



ORIGINAL RESEARCH PAPER

Paediatrics

IRON DEFICIENCY ANEMIA AND FEBRILE SEIZURES IN CHILDREN AGED 6 MONTHS TO 60 MONTHS

KEY WORDS: Febrile convulsion, iron deficiency anemia, hemoglobin

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ABSTRACT

Background - Febrile convulsion is one of the most common neurological disorder seen in children between 6 months to 5 years, which is benign in nature and generally carry excellent prognosis. The prevalence of febrile seizures in children is approximately 2 to 5%. Iron deficiency is postulated as a risk factor for febrile seizures in children and it is an easily correctable condition. We, therefore, studied the association between iron deficiency and simple febrile seizures.

METHODS – The study was conducted in department of pediatrics at PESIMSR, kuppam. The study included 53 cases and 53 controls. Cases were children with febrile seizures and controls were children of same age group with short febrile illness and without seizures. Febrile seizures defined according to AAP (American Academy of Pediatrics) guidelines and iron deficiency was defined based on hematological parameters of Hemoglobin<11g/dl, MCV<70fl and RDW >14.5%)

RESULTS – OF 53cases, 58.4% children were below 24months. Iron deficiency anemia was present in 90.57% of cases and 54.72% in control group. Significant association was seen between iron deficiency anemia in febrile seizures.

CONCLUSION – Our study reveals that there is a significant relation between iron deficiency anemia and febrile seizures.

INTRODUCTION

Febrile convulsion is one of the most common neurological disorder seen in children between 6 months to 5 years, which is benign in nature and generally carry excellent prognosis. The prevalence of febrile seizures in children is approximately 2 to 5%.¹ Febrile seizure is the most common seizure type in young children, which is not triggered by central nervous system infection or metabolic disorders [2].

Iron is essential for proper growth and development, and iron deficiency is reported to involve behavioral disorders, mental retardation, and impaired immune function [3]. The peak ages for FS and IDA coincide [4], and numerous studies have been performed to determine an associative relationship. However, individual studies have provided conflicting results with other studies. Some studies reported an association between IDA and FS [5-8], whereas other studies did not detect an association [9,10]. A few studies even suggested a protective effect of IDA on FS [11-13]. Systematic reviews and meta-analyses published in 2010 [14] and 2014 [15] examined the association between IDA and FS in children aged 3 months to 6 years. Iron deficiency is postulated as a risk factor for febrile seizures in children and it is an easily correctable condition. We, therefore, studied the association between iron deficiency and febrile seizures using limited criteria for IDA (hemoglobin, hematocrit, MCV and RDW).

MATERIALS & METHODS

This case control study was conducted in the department of pediatrics, PESIMSR from January 2018 to march 2019. The study included 106 children, of which 53 were cases and 53 controls.

INCLUSION CRITERIA – CASES

Children aged 6months to 60months presenting with febrile seizures., either typical or atypical febrile seizures.

EXCLUSION CRITERIA

- Children with previous febrile seizures
- Neurological infections
- Developmental delay
- Children on Iron therapy

THE CONTROL GROUP

50 children aged 6 months to 60months who were admitted with acute febrile illness without febrile seizures.

Simple or typical febrile seizures are defined as tonic clonic or tonic seizures lasting for less than 15 minutes without focal signs with a short postictal period. Atypical febrile seizures defined as seizures more than 15minute duration occurring more than once in 24 hours or with focal features.

After admission, all children(cases & controls if applicable) were completely examined to exclude children with a previous history of epilepsy, developmental delay, neurologic deficit and CNS infection. Information on age, gender, body temperature upon admission, cause of fever, duration between initiation of fever and convulsion, family history of febrile convulsion and details of the seizure history including duration, frequency and type of seizure (simple or complex) were recorded for all cases.

Blood investigations done to diagnose iron deficiency included hemoglobin estimation, red cell distribution width (RDW) and Mean corpuscular volume(MCV) and Iron deficiency was diagnosed by hemoglobin value <11g%, MCV <70fl and RDW > 14.5% (AAP)

Discrete variables are expressed as counts (%) and compared using the Chi-square tests. Statistical analysis was performed by independent t test and Pearson correlations using SPSS 20. Differences were considered statistically significant if the P value was less than 0.05.

RESULTS

Our study included 53 cases and 53 controls. In the case group, there were 35(66.03%) males and 18 (33.97%)females. In control group there were 28(52.83%) males and 25(47.17%) females. Febrile seizures were noted most commonly between the age group of 13-24months(41.51%). 13(24.52%) children had atypical febrile seizures. [TABLE 1][FIG 1,2)

TABLE 1 – CHARACTERISTICS OF CASES AND CONTROLS

CHARACTERISTICS	CASES (53)	CONTROLS (53)
6-12MONTHS (n)	9 (16.98%)	14 (26.42%)
13-24M (n)	22(41.51%)	19(35.85%)
25-36M (n)	14(26.42%)	8(15.09%)
37-48M (n)	5(9.43%)	7(13.21%)
49-60M (n)	3(5.66%)	5(9.43%)
MALE	35(66.03%)	28(52.83%)
FEMALES	18(33.97%)	25(47.17%)

FIG 1 – AGE DISTRIBUTION IN CASES

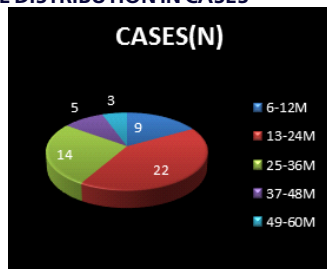


FIG 2 – AGE DISTRIBUTION IN CONTROLS

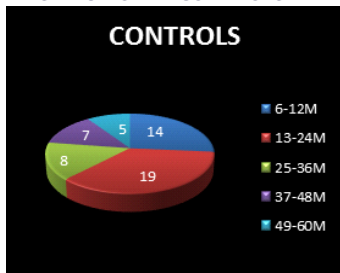


TABLE 2 – RBC INDICES IN CASES AND CONTROLS

CHARACTERISTICS	CASES (53)	CONTROLS (53)	ODDS RATIO (95% CI)	P VALUE
MEAN HB(g/dl)	9.88±1.11	10.94±1.22	2.22 (1.48-3.33)	<0.001
MEAN HCT (%)	31.50±2.88	33.44±4.22	1.17 (1.03-1.32)	0.006
MEAN MCV(FL)	69.56±9.08	73.24±7.83	1.05 (1.002-1.10)	0.027
MEAN MCH(pg)	22.52±3.83	24.57±3.65	1.16 (1.03-1.29)	0.005
MEAN MCHC(g/dl)	31.79±1.32	32.07±1.52	1.15 (0.87-1.51)	0.30
MEAN RDW(%)	17.30±2.97	15.97±3.07	0.86 (0.75-0.98)	0.02

The mean hemoglobin concentration in cases was 9.88±1.11g/dl in cases and 10.94±1.22g/dl in control group (p value <0.05). [TABLE 2]

The mean MCV in cases was 69.56±9.08fl in cases and 73.24±7.83fl in control group (p value <0.05). [TABLE 2]

The mean RDW in cases was 17.3±2.97% in cases and 15.97±3.07% in control group (p value <0.05). [TABLE 2]

The mean hematocrit in cases was 31.5±2.88% in cases and 33.44±4.22% in control group (p value <0.05). [TABLE 2]

TABLE 3 – ASSOCIATION OF IRON DEFICIENCY ANEMIA IN FEBRILE SEIZURES

GROUP	IRON DEFICIENCY ANEMIA	NO IRON DEFICIENCY ANEMIA
CASES (N=53)	48 (90.57)	5 (9.43%)
CONTROLS (N=53)	29 (54.72)	24(45.28%)
TYPICAL FEBRILE SEIZURES (40/53)	35(87.5%)	5(12.5%)
ATYPICAL FEBRILE SEIZURES (13/53)	13(100%)	0

There was significant relation between iron deficiency anemia and febrile seizures. 48 of 53 cases had iron deficiency anemia i.e., 90.57% of children with febrile seizures has iron deficiency anemia with a p value of <0.05. [TABLE 3] There is also significant relation between atypical febrile seizures and iron deficiency anemia. 13 of 13 cases with atypical febrile seizures had iron deficiency anemia i.e., 100% of children with atypical febrile seizures had iron deficiency anemia. [TABLE 3]

DISCUSSION

The most common age for febrile seizures in our study was 13-24months with mean age of 24.5±10.08 months compared to Shah SS et al which found mean age to be 15.9 months, Fallah R et al found mean age to be 22.78±11.08 months.[15] Rehmaan N et al found the mean age to be 22.97±9.52 months.[16]

In our study, there was male preponderance similar to that Forefar text book of pediatrics also mentions preponderance of male gender.[17] Other studies have also found a preponderance of males-Daoud AS et al (53.33), Hartfield DS et al (57.35%).[18,19] In our study, the incidence of iron-deficiency anemia in the febrile convulsion group was obviously higher than the control group similar to the study of Pisacane et al which reported that anemia in the case group (30%) was higher than in the hospital control group (14%) and the healthy group (12%) (Pisacane et al.,1996). In the study of Vaswani et al also, 68% of cases were iron deficient compared to 30% of the controls (Vaswani et al.,2009). In the study of Sadeghzadeh et al, although anemia was not common among febrile seizure patients, iron deficiency was more frequent in these patients (Sadeghzadeh et al., 2012). A Kenyan case-control study as well as the meta-analysis of eight case-control studies that have examined the relationship between febrile seizures or acute seizures and iron deficiency suggested that iron deficiency may be associated with an increased risk of febrile seizures in children (Idro et al., 2010)

CONCLUSION

This study shows that there is a significant relation between febrile seizures and iron deficiency anemia in children aged 6 months-60months.

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