



The Association between Iron Deficiency Anemia and Febrile Convulsion

Authors

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Introduction

Febrile seizures [FS] are the most common seizures in children. Their incidence is ranged between 2-5 %.⁽¹⁾ Febrile seizure is more common in boys, usually manifesting as tonic-clonic convulsion.⁽²⁾ Although FS is benign and rarely leads to brain damage, it causes emotional, physical, and mental damages, which are stressful for parents, and affects families' quality of life^(3,4). Many studies have tried to find its risk factors, because of its relation to epilepsy in 2-4% in future, the fact that it can lead to hospitalization, costs for families and the society, and likelihood of recurrence (30% and 50% after the first and the second occurrences, respectively)^(3, 5).

Some recent studies have reported that iron-deficiency anemia (IDA) could be a risk factor for FS, because the latter is more common in children under two years of age and IDA is also common in children of the same age. Iron plays a critical role in the metabolism of several neurotransmitters, and in low iron status, aldehyde oxidases and monoamine are reduced. In addition, the expression of cytochrome C oxidase, a marker of neuronal metabolic activity, is decreased in iron deficiency.⁽⁶⁾ It is interesting to note that reduction in the levels of several neurotransmitters, monoamines and aldehyde oxidase is also critically associated with iron deficiency which

proved to influence normal behavioral and developmental processes.⁽⁷⁻⁹⁾

Recently many studies have been conducted to identify the relationship between IDA and FS but the results were not conclusive. Among the studies carried out so far some have reported that in the patients with ID, febrile convulsion is significantly higher than that in control group^(10,11-13). On the contrary, some authors have concluded that the risk of FS in anemic children seems to be less than that in children without FS⁽¹⁴⁾ and that ID can be a protective mechanism against convulsions by increasing the convulsion threshold, and thus iron supplements should be given with caution to the children⁽¹⁵⁾. Other studies have shown that ID plays no role in paediatric FS^(16,17).

Since there is no determined relationship between IDA and FS, this study was conducted to further establish an association between IDA and FS if any.

Aim and Objective

To study the association between febrile seizure and iron deficiency anemia.

Patients and Method

This prospective case control study was carried out at Sri Aurobindo Medical College, Indore in the pediatric department. The study was a 2 year

duration study which included details of all patients with history suggestive of febrile seizure between age of 6 months to 5 years and controls matched for age and sex were include in the study. A total of 100 patients were taken into consideration. Febrile convulsions were defined as seizures associated with fever in which there is no evidence of CNS infection. Out of these 100 patients, 50 were classified as cases having febrile convulsions as per standard definition whereas 50 were controls having febrile illness but no convulsions. Both groups were compared on basis of Haemoglobin, MCV, MCH, MCHC levels.

Exclusion Criteria

Any metabolic disturbances, developmental, structural or neurological abnormalities or infective CNS pathology. Patients were divided into two groups as per history and examination. Group 1 Cases [50]: with history of febrile seizures. Group 2 Control [50]: with febrile illness of any origin without seizures. A standard protocol for doing Hgb, HCT, MCV, MCH, estimation in both groups were drawn.

Statistical analysis

Final evaluation done in respect of certain fixed parameters and total data collected were analysed to arrive at a conclusion. Statistical data t test applied. T value was chosen as the data was continuous and we wanted to find out significant difference between the two groups.

Results

In our study it was found that a mean age of appearance of febrile convulsion was found to be 18 months in the cases while 20 months in the control group but the difference was not statically significant. Our study also was found that the proportion of male and female among the cases and controls were similar with no statically significant t value. The haemoglobin levels were found to be only 10.86 in the cases while it was found to be 12.72 in the control group but the difference was not statically significant. Also the parameters compared between the cases and controls were not found to be statically significant.

Age

Cases- 18.16 +/-8.09 months, Control -20.64 +/- 5.16 months (t value 1.80)

Sex

Cases Male- 35, Control Male 39

Cases Female-15, control Female-11 (t value 0.83)

Hgb: (11-13.6 gm/dl): Cases 10.86 +/- 1.23; Control 12.72 +/- 1.33 (t value 0.97)

MVC (75 – 87 fl) Cases 72.37 +/-5.77 Control 74.07 +/- 5.34 (t value 1.52)

MCH (25.4 – 29.6 pg): Cases 23.02 +/- 2.88 Control 23.72 +/-3.85 (t value 1.03), **MCHC** (32.9 - 35.7): Cases 31.76 +/- 1.79 Control 32.09 +/- 1.94 (t value 0.89).

Table-1:

Parameters	Cases	Controls	t value
Age(months)	18.16 +/- 8.09	20.64 +/- 5.16	1.80
Sex	M-35 F-15	M-39 F-11	0.83
Hemoglobin levels(gm/dl)	10.86 +/- 1.23	12.72 +/- 1.33	0.97
MCV	72.37 +/-5.77	74.07 +/- 5.34	1.52
MCH	23.02 +/- 2.88	23.72 +/-3.85	1.03
MCHC	31.76 +/- 1.79	32.09 +/- 1.94	0.89

Discussion

In our study iron deficiency anemia was not found to be associated with febrile convulsion, which is a similar finding to other studies like Hartfield et al, where iron deficiency was found to be 9% and 5% in the children of two groups of febrile convulsion and febrile without convulsion, respectively; and iron-deficiency anemia was found to be 6% and 4% in the former and latter groups, respectively (Hartfield et al., 2009)⁽¹⁸⁾ thus concluding no significant relationship between iron deficiency anemia and febrile convulsion which is similar to our study. Again, in the study of Kobrinsky et al⁽¹⁹⁾, the febrile convulsion group suffered less from iron deficiency. They concluded that iron deficiency could have a protective effect against febrile convulsions (Hartfield et al., 2009); and in the paper by Bidabadi⁽²⁰⁾, iron deficiency in the febrile convulsion group (44%) was less than in the control group (48%), but since there was no significant difference, the protective effect of iron deficiency against febrile convulsions was not confirmed (Bidabadi et al.,2009).Also Momen and

Hakimzadeh et al⁽²¹⁾ reported no relationship between iron-deficiency anemia and first febrile convulsion in children younger than 5 years of age in Iran, similar to our study, also in a study by Sadeghzadeh et al⁽²²⁾, although anemia was not common among FS patients, ID was more frequent in these patients.

While, on the contrary numerous studies in the literature found a significant association between iron deficiency anemia and febrile convulsions like a few are discussed here, a study done by Naveed and Billo⁽²³⁾ showed that SF levels were significantly lower in children with febrile seizure compared to controls, and suggested that children with iron deficiency are more prone to febrile seizures. Pisacane et al⁽²⁴⁾ reported an association between iron-deficiency

anemia and febrile convulsions in Neapolitan children. Also, in a study by Vaswani et al⁽²⁵⁾, 68% of cases were iron-deficient compared to 30% of controls. A study by Ur-Rahman and Billoo⁽²⁶⁾ on 30 children with febrile convulsion and 30 children with other febrile diseases indicated that IDA in their case group was significantly more common than in control group. The cause of difference between the findings of the above study and our study might be, the smaller sample size of our study as compared to other studies, along with the fact that, in our study, we did not consider the parameters like, serum ferritin values, which is important for proper assessment of iron deficiency anemia while most of the above studies did.

Conclusion

There was no statistical difference between the groups(cases vs control), in variables like haemoglobin, MCV, MCH and MCHC (t value suggesting no significance either at 0.01 or at 0.05 level of significance i.e > 2.5).

Hence there is no association between iron deficiency anemia and febrile seizure according to the above study.

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