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Original Research Paper

Paediatrics

LOW IRON STATUS: A POSSIBLE RISK FACTOR FOR FIRST FEBRILE SEIZURE

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ABSTRACT The peak incidence of febrile seizures is between one and two years of age.The mean age being 18 months. A male preponderance is observed in all age groups with male: female ratio of 1.4:1. Family history of febrile seizures is observed in 28.5% of cases. The mean Serum Ferritin, Hemoglobin and Mean Corpuscular Volume are significantly lower in children with febrile seizures as compared to controls. Significantly, a greater proportion of children with febrile seizures have low Serum Ferritin (<10ng/ml) ; low Hemoglobin (<11gm/dl) and low Mean Corpuscular Volume (<70fl) as compared compared to controls.

KEYWORDS : Febrile Seizure, Low Iron , Heamoglobin, S.Ferritin.

INTRODUCTION

A seizure or convulsion is a paroxysmal, time-limited change in motor activity and/or behavior that result from abnormal electrical activity in the brain. Seizures are common in the pediatric age group and occur in approximately 10% of children. Most seizures in children are provoked by somatic disorders originating outside the brain, such as high fever, infection, syncope, head-trauma, hypoxia, toxins, or cardiac arrhythmias. Other events, such as breathholding spells and gastro esophageal reflux, can cause events that simulate seizures. A few children also exhibit psychogenic seizures of psychiatric origin. Less than one third of seizures in children are caused by epilepsy, a condition in which seizures are triggered recurrently from within the brain. For epidemiological classification purposes, epilepsy is considered to be present when two or more unprovoked seizures occur at an interval greater than 24 hr apart.

The cumulative lifetime incidence of epilepsy is 3% and more than half of cases begin in childhood. However, the annual prevalence of epilepsy is lower (10.5—0.8%) because many children outgrow epilepsy. Although the outlook for most children with symptomatic seizures or those associated with epilepsy is generally good, the seizures may signal a potentially serious underlying systemic or central nervous system (CNS) disorder that requires thorough investigation and management. For children with epilepsy, the prognosis is generally good, but 10—20% have persistent seizures refractory to drugs, and those cases pose a diagnostic and management challenge. Seizures have been recognized since ancient times and although improvement has been made in management over this century compared to the previous 2000 years, there are still far too many children whose lives are crippled by poorly controlled seizures. Infants and children are more prone to have seizures than adults. This appears to reflect greater neuronal excitability at certain ages as the excitatory glutamate system and inhibitory gamma amino benzoic acid (GABA) system do not always balance each other. This also results in the tendency to exhibit symptomatic seizures related to high fever, virus infection, minor asphyxia, medication, bacterial toxins and biochemical upsets such as hypo- or hypernatremia and hypocalcemia Childhood seizure differs from adult seizure since the brain is a developing organ. The clinical picture is not static and the pattern of fits may change with age, e.g. infantile spasms can evolve into Lennox—Gastaut syndrome. In addition, many types of seizures are restricted to childhood.

MATERIAL AND METHODS

After informed consent, detailed history was taken and clinical examination done in both cases and controls and blood investigations were done to diagnose iron-deficiency in both cases and controls. Iron deficiency was diagnosed as per WHO criteria (hemoglobin value 15% and serum ferritin value < 12ng/mL). Other explanatory variables, which can be the potential confounders were also included in the study and considered for analysis.

RESULTS

Highly significant association was found between iron deficiency and simple febrile seizures in both univariate and multivariate analysis. Crude odds ratio was 5.34 (CI 3.27- 8.73, P<0.001). and adjusted odds ratio in the logistic regression analysis was 4.5 (CI 2.69- 7.53, P <0.001).

DISCUSSION

In our study to detect low iron status as a possible risk factor for first febrile seizures 63 cases and 63 age and sex matched controls are studied and analyzed . In the present study we found that the peak incidence of febrile seizure occur during one to two years of age and the mean age is 18 months. This is comparable to previous studies. The peak age of onset being 14-18 months of age as per Nelson textbook of pediatrics. Berg et al. in his study found that the peak incidence is between 18 and 24 months. Similarly Naveedur Rehman et al. reported the peak incidence at 22 Months .The present study depicts that the incidence of febrile seizures is slightly higher in boys than in girls and the male: female ratio 1.4: 1. This is similar to the study by Berg et al. while Naveedur Rehman et al. reported no gender difference in their study .In our study family history of febrile seizures is seen only in 28.5% of cases. But Forfar textbook of pediatrics mentions that 50% will have a family history of convulsions and 80% of monozygotic twins are concordant for febrile convulsions.The mean serum ferritin level in our study is 14.5ng/ml. whereas Daoud As et al. in his study group from Jordan found that the mean ferritin level was 29.5ng/ml. It is probably due to the fact that iron deficiency anemia is more prevalent in our country; the mean serum ferritin level of Indian children is also low when compared to the Western standards. Daoud As et al. in his study found that a significant proportion of children with febrile seizures had only low serum ferritin level. The proportion of children with febrile seizures having low hemoglobin, Mean Corpuscular Volume and Mean Corpuscular Hemoglobin were not statistically significant. Whereas our study demonstrates a

statistically significant difference in the proportion of children with febrile seizures have not only low serum ferritin but also low hemoglobin and low Mean Corpuscular Volume. This is similar to the findings reported by Naveedur Rehman et al. in his study at Karachi. This is probably due to the fact that iron deficiency occurs in three stages.First stage characterized by decreased storage of iron without any other detectable abnormalities. An intermediate stage of `latent iron deficiency` i.e. iron stores are exhausted, but anemia has not occurred yet.The third stage is that of overt iron deficiency when there is a decrease in the concentration of circulating hemoglobin due to impaired hemoglobin synthesis. The children in Western countries if they are iron deficient are mostly in the early stage. So the study done by Daoud AS et al. in Jordan has a significant proportion of children with low ferritin level, without significant difference in HB, MCV and MCH. Whereas Indian children/children of our neighboring country Pakistan are in the stages of latent or overt iron deficiency. So our study and the study done in Karachi by Naveedur Rehman et al. had a significantly greater proportion of children with not only low serum ferritin but also low HB and MCV. As similar to previous studies by Daoud As et al., Naveedur Rehman et al. and Alfredo Pisacane et al. our study also demonstrates an association between iron deficiency and febrile seizures. Thus iron deficiency is one of the possible risk factor for febrile seizures. Developmental problems, risk of pediatric stroke, the occurrence of febrile seizures and breath holding spells are perhaps the tip of the iceberg, of the neurological consequences of iron deficiency. With appropriate recognition, treatment or better yet, prevention the neurological sequalae of iron deficiency are entirely preventable and perhaps reversible.

CONCLUSION

Plasma ferritin level and blood indices are significantly lower in children with febrile seizures as compared to children without febrile seizures suggesting that iron deficient children are more prone to febrile seizures. A follow-up study of patients found to be iron deficient at the time of a first febrile seizure to determine the incidence of subsequent febrile seizures after treatment for iron deficiency would be of great interest.

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