ORIGINAL ARTICLE

RELATIONSHIP BETWEEN ANAEMIA AND SIMPLE FEBRILE CONVULSIONS

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Background: Simple febrile seizures are the commonest convulsions occurring in children and its exact pathophysiology is unknown. Among other postulated reasons anaemia has been thought to be a possible aetiology. This study was conducted to find out any relationship between anaemia and simple febrile convulsions. **Methods:** We studied notes of 1,951 patients retrospectively who were admitted in the Women & Children Hospital Abbottabad from Jan 2013 to Aug 2013. Thirty-one patients with febrile seizures were included in the study as group I and another 31 patients matched for the demographic data were taken as group II. Degree of temperature, family history of simple febrile convulsions, underlying focus of infection and haemoglobin level were recorded. **Results:** Sixty-eight percent of patients in group I had Hb level below 11 gm/dl compared to 39% of patients in group II; 32% patients of group I, had level on/above 11 gm/dl but none of them had Hb above 11.5 gm/dl in comparison to group II where 61% had Hb level on/above 11 gm/dl with upper limit of 13 gm/dl. **Conclusion:** Significant association was found between anaemia and Simple Febrile Convulsions.

Keywords: Simple Febrile Convulsions, Haemoglobin, iron deficiency, treatment, temperature

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INTRODUCTION

Simple febrile seizures or febrile fits are the commonest convulsions occurring in childhood between ages 6 months to 6 years with peak incidence at the age of 18 months, without any CNS infection or metabolic disturbance. Incidence of febrile convulsion is 4.8/1,000 children/year.[1,2]

Febrile convulsions have been studied thoroughly over past two decades but exact pathophysiology is unknown to date.[3] Several hypothesis have been proposed and several independent risk factors like height of temperature, history of febrile fits in first degree relatives, maternal antenatal smoking and alcohol consumption have been thought to be the predisposing factors. Recently anaemia or iron deficiency have been studied.[4–6]

Iron deficiency is the most prevalent nutritional problem not only in developing countries but worldwide, between ages 6 to 24 months. It is easily preventable and treatable issue.[7,8] Relationship between anaemia and febrile convulsions has been found to be controversial.[7–9] So we conducted this study in order to access whether anaemia is a risk factor for febrile convulsions in our patients.

MATERIAL AND METHODS

We studied notes of 1,951 patients retrospectively who were admitted in the Women and Children Hospital Abbottabad from Jan 2013 to Aug 2013. We isolated 31 patients who were admitted with febrile convulsions. These were the patients presented with convulsions (lasting for less than 10 min) between age ranges 9 months to 5 years, with high grade fever (on/above 103 °F) without evidence of intracranial cause or metabolic disturbance and were labelled as group I. We excluded all the children who only had history of febrile convulsion, had any developmental delay or neurological deficit and convulsions lasting for more than 15 min. Another 31 patients were matched for age, gender, time of admission and height of temperature to be taken as group II. Data like age, gender, height of temperature, number of fits, family history of fits, focus of infection and haemoglobin level was collected on predesigned pro forma. Haemoglobin level <11 gm/dl was taken as anaemia[10], and $p<0.05$ was considered as significant.

RESULTS

Our results are based on 62 patients' notes, 31 patients in group I and 31 patients in group II. Table-1 shows age range, gender, family history of simple febrile convulsion, height of temperature, underlying focus of infection and haemoglobin level.

Both groups had similar proportion of males (54% in group I and 58% in group II) and females (46% in group I and 42% in group II). Mean age for both groups was similar as well (23.02±8.85 months in group I and 22.96±11.87 months in group II). Underlying focus of infection was respiratory infection (78% patients of group I and 77% of group II). Similarly gastroenteritis was present in 19% of group I patients and 13% of group II. Rest of the patients in both groups had measles as under lying illness. Temperature of both groups ranged from 103 to 105 °F (103.48±.85).

Unfortunately the only parameter to assess anaemia as well as iron deficiency was haemoglobin level which showed a significant difference ($p=0.016$) in both groups. Sixty-eight percent of patients of group I

had Hb level below 11 gm/dl as compared to 39% of group II. Another significant finding was, 32% patients of group I, had level on/above 11 gm/dl with maximum level of 11.5 gm/dl in comparison to group II where 61% patients had Hb level on/above 11 gm/dl with upper limit of 13 gm/dl.

Table-1: Basic Demographic data

		Group I			Group II		
Total Number of Patients		31			31		
Male		54%			58%		
Female		46%			42%		
Mean Age		23 Months			22 Months		
Temperature [°F (%)]		103 (54)	104 (32)	105 (13)	103 (45)	104 (40)	105 (15)
Family History of Convulsions (%)		+ve	-ve		+ve	-ve	
		71	29		12	88	
Underlying focus of infection	Upper Respiratory Tract Infection (URTI)	26%			22%		
	Lower Respiratory Tract Infection (LRTI)	32%			26%		
	Bronchiolitis	10%			22%		
	Acute Pharyngitis	10%			7%		
	Gastroenteritis	19%			13%		
	Measles	3%			10%		
Haemoglobin level <11 gm/dl		68%			39%		
Haemoglobin level at or >11 gm/dl		32%			61%		
p		0.016					
Max level of Hb		11.5 gm/dl			13 gm/dl		

DISCUSSION

Simple Febrile Convulsions are the commonest convulsions in childhood, quite benign but frightening for the parents and siblings.[1,7] Their association with iron deficiency anaemia is being widely explored all over the world . There is considerable evidence that iron has important role in neurological functions in addition to its biological affects.[7–9,11] It is needed in neurotransmitter metabolism, myelin formation and brain energy metabolism.[11,12]

Neurotransmitters, mono amine and aldehyde oxidases are reduced in iron deficiency anaemia.[13–15] Tryptophan hydroxylase and tyrosine hydroxylase are also iron dependent enzymes.

There is a controversy about the relationship between iron deficiency anaemia and simple febrile convulsions. Pisacane *et al*[6], reported a significantly higher rate of iron deficiency anaemia among children with febrile convulsions and Kobrinsky *et al*[9], reported a protective effect of iron deficiency by raising the threshold for these convulsions. On the other hand Momen *et al*[10] found no relationship between iron deficiency anaemia and febrile convulsions.

It was very interesting for us to look at this relationship in our patients. As our study has limitation of being a retrospective study, we cannot request any further lab analysis to look at other parameters of iron deficiency in our patients such as total amount of Hct, MCV, MCH, MCHC, Serum ferritien, TIBC.

Our study suggests that more males had febrile convulsions as compared to females which is contrary to other studies that document no significant difference among the gender.[16] Similarly peak temperature was above 103 °F at the time of convulsions.

Positive family history was found in 71% of group I patients as compared to 12% of group II patients. Seventy-six percent of group I patients had respiratory tract infection and 19% had gastroenteritis which was comparable to group II and is comprehensible that these are common infections causing high temperature in our community.

Sixty-eight percent of group I patients had significantly lower levels of Hb as compared to group II where 39% of patients had lower Hb level which shows that there is an association between anaemia and febrile convulsions. Another important finding was, upper limit of Hb in group I patients was only 11.5 gm/dl while in group II upper limit was 13 gm/dl.

A prospective case control study in future with detailed assessment of iron level will be able to strengthen our study.

CONCLUSION

We report anaemia as a risk factor for simple febrile convulsions. Its easy detection and supplementation may be helpful not only in behavioural and neurological development but also in prevention of simple febrile convulsions.

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