

ORIGINAL ARTICLE

IRON STATUS: IS THERE A ROLE IN FEBRILE SEIZURES?

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Background: Febrile seizure a common convulsion disorder in children, can lead to increased morbidity and mortality because of risk of aspiration and hypoxia during prolonged febrile seizures. There are many risk factors associated with febrile seizures and their recurrence. We conducted this study to see if there is a role of iron status in febrile seizures. **Methods:** This cross-sectional study was conducted in 323 children 6 months to 5 years of age admitted in department of Paediatric DHQ Hospital Faisalabad with fever and seizures from July 2009 to April 2011. Iron deficiency anaemia including haemoglobin concentration (Hb), Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH) and Plasma Ferritin were measured. **Results:** Febrile seizures were more common between ages 12 months to 36 months. Of 323 children with febrile seizures 17 (5.3%) were iron deficient. Mean Hb was 11.71 ± 1.38 g/dL, mean MCV 78.40 ± 3.29 , mean MCH 27.11 ± 3.28 , and mean ferritin was 66.57 ± 24.7 . **Conclusion:** Iron deficiency anaemia was not common in patients with seizures. Iron status has no role in febrile seizures.

Keywords: Iron deficiency anaemia, febrile seizures

INTRODUCTION

Febrile seizure is the most common convulsion disorder in children which occur 2–5% world wide.¹ Febrile seizures are a form of acute symptomatic seizure occurring between ages 5 month and 5 years, associated with fever but without any evidence of intracranial infection or other defined causes of seizures.^{2,3} It is seen in 2–4% children in Pakistan.⁴

Febrile seizures, though has excellent long term prognosis with risk of epilepsy in less than 1% but occurrence of seizures can lead to increased morbidity and mortality because of risk of aspiration and hypoxia during prolonged febrile seizures.⁵ Therefore it is attempted to identify the risk factors associated with febrile seizures and their recurrence including, family history of febrile seizures, degree of rise of temperature with seizures threshold, Perinatal factors and iron deficiency anaemia.^{6,7}

Considering the age prevalence of iron deficiency anaemia and febrile seizures, which are the same, role of iron has been studied. Some studies deducted that iron deficiency might have protective role on febrile seizures.^{8,9} Other believed that in patients with iron deficiency anaemia there was a higher incidence of febrile seizures.¹⁰ Considering the conflicting results of previous studies, we designed this cross-sectional study to investigate the role of iron deficiency in febrile seizures.

MATERIAL AND METHODS

After taking approval from hospital ethical review committee, Punjab Medical College, Faisalabad children aged 6 months to 5 years of both gender with febrile seizures admitted in Paediatrics Ward District Head Quarter Hospital Faisalabad (DHQ), a (Tertiary Care, Hospital, Faisalabad) through out-patient

department, emergency department and via consulting clinics, was selected after explaining the purpose, risk benefits ratio, addressing ethical issues and taking informed written consent from parents or guardians. Exclusion criteria were CNS infection, developmental delay and neuromuscular disorder, hepatic renal and metabolic disorder. Children included in study were thoroughly evaluated by taking detailed history and physical examination. The quantity of 3 ml blood was collected in EDTA anticoagulant for complete blood count including hematocrit, blood indices and serum ferritin level was sent to hospital haematology laboratory, where these was reported by pathologist. A Performa containing bio-data, history, examination and investigation was completed. Data was analysed with the help of SPSS-10.

RESULTS

Age distribution of the patients is given in Table-1. Three hundred and twenty-three children with febrile seizures (sample size calculated according to WHO calculator) were included in study. One hundred ninety-seven (61%) were male and 126 (39%) were females. Mean age of children was 23.41 ± 12.39 months. Febrile seizures were more common between ages 12 months to 36 months. Of 323 children with febrile seizures 17 (5.3%) were iron deficient while 306 (94.7%) were not iron deficient. Mean Hb was 11.71 ± 1.38 g/dL, mean MCV was 78.40 ± 3.29 , mean MCH was 27.11 ± 3.28 , and mean ferritin was 66.57 ± 24.7 (Table-2).

Table-1: Distribution of febrile seizures in age groups

| Age Group | Number | Percentage |
|--------------|--------|------------|
| 6–19 Months | 11 | 3 |
| 20–33 Months | 162 | 50 |
| 34–47 Months | 132 | 40 |
| 48–60 Months | 12 | 7 |

Table-2: Hb, MCH, MCV, and Plasma Ferritin in children with febrile seizures

| | Min | Max | Mean | SD |
|-------------------------|------|------|-------|-------|
| Hb (g/dl) | 8.5 | 15.0 | 11.71 | 1.38 |
| MCH (pg) | 20.0 | 36 | 27.11 | 3.28 |
| MCV (fl) | 68.0 | 88.0 | 78.40 | 3.29 |
| Plasma ferritin (µg/dl) | 22.0 | 140 | 66.57 | 24.72 |

DISCUSSION

Considering the above mentioned results, it seems that febrile seizures were more common in male children over age 6 months. Similar results were obtained in study by Akbar MA, Roya N and Karimi B while in other studies gender predominance has not been found.¹¹ Febrile seizures were found to occur mostly between ages of 12–36 months, same as in other studies.¹² There is controversy regarding the role of iron status in febrile seizures some of them concluded that iron deficiency anaemia caused intensification of febrile seizures, other mentioned protective effect of iron deficiency against febrile seizures and the remaining confirmed our results.

Pisacane *et al* in case-control study of 293 controls and 146 patients aged 6–24 months, showed a significantly higher rate of iron deficiency anaemia in patient with febrile seizures as compared to controls¹³, while Daoud *et al*¹⁴ in a similar study on 75 patients and 75 controls, concluded that only a low plasma ferritin level was correlated with febrile seizures, but there was no significant difference in Haemoglobin and MCV. Kobrinsky *et al*¹⁵ in a case-control study 25 cases and 26 controls, described that anaemia increased the threshold for febrile seizure and the lack of iron might protect against the development of febrile convulsion. Nveed-ur-Rehman¹⁶ declared that plasma ferritin level was significantly depleted in cases compared to controls and suggested that iron deficient children were more vulnerable to febrile convulsions. Bidabadi *et al*¹⁷ suggested that iron deficiency anaemia was less frequent among cases with febrile seizures, as compared to the controls. Abaskhanian *et al*¹⁸, in a cases-control study of 100 cases and 100 controls, reported that the incidence of febrile seizure was lower in cases with iron deficiency anaemia but the difference was not significant. Asadi-Pooya *et al*¹⁹ conducted a case-control study on 96 cases and 106 controls and stated that there was no significant difference in the means of Haemoglobin, hematocrit, MCV, mean corpuscular Haemoglobin, mean corpuscular Haemoglobin concentration (MCHC) and platelet count between cases and controls. Also, the study showed no relationship between epilepsy and RBC indices. However, this study was performed on epileptic children while we studied children with febrile seizures.

Vaswani *et al*²⁰ performed a cases-control study on 50 cases and 50 controls and concluded that the mean serum ferritin level was significantly diminished

in cases compared with controls so iron deficiency might be a possible risk factor for febrile convulsion in children. Susan *et al*²¹ performed a case-control study and found no relationship between iron status and febrile seizure.

A large retrospective case-control study of 361 patients and 390 controls which was performed by Hartfield *et al*²² showed that children with febrile convulsions were nearly twice as likely to be iron deficient compared to those with febrile sickness merely. His study suggested that screening for iron deficiency should be regarded in children presenting with febrile convulsions.

The results of our study demonstrated that Iron Deficiency Anaemia is significantly less frequent in children with febrile seizures. These results are in contrast with Piscane *et al*, Naveed ur Rehman and Billoo and Daoud *et al*. and confirmed Korbinsky *et al*, Abaskhanian *et al*, Asadi Pooya *et al*, Bidabadi *et al* and Susan A *et al* but in contrast with study of Korbinsky our study failed to demonstrate protective effect of iron deficiency anaemia against development of febrile seizures.

CONCLUSION

No relationship was found between iron deficiency anaemia and febrile seizures in children aged 6 months to 5 years.

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