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ASSOCIATION OF IRON DEFICIENCY ANAEMIA WITH FEBRILE SEIZURES

Pediatrics

Dr. Raman Kishore Senior Resident, Department of Pediatrics, All India Institute of Medical Sciences Patna, Bihar

Dr. (Prof.) Radha Krishna Sinha* Professor, Department of Pediatrics, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar

ABSTRACT

INTRODUCTION: Iron deficiency anemia is one of the most prevalent micronutrient deficiencies in young children in India and other parts of the world. Considering the age prevalence of iron deficiency anaemia and febrile seizure which are the same and some studies have suggested iron deficiency as a predisposing factor for febrile seizures. We designed this study to evaluate the relationship between iron deficiency anaemia and febrile seizures. **METHODS:** study consists of 110 children of age group between 6months to 5 years. Children with seizure who attended pediatric department, Jawaharlal Nehru Medical College and Hospital, Bhagalpur during a period from June 2013 to May 2015 in outdoor and indoor department were included in the study. After taking written consent, the detailed clinical history, physical examination and other related investigations were recorded and data were analysed. **RESULTS:** In this study the mean age of onset of febrile seizures is 21 months. Severity of anemia doesn't have any correlation with occurrence of febrile seizures. Iron deficient in terms of low HB, low MCH, low MCV, high RDW, low serum Iron, high TIBC and low serum iron and TIBC ratio. **CONCLUSIONS:** Iron deficiency is a significant risk factor for febrile seizures in children of age group six months to five years.

KEYWORDS

Febrile Seizures, Iron Deficiency Anemia, Children.

INTRODUCTION

The World Health Organization estimate iron deficiency anemia is the main cause for anemia affecting 500 million and 2 billion people worldwide [1]. Iron is nutritional element not only needed for synthesis of haemoglobin, but it is also essential for enzymes involved in neurochemical reactions [2]. The peak incidence of febrile seizure is at the age of 14 to 18 months [3]. Iron stores are usually sufficient for blood formation in the first 6-9 months of life in term infants. In term infants, anemia is caused solely by inadequate dietary iron usually occurs at 9-24 months of age and is relatively uncommon thereafter [4, 5]. Considering the age prevalence of iron deficiency anaemia and febrile convulsion which are the same, the role of iron in the metabolism of neurotransmitters (such as GABA and serotonin) and some enzymes (such as monoamine oxidase and aldehide oxidase), the function of hemoglobin in conveying oxygen to the brain and since fever can exacerbate symptoms that result from anaemia, a relationship between iron deficiency anaemia and febrile convulsions is probable. Some studies have suggested iron deficiency as a predisposing factor for febrile seizures. We designed this study to evaluate the relationship between iron deficiency anaemia and febrile seizures.

METHODS

Study consists of 110 children of age group between 6months to 5 years. Children with seizure who attended pediatric department, Jawaharlal Nehru Medical College and Hospital, Bhagalpur during a period from June 2013 to May 2015 were included in the study. After taking written consent, the detailed clinical history, physical examination will be done, and then venous blood sample will be collected and sent to the pathology department for investigation. To diagnose iron deficiency following investigation will be done, which include, Hemoglobin estimation (Hb), RBC count, peripheral smear, MCV, MCH, MCHC, Red cell distribution width (RDW), Sr. iron, Total iron binding capacity (TIBC), Sr. Iron: TIBC ratio.

Equipment is used Nihon Kohden cell tac used for CBC and Fimens Deadmax used for Sr. iron and TIBC. Results of the investigation will be correlated with the patient. Anemia is defined as Hemoglobin concentration <11g/dl. Microcytosis is defined as MCV below the age corrected normal values for erythrocytic volumes (MCV of 70 fl/mcl in children <2 years, of 73fl/mcl in children 2-4 years, 75 fl/mcl in children5-6 yrs).

RESULTS

The percentage of male patients involved in the study is 70% which is higher than that of female patients involved in the study which is only 30%.

percentage of the children chosen for the study between the age group of 6 months to 12 months is higher which is 35.45% than the percentage of children between the other age groups as 13-18 months, 19-24 months, 25-60 months which are12.73%, 22.73%, 29.09% respectively. Mean age of the children involved in the study is 21 months as shown in Table 1.

Table 1: Age in month's distribution of children

Age in months	%	No. of children
6-12	35.45%	39
13-18	12.73%	14
19-24	22.73%	25
25-60	29.09%	32
Total	100%	110

Mean ± SD: 21.73±9.91

52.73% patients had body temperature between <100°F which is more than the patients who had body temperature of 100-101°F which is 20% and patients with body temperature of >101°F are 27.27%

Table 2: Hemoglobin distribution of children

Hemoglobin (g/dl)	No. of children	%
6-9	23	20.91%
9-11	56	50.91%
>11	31	28.18%
Total	110	100%

Table 2 shows haemoglobin distribution of children. It shows that <11 is considered as anemic which comprise of 71.82% of which 6-9gm%, 9-11gm%, includes 20.91%, 50.91% respectively**.**

Table 3: MCV/MCH and MCHC distribution of children

	No. of children	%
MCV		
<70	38	34.55
70-80	68	61.82
>80	4	3.63
MCH		
<25	47	42.72
25-30	58	52.73
>30	5	4.55
MCHC		
<30	26	23.65
30-35	82	74.55
>35	2	1.80

Mean MCV is 71.98fl, Mean MCH is 24.6, Mean MCHC is30.74, p

value <0.001

Patients with MCV <80fl comprised of 96, 37% among it <70fl are 34.55%and between 70-80fl is 61.82% and patients with >80fl are much low which comprise of only 3.63%.

The value of MCH among patients in this study <25 are 42.72% and between 25-30 is 52.73% and >30 is 4.55%.

The value of MCHC <30 among the patients of study comprised of 23.65%, 30-35 comprised of 74.55%and >35 is about 1.80%.

Serum iron level <90 comprise of 83.64% of patients among which <50 are 21.82% and between 50-90 are 61.82%. And the patients with >90 are only 16.36%. The p value is significant for serum iron level for this study.

Table 4: Febrile seizures and its association with or without iron deficiency

	No. of patients	Percentage
Febrile seizure with iron deficiency	94	85.45%
Febrile seizure without iron deficiency	16	14.55%
	110	100%

P value<0.001

Patients with febrile seizures and having iron deficiency account for about 85.45% of all the patients in this study and the patients with febrile seizures with no iron deficiency account for 14.55%. p value is significant for this study.

In this study patients with raised TIBC comprise of 72 patients which are about 65.45% and normal TIBC is about 34.55%. P Value is significant

Serum Iron/TIBC <20 accounts for about 90.91% of which <10 are 23.64% and 10-20 are 67.27% and p value is significant for this study.

Table 5: Peripheral smear distribution of children

Peripheral smear	%	No. of children
Normocytic normochromic	31.82%	35
Hypochromic microcytic	68.18%	75
Total	100%	110

In this study, patients with hypochromic microcytic peripheral smear are 75 which are about 68.18% and normocytic normochromic are 35 which are 31.82%.

DISCUSSION

In present study there was a preponderance of male gender in the febrile seizure group which is around 2.5:1 for male as to female. Many studies have been conducted since long time which always showed that boys have consistently emerged with a higher frequency of febrile seizures. Ratios of boys: girls in different studies have ranged from 1.1:1 (Nelson and Ellenberg) to 2:1; (Hauser; Forsgren et al)[6,7]. However, findings of our present study are in contrast to other large studies done by Verity et al, 1985 who found that there is no sex difference in occurrence of febrile seizures.The mean age of occurrence of febrile seizures in present study was about 21 months which was comparable to the other studies such as Alfredo Piscane et al found that the mean age for febrile seizures was about 15 months [8]. Separate studies done by Vasvani RK et al, Waruiru C et al and Azhar S Daoud et al also found that febrile seizure peaks at 18 months [9, 10, and 11]. Ellenberg et al found the average seizure age to be 23.3 months. Generally, it is noted that noted that the most common age in which the febrile seizure and the first febrile seizure occur is second year of life [12].

The axillary temperature taken at the time of admission, before prescribing anti pyretic as recorded by standard protocol. In present study, initial temperature of the body was around, 100^{o}F. In the literature, the higher the peak temperature, the lower the chance of recurrence suggested by Berg et al, what was not established in present study?

In present study red blood indices mean Hb, MCV and MCH was 10.35g%, 71.98 fl, 24.6 pg respectively which was significantly low. Kumari PL et al, Naveed-ur-Rehmann et al and Piscane et al had results similar to present study while Azhar S Daoud et al, Vasvani et al failed to find any significant difference between the two groups[13].

In present study shows that there was significantly low iron level which was <90mcg/dl in about 83.64%. Present study also suggests that about 85.45 percent children having iron deficiency had febrile seizure. Pisacane et al studied the serum iron level between 6 - 24 months of age, where the level was low in febrile children. Bidabadi et al reported that the serum Iron level in febrile seizure was higher at a statistically insignificant level. Khalid N et al couldn't appreciate significant TIBC changes between cases and control [14].

CONCLUSIONS

Iron deficiency is a significant risk factor for febrile seizures in children of age group six months to five years.

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