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Correlation between Iron Deficiency Anemia and Febrile Seizure

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Original Research Article

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Abstract: Febrile seizure is a common cause of seizure occurring in 3-5% children under 5 years of age. Iron is important for neurological functions and development of brain. Iron deficiency anemia can be a risk factor for febrile seizure, because the latter is more common in children under 5 years of age and iron deficiency anemia is also common in children of the same age group. Early detection and timely correction of iron deficiency may be helpful for prevention of febrile seizures in children of this age. The aim of this study is to evaluate role of iron deficiency as a risk factor of febrile seizure.
Keywords: Febrile seizure, Iron deficiency anemia, Hemoglobin.

INTRODUCTION

Febrile seizures are seizures that happen between the age of 6 months and 5 years with a temperature of 38°C (100.4°F) or higher, those are not the outcome of central nervous system infection or any metabolic inequity, and that occur in the deficiency of a history of previous afebrile seizures [1].

Febrile seizure has multiple etiological causes of which iron deficiency in febrile seizures havedrawn much attention [2]. Iron plays an important role in the metabolismof several neurotransmitters, and in low iron status, aldehyde oxidases and monoamine are reduced.

In addition, the expression of cytochrome C oxidase, a marker of neuronal metabolic action, is decreased in iron deficiency [3] which ascertained to influencenormal behavioral and developmental processes [4-6]. Neurological symptoms like poor attention span, learning deficits, weak memory, delayed motor progress and behavioral disturbances caused by iron deficiency are well known [7-9]. Iron deficit may lead to anemia, behavioral and cognitive alterations, growth interruption, immune function disorder, stroke, breath-holding spells and pseudo-tumor cerebri [10].

Although febrile seizure is benign and often leads to brain damage, it causes emotional, physical, besides mental damages, which are traumatic for parents, and affects families' quality of life [11, 12]. Iron deficiency is postulated as a risk factor for febrile seizures inchildren and it is an easily correctable condition. Hence, the existing study is conceded out to evaluate the relationship among iron status and febrile seizures [13, 14].

MATERIAL AND METHODS

This prospective case control study was carried out at Index Medical College, Hospital and Research Centre, Indore (M.P.) in the Pediatric Department after taking informed and written consent. The study was a 1 year duration study which included details of all patients suggestive of febrile seizure between age of 6 months to 5 years.

A total of 100 patients were taken for study. Out of these 100 patients, 50 were categorized as cases having febrile convulsions as per standard definition although 50 were controls having febrile sickness but no convulsions. Both groups were compared on basis of their hemoglobin levels, haematocrit, MCV, MCH and MCHC.

A simple febrile seizure isa primary generalized, usually tonic-clonic attack linked with fever, enduring for a maximum of 15 min, and not regular within a 24-hr period. Iron deficiency anemia is defined as decrease of the hemoglobin <11gm%, hematocrit <34 %, MCV <73 microM [3], MCH <27 pg, MCHC < 33 g/dL. Discrete variables were

expressed as counts (%) and compared using the Chi-square tests, statistical significance is set at $p < 0.05$.

Exclusion criteria

Children presenting with atypical febrile seizures, those having any signs of central nervous system infection, those with any chronic neurodevelopment problems, those who were previously diagnosed cases of other hematologic problems, bleeding or coagulation disorders, hematologic malignancy, those who were on iron supplementation, and very sick children were excluded from the study.

RESULTS

We studied 100 children with fever, of which 50 children having simple febrile convulsion while 50 children having fever without convulsion or history of convulsions (were taken as controls).On correlating iron deficiency with prevalence of febrile seizures, we observed that 34 cases (68%) of febrile seizures had iron deficiency (mean Hb 8.9 gm%, hematocrit 32%,MCV 71 microM[3], MCH 23 pg, MCHC 30 g/dL) as compared to 16 cases (32%) of control group (mean Hb 11.6 gm%, hematocrit 38%, MCV 84 microM[3], MCH 28 pg, MCHC 34 g/dL).

DISCUSSION

Febrile seizure is the most common type of seizure in children.Although febrile seizure in children is benign; seizureoccurrence in children may cause parents to worry andfear [15, 16]. It can potentially affect thequality of familylife and cause anxiety in parents.

These effects appear as physical,psychological and behavioral manifestations. It may have a series of negative outcomes in life which are due to lackof sufficient knowledge of parents about febrile seizure[17]. Iron deficiency anemia in young children is one of the most common micronutrient deficiencies worldwide which can lead to developmental and cognitive disorders.

It has been revealed that disorders such as restless leg syndrome, attention deficit hyperactivity disorder (ADHD) and febrile seizures are related to iron deficiency [18]. Mean hemoglobin level is marker of iron deficiency anemia. It is significantly lower in simple febrile seizure group compared with control group. Low hemoglobin is found to be significant risk factor (p value <0.05) for simple febrile seizure.

The results of a study conducted by Pisacane *et al*. showed that iron deficiency anemia in patients withfebrile seizure (30%) was more prevalent than controlgroups (14%) and healthy children (11.6%) [19]. Naveed-Ur-Rehman and Billoo AG found that iron deficiency anemia in patients with febrile seizure was significantly more common than in the control group and the hemoglobin level was significantly lower than control group [20]. Sherjil A *et al*. found thatthe iron deficiency anemia in patients with febrile seizurewas almost two times more prevalent. Iron deficiency wasconsidered as a risk factor for seizures in these patients [21].

CONCLUSION

In conclusion, iron deficiency anemia has strong association with simple febrile seizure and hemoglobinlevel is an important tool to find out the same.

We report iron deficiency as a risk factor for simple febrile seizures in children. Low level hemoglobin may lower the seizure threshold, as iron is important for the function of various enzymes and neurotransmitters present in the central nervous system. Early detection and timely correction of iron deficiency may be helpful for prevention of simple febrile seizures in children of this age group.

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