



IRON DEFICIENCY ANEMIA IS RISK FACTOR IN CASE OF SIMPLE FEBRILE CONVULSION

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ABSTRACT

Background : Febrile Convulsions are the most common cause of convulsions in children and frequent cause of emergency hospital admissions. Indian studies suggested that up to 10% of children experience a Febrile Convulsion.

Objectives: This study was done with the intension of finding out incidence of Iron deficiency anemia in case of Febrile Convulsion. Also to evaluate correction of Iron deficiency anemia and its relation with Febrile Convulsion in children aged between 6months to 5years.

Material and Methods: One hundred infants and children aged between 6months to 5 years were included in this case control study. Further divided into 2 groups each consisted 50 patients with Febrile Convulsion and febrile illness respectively who were assigned to receive oral Iron therapy based on their hemoglobin level less than 11gm/dl and reviewed those patients at 8 weeks of therapy and recorded hemoglobin, MCH, MCV, MCHC, RDW, S.Ferritin levels and number of admission and number of Febrile Convulsion in 1year duration after 1st episode of Febrile Convulsion.

Result: Majority of patients were in age group between 24 to 47months among cases and 12 to 23months among controls. There were 32 cases and 16 controls with hemoglobin less than 11gm/dl who received Iron therapy and noticed only 3 patients had more than 2 episodes of Febrile Convulsion out of 32 cases in 1year of duration.

Conclusion: Iron deficiency anemia is modifiable risk factor for Febrile Convulsion in age group between 6months to 5years. Early detection and timely correction of Iron deficiency may be helpful for prevention of Febrile Convulsion in children of this age group.

KEYWORDS : Febrile Convulsion, Iron deficiency, hemoglobin

INTRODUCTION

Febrile Convulsion are the most common cause of convulsions in children and a frequent cause of emergency hospital admission. The international league Against Epilepsy(2009) defines a Febrile Convulsion as a convulsion occurring in childhood between 6 months to 6 years of age, associated with fever more than 38.4°C (skin) not caused by infection of central nervous system, without previous neonatal convulsions or previous unprovoked convulsion and not meeting criteria for other acute symptomatic convulsion [1]. Febrile Convulsions are characterized by their benign prognosis. Classified into simple and complex. A simple convulsion is usually generalised tonic clonic associated with fever, lasting for maximum of 15 min, not recur within 24hours period. A complex convulsion is more prolonged more than 15 min, is focal and/or recurs within 24hrs. There are no long term adverse effect having more than 1 simple Febrile Convulsion. Recurrent simple Febrile Convulsion do not damage the brain [2].

The pathophysiology of Febrile Convulsion remains unclear. It is generally believed that FEBRILE CONVULSION is age dependant response of the immature brain to fever. This postulation is supported by the fact that most (80-85%) FEBRILE CONVULSION occurs between 6 months and 3 years of age, with the peak incidence at 18 months. Although the mechanism of this increased susceptibility is unclear.[3]

Risk factors for the first FEBRILE CONVULSION have been studied in comparison to febrile controls without convulsions. A higher temperature was risk factor for FEBRILE CONVULSION in two studies[4][5] and history of FEBRILE CONVULSION in the immediate family was noted in another study. Low plasma ferritin, reflecting poor Iron status, also increased the risk[6]. When both febrile and afebrile children were used as controls, in addition to a family history of Febrile Convulsion, neonatal discharge at 28 days or later, parental report of slow development, and day care attendance were also risk factors.

Despite the abundance Iron in the environment, Iron deficiency is the most common nutritional deficiency in the western world and the most common cause for anemia worldwide. The Iron status of infants and children is especially precarious because of exaggerated needs imposed by growth. Due to presence of iron in the hemoglobin structure, it plays a crucial role in the transport of oxygen to different tissue such as brain. There is increasing concern with the implication of Iron deficiency for tissue other than erythron. Iron deficiency reduces the metabolism of some neurotransmitters[7].

Iron containing tissue proteins of known biologic importance include myoglobin and enzymes involved with mitochondrial oxygen transport, DNA synthesis, catecholamine metabolism and detoxification. Several lines of evidence led to the hypothesis that iron deficiency can have role in the onset of a convulsion. However, the studies carried out so far have reported conflicting results[8]. In present case control, hospital based study is to find out the incidence of Iron deficiency anemia in case of Febrile Convulsion and to evaluate correction of Iron deficiency anemia and its relation with Febrile Convulsion.

MATERIALS AND METHODS

The proposed study is case control study consisting of infants and children aged between 6months and 5years conducted at tertiary care centre of a teaching hospital over period of twenty three months from August 2013 to July 2015.

A total of one hundred infants and children aged between 6months to 60 months were included in study. Demographic data, convulsion details, nature of febrile illness, past history of convulsion, birth history, developmental history, any neurological deficit were recorded. Children were further divided into 2 groups of fifty each. The group 1 comprised of children with Febrile Convulsion and group 2 comprised of children with febrile illness without convulsion and children with history of previous convulsion, delayed development, neurologic deficit, CNS infection, birth asphyxia, prematurity were excluded.

Estimation of hemoglobin, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, red cell distribution width, hematocrit by auto analysers and serum ferritin level by chemiluminescence method was done.

For the purpose of this study level of hemoglobin less than 11g/dl, mean corpuscular volume less than 70 fl, mean corpuscular hemoglobin less than 27 pg, mean corpuscular hemoglobin concentration less than 33 gm/dl, hematocrit less than 32 %, red cell distribution width more than 15 fl and serum ferritin less than 12 mcg/dl. Since serum ferritin is acute phase reactant and its level is increased in any inflammatory condition, in presence of fever a higher cut off value of less than 30 mcg/dl was considered[6]. Case and control were compared with respect to blood indices and serum ferritin.

Group 1 and group 2 each consisted 50 patients with Febrile Convulsion and febrile illness respectively and were assigned to receive oral Iron therapy (sodium ferredetate) in dose of 4mg/kg/day single dose per day in morning empty stomach based on their hemoglobin less than 11 g/dl and reviewed only those patients at 8 weeks of therapy and recorded blood indices and serum ferritin. Those with normal hemoglobin did not receive Iron therapy[9].

Group 1 consisted with Febrile Convulsion in those who received oral Iron therapy have been taken follow up randomly on basis of number of admission, number of febrile illness and number of Febrile Convulsion episodes in 1year duration after 1st episode of Febrile Convulsion.

RESULT

In the present study 100 patients were enrolled over period of 23months. They were divided into two groups cases and controls consisting 50 each with Febrile Convulsion and febrile illness respectively. Majority of patients were in the age group between 24 and 47 months among cases and 12 and 23 months among controls[10].

Table 1 Personal information of patient under study in two groups

Personal information	Group	Febrile Convulsion n(%)	Fever without convulsion n(%)	P – value
Gender	Boy	33(66)	27(54)	0.22
	Girl	17(34)	23(46)	
Age (months)*		25.34+12.56	24.78+14.56	0.77

*mean ± standard deviations

In the Febrile Convulsion group, most of the patients (60%) belonged to the age group of less than three years (10% were less than one year, 22% between 1 and 2 years old, 56% between two and three , and 12% over three years)(Table 1)[18].

There were 64% cases and 32% controls with hemoglobin less than 11 g/dl. Mean corpuscular volume was less 70 fl in 52% cases and 52% in controls. Mean corpuscular hemoglobin less than 27 pg in 56% cases and 58% in controls. Mean corpuscular hemoglobin concentration less than 33 g/dl in 42% cases and 54% in controls. Hematocrit less than 32% in 64% cases and 52% in controls. Red cell distribution width more than 15% in 64% cases and 60% in controls. Serum ferritin less than 30 ng in 56% cases and 52% in controls (Table 2)[11]. Group 1 comprises of 50 cases in those 32 received oral Iron therapy for 8 weeks and noted random follow among those treated patient during period of 1year and showed significant reduction in frequency of Febrile Convulsion and febrile illness (Table 4 and Table 5).

Table 2 Iron deficiency anemia in children under study

Iron deficiency anemia	Positive n(%)	Negative n(%)	P- value
Febrile Convulsion	32(64)	18(36)	0.0013
Fever without convulsion	16(32)	34(68)	
Total	50	50	

The presence of iron deficiency anemia was 64% in the convulsion group, 32% in the group with fever without convulsion. Chi square test indicated a significant difference between the groups[12].

Table 3 Correlation of iron deficiency anemia in pre and post Iron therapy in two groups

Iron deficiency anemia	Pre (Iron therapy)	Post (Iron therapy)
Febrile Convulsion	64%	32%
Fever without convulsion	56%	25%

Result is not significant at p<0.05

Table 4 Comparison of number of follow up for febrile illness without convulsion in treatment cases

Febrile illness (Without convulsion)	Treated cases	
	No.	%
<2 follow up	28	56
>2 follow up	12	24

Table 5 Comparison of Febrile Convulsion episodes in treatment cases

Febrile Convulsion	Treated cases	
	No.	%
<2 episodes	32	64
>2 episodes	3	06

DISCUSSION

Convulsions or seizures are one of the important pediatric health problems in developing countries. Febrile Convulsions are the most common convulsion disorder in childhood affecting 2% to 5% of children ages between 6 and 60 months[13]. It is generally believed that FEBRILE CONVULSION is an age dependent response of the immune brain to fever. This postulation is supported the fact that most (80-85%) Febrile Convulsion occur between 6 months and 3years of age, with the peak incidence at 18months. Although the mechanism of this increased susceptibility is unclear, animal model suggest that there is enhanced neuronal excitability during the normal brain maturation[14].

The Iron deficiency is identified as a risk factor for Febrile Convulsion. The objective of the study is to determine Iron deficiency as a risk factor for Febrile Convulsion.

One hundred cases meeting the criteria were included for the present study and are randomized equally into two groups 50 each. Both cases and controls were evaluated with following parameters: Hemoglobin, mean corpuscular volume (MCV), mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, red cell distribution width, hematocrit and serum ferritin were measured and compared using statistical methods[15].

In the present study 52% of patient among cases were in age group between 24 to 47 months, and 48% were in age group between 12 to 23 months among controls. There was also male preponderance. Out of 100 cases 60% were male and male to female ratio was 1.5:1. This could be because generally, for any illness males are brought to medical attention more when compared to females because of male dominant social pattern[20].

In the present study, hemoglobin was below 11 g/dl in 32

among cases and 16 among controls. MCV level below 70 fl in 26 among cases and 26 among controls, MCH level below 27 pg in 28 cases and 29 among controls, MCHC level below 33 g/dl in 21 cases and 27 among controls, hematocrit level below 32% in 32 cases and 26 among controls, serum ferritin below 30 ng in 28 cases and 26 among controls.

Serum ferritin is a indicator of body stores of Iron. Bone marrow aspiration is gold standard for determining body stores[16]. But bone marrow is painful and cannot be done in all patients. Serum ferritin is reliable indicator which can be used to determine body stores of Iron can be repeated whenever required. A serum ferritin level below 30 ng is indicator of Iron deficiency status[17].

Those 32 cases whose hemoglobin level was below 11g/dl were treated with oral Iron therapy for 8 weeks and assessed by change in blood indices and reviewed on basis of number of febrile illness and number of Febrile Convulsion in 1 year duration randomly after 1st episode[19].

Cases treated with oral Iron therapy showed significant reduction in the frequency of Febrile Convulsion only 3 cases 06% had more than 2 episodes of Febrile Convulsion in 1 year of duration after the therapy.

CONCLUSION

It can be concluded that Iron deficiency which is the common in the age group of 6months to 5years is risk factor for Febrile Convulsion.

Early detection and timely correction of Iron deficiency may be helpful for prevention of Febrile Convulsion and also reduces frequency in children of this age group.

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