addition to this, the recurrence rate of febrile seizure after the first episode in children under the age of 1 year is 50% and 29% in older than 1 year [5].

The problems related to febrile seizure can be simple and complex as more than 80% of children have simple and 78% of these simple febrile seizures lasts for 6 minutes [6]. According to previous clinical studies in India, 72% of the children between 6 months to 55 months have anaemia that causes more than 50% of the iron deficiency anaemia [7]. This kind of problem also coincides with the peak incidents of the seizure occur between the ages of 16 and 18 months. In addition to this, the fall in serum ferritin level provides the information related to deficiency of iron and can be seen prior to anaemia [8]. The serum ferritin provides the information

related to the iron store in the human body and helps to analyze the health condition of the individual [9].

According to studies, iron is one of the important micronutrients that is required for production of neurotransmitters (serotonin, dopamine, gamma amino butyric acid), enzymes and myelination [10,11]. Now, it can be considered that deficiency of iron in children causes seizure threshold [12]. The prevalence of iron deficiency in children considered as febrile seizure which is known as aggressive fever that results from anaemia and influences the health of the children [13]. Hence, the relationship between iron deficiency anaemia and febrile convulsions is probable. Now, the current study determines the iron profile of children with the febrile seizure.

Aim

The study aims to evaluate iron status in children presenting with febrile seizure in a tertiary health care facility

Material and Method

The current study is conducted using the cross-sectional approach. The study was conducted at GS Medical College and Hospital, Pilakhuwa, Hapur, Uttar Pradesh over the period of 4 months from March 2021 to June 2022 and approved by the Ethical committee. The researcher has followed the guidelines proposed by the committee to maintain the standards of the study. The written informed consent from was submitted to the committee to enrol in the subject study. The data was collected

from predesigned proforma that having the information related to demographic, seizure episode and complete history of the clinical examination. For the analysis of issues and health problems, the children were divided into two groups. First group was febrile seizure and second group was other than febrile seizure considering the clinical scenario.

For the current study, total of 100 children were selected from pediatric outpatient department and admitted to pediatric ward. For the selection of sample, consecutive method was used. The children enrolled for the study aged between 6 months to 5 years having the history of seizures with fever. Moreover, children with iron deficiency were also selected for the study those have the problem related to the hematological other than iron deficiency. Apart from this, under full aseptic precaution, blood sample of the children was collected for analyzing

the serum iron, serum ferritin that has provided the information related to level of iron. Moreover, serum iron in blood was analyzed using the Ferrozine-no depolarization method on Unicel DX C 800. Serum ferritin by enzyme linked fluorescence assay on Vidas PC and hemoglobin (Hb) estimation by Beckmann coulter apparatus and Roller-20 LC apparatus.

Statistical analysis

For the analysis, MS Excel was used as well as the statistical package for social science version 20 was applied for further evaluation. Moreover, independent T-test was used for comparison of the quantitative data. Chi-square was also used for comparison of the qualitative data to analyze the association between the variables.

Results

Table 1: Age

Age (Months)	Group 1 (N=50)	Group 2 (N=50)
6-24	40(80%)	20 (24%)
25-42	6 (12%)	10 (20%)
43-60	4 (8%)	20 (40%)

For the current study, children from different age groups were considered that involve 80% from 6-24 months 12% 25-42 months and 8% 43-60 months for group 1. In Group 2, 24% were 6-24 months, 20% 25-42 months and 40% 43-60 months.

Table 2: Gender

Gender	Group 1	Group 2
Male	42 (84%)	24 (48%)
Female	8 (16%)	26 (52%)

For study both male and female children were considered. The current study involves 84% male and 16% female for group 1 and 48% male and 52% female for group 2.

Table 3: Subject according to hemoglobin

Hemoglobin	Group 1	Group 2	P value
≤10.5 gm/dl	22 (44%)	15 (30%)	0.048
>10.5 gm/dl	28 (56%)	35 (70%)	

Table 3 has provided the information related to subject according to hemoglobin. According to analysis, in group 1 (febrile seizure) 44% subject had anemia while 56% had no anemia. In group 2 only 30% of subject had anemia. Moreover, there was significant difference found in both groups.

Table 4: Distribution of subjects according to hematological parameters

Hematological parameter	Group	Group 2	P value
Hemoglobin (Mg/dl)	10.80±1.66	10.50±1.68	0.698
Serum iron (µg/dl)	22.8±18.6	43.02±42.66	0.001
Serum ferritin (ng/ml)	57.80±113.66	190.87±332.69	0.009

Table 4 has provided the information about the hematological parameters and means SD Hb in two groups. Hb was not statistically different in both groups but mean Serum iron and Serum ferritin level in two groups were found to be significant different. Serum iron and serum ferritin were higher for group 2.

Table 5: Distribution of group I (febrile seizure) according to the serum iron and serum ferritin level

	Number of subjects	Percentage
S. iron level (µg/dl)		
<22	37	61.7
22-184	23	38.3
Serum ferritin (ng/ml)		
<10	14	23.3
10-60	26	43.3
>60	20	33.4

According to table 5, in group 1 61.7% of subjects had iron deficiency and 38.3% has normal iron level. Apart from this, 23.3% in group 1 had low serum ferritin level and 43.3% had normal level and 33.4% had high serum ferritin level.

Discussion

The study has analyzed iron level of the children to understand the febrile seizure between the age of 6 months and 5 years. This kind of health problem have a significant impact on the emotional, physical, psychological, and mental stress to parents and affects the lifestyle of the family. In addition to this, the recurrence rate of febrile seizure after the first episode in children under the age of 1 year is 50% and 29% in older than 1 year. For the current study, total of 100 children were selected from pediatric outpatient department and admitted to pediatric ward. For the selection of sample, consecutive method was used. The prevalence of the iron deficiency in children considered as febrile seizure which is known as aggressive fever that results from anaemia and influences the health of the children.

Children from different age groups were considered that involve 80% 6-24 months 12% 25-42 months and 8% 43-60 months for group 1. Group 2 has 24% 6-24 months, 20% 25-42 months and 40% 43-60 months. The current study involves 84% male and 16% female for group 1 and 48% male and 52% female for group 2. According to analysis, in group 1 (febrile seizure) 44% subjects had anemia while 56% had no anemia. In group 2 only 30% of subject had anemia. Moreover, there was significant difference found in both groups. In a case control study, Trainor et al, (2001) [14] reported preponderance of male gender in febrile seizure group with male:female ratio of 2.5:1 which was similar to the present study.

According to the outcome of current study, Hb was not statistically different in both groups but mean Serum iron and Serum ferritin level in two groups were found to be significant different. Moreover, in group 1, 61.7% of subjects had iron deficiency and 38.3% has normal iron level. Apart from this, 23.3% in group 1 had low serum ferritin level and 43.3% had normal level and 33.4% had high serum ferritin level. In a case control study, Batra et al, (2011) [15]

reported that mean haemoglobin in febrile seizure cases were 10.42 ± 0.83 gm/dl as compared to controls, i.e., 11.27 ± 0.94 gm/dl. This kind of problem also coincides with the peak incidents of the seizure occur between the ages of 16 to 18 months. [16]

Conclusion

From the study, it has been carried out that iron deficiency is common in febrile seizure and had the positive association with serum iron. Therefore, early detection and replenishment of iron store in children using the iron therapy can be helpful for increasing the iron level and decreasing the frequency of febrile seizure.

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