RESEARCH ARTICLE

FEBRILE SEIZURE AND ANEMIA

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Abstract:

Objective

Considering the controversial results in present day literature regarding the relationship between febrile seizures and anemia and the high rate of such seizures in children, this study was conducted to evaluate the association between pediatric febrile seizures and anemia.

Material and Methods

In this case-control study, conducted in 2003, 60 children with febrile seizure(cases) and 60 febrile children without seizure(controls) were evaluated in the Kashan Shahid Beheshti hospital; all patients were matched for age, sex, type of feeding, and use of supplemental iron. Thirty-six (60%) and 39 (65%) of the patients in case and control groups respectively were male, and the remaining female. Levels of hemoglobin, hematocrit, and red blood cell indices were determined in all children and Chi-square and Fisher exact tests were used to analyze data.

Results

Of the case group, 13.3% (6 male, 2 female) and of controls, 20% (9 male, 3 female) of children had anemia (p= 0.327), the condition being more common in male children aged over 6 months. Febrile seizures were found to occur mostly between the ages of 6 to 24 months.

Conclusion

The risk of febrile seizure occurrence in anemic children seems to be less than that in children who do not suffer from the condition.

Keywords: Febrile seizure, Anemia, Children

Introduction

Febrile convulsion (FC) is the most common seizure disorder occurring in 2-5% of children (1). FC is defined as a convulsion that occurs in 6-month to 5-year old children with a temperature over 38.5°C, without central nervous system infection or any other predisposing factors (2). Although results suggest genetic and environmental factors to be involved in its occurrence, the precise risk factors of febrile convulsion are still unknown (3). The age range of occurrence of anemia, iron deficiency anemia in particular, and that febrile convulsion is common to both the conditions (4). Iron has a role in the metabolism of neurotransmitters and some enzymes such as monoaminooxidase and aldehyde oxides (5) and considering the role played by hemoglobin in carrying oxygen to body tissues such as the brain (6) and the fact that fever may exaggerate the symptoms of anemia (5), it is possible that

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an association between anemia and febrile convulsion does exist; however studies regarding this association document controversial results (5, 7-9). Given these conflicting results and the relatively high prevalence rate of febrile convulsion, the current study was carried out to investigate the association between anemia and febrile convulsion in children aged below 5 years referring to the Shahid Beheshti hospital in Kashan.

Materials and Methods

In this case-control study, 60 children with febrile convulsion (case group) and 60 children with fever but without convulsion (control group) were evaluated in the Shahid Beheshti hospital in Kashan. The diagnosis of febrile convulsion was confirmed by a pediatric neurologist. All children were aged under 5 years and their growth and development were normal. Those children with diarrhea and convulsion without fever were excluded. Hematologic evaluations including cell blood count tests, Hb, HCT, and other RBC indices were carried out in all patients and diagnosis of anemia was confirmed by a pediatric hematologist (6). The patients' data was recorded and analyzed using the Fisher exact test.

Results

Of patients, 36 (60%) in the case group and 39 (65%) in the control group were male, while the remaining were female. Febrile convulsions were more prevalent in children aged between 6 and 24 months (65% case and 71.5% controls). Table I shows the frequency of the patients in two groups based on the age and sex.

The most common causes of fever were respiratory tract infection (71.5%) and gastroenteritis (58.3%) in the case and control groups respectively. Table 1 shows causes of fever in both groups.

Eight patients (13.3%) in the case and 12 (20%) in control group had anemia (p= 0.327). Table 2 shows the frequency distribution rate of anemia in both groups.

In both groups, 44% of the patients, had histories of taking supplemental iron. A positive history of febrile convulsion was documented in 16 patients (25.5%) of the case group, whereas none of the controls had such a history. Simple and complex convulsions were found to have occur in 56 (93.3%) and 4 (6.7%) patients of the case group, respectively. Thirty-eight children in the case group and 34 of the controls were breast-fed, while the rest were on formula feeding. Anemia was found in 16.7% and 23.1% in boys in case and control groups, while these figures were 8.3% and 14.3% in girls, respectively, demonstrating an almost two fold prevalence rate of anemia in boys as compared to girls.

Discussion

According to our results, 8 (13.3%) patients in the case and 12 (20%) in the control group had anemia, revealing no significant relationship (p= 0.327). The occurrence rate of convulsion in children with anemia was less than that seen in their counterparts without the condition. In a case-control study carried out by Kobrinski and colleagues, anemia was found in 25.1% and 26.6% in the case and control groups respectively (7), compatible to our finding; Kobrinski believed that anemia might have a protective effect against febrile convulsions. In another study conducted by Pisacane and associates, anemia was present in 30% and 14 % of the case and control groups respectively (5), results which are in contrast with our findings. They concluded that fever could exaggerate the negative effect of anemia on brain; and consequently, convulsion may occur. In the Daoud et al study, performed in Jordan, the average levels of hemoglobin, hematocrit and ferritin were significantly lower in the case group (8). In a study done by Siadati, iron deficiency anemia was detected in 20% and 12% of the case and control groups, respectively (10). In another study, conducted by Naveed-Ur-Rehman and colleagues, iron deficiency anemia was significantly more common in case group (11). The results of these studies are incompatible with our results suggesting the higher incidence rate of anemia and iron deficiency in children who have febrile convulsion. The prevalence rate of anemia in patients with or without febrile convulsion was the same in the study by Mo`omen and Hakimzadeh (29%) (9).

Conclusion

Results of studies regarding the association between anemia and febrile convulsion vary; further studies, conducted simultaneously in different regions, are strongly recommended to clarify the issue.

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Table 1: Frequency of patients in case and control groups based on the age and sex.

Age / Sex	Case group			Control group			Total
	<6 months	6 months to 2 years	2 years to 5 years	<6 months	6 months to 2 years	2 years to 5 years	
Boy	2	23	11	3	21	9	75
Girl	1	16	7	2	14	5	45
Total	3	39	18	5	41	14	120

Table 2: Distribution of the causes of fever in cases and controls group.

Groups / Fever causes	Case	Control	Total
Urinary tract infection	1* (1.7)	2 (3.3)	3 (2.5)
Respiratory tract infection	43 (71.5)	22 (36.7)	65 (54.2)
Gastroenteritis	15 (5)	35 (58.3)	50 (41.6)
Post-vaccination fever	1 (1.7)	1 (1.7)	2 (1.7)
Total	60 (100)	60 (100)	120 (100)

* Numbers in parenthesis are percents.

Table 3: Frequency distribution of anemia in cases and controls group.

Groups / Anemia	Case	Control	Total
Present	8 *(13.3)	12 (20)	20 (16.7)
Absent	52 (86.7)	48 (80)	100 (83.3)
Total	60 (100)	60 (100)	120 (100)
p= 0.327			

• Numbers in parenthesis are percents.