

ORIGINAL ARTICLE**Iron deficiency anemia as a risk factor for the first episode of febrile seizure**

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ABSTRACT:

Aim: Iron deficiency anemia as a risk factor for the first episode of febrile seizure. **Material and Methods:** Cases (n=100) were patients with typical febrile convulsions between 1 year to 5 years (AAP clinical practice guidelines). A control group (n=100) was selected from age and sex matched children admitted with febrile illness but without a seizure. **Results:** 86% (n=86) children had Hb <11 gm/dl from the case group as compared to 25% (n=25) in control group with significant p-value (p <0.01). The proportion of cases with anemia was significantly higher as compared to that of controls (p=0.015). mean hemoglobin level and MCV in cases were significantly lower as compared to that in controls (p <0.03). RDW value is significantly higher in cases as compared to control (p <0.03). No significant difference between the two groups was observed with respect to mean MCH levels (p>0.03). serum ferritin and serum iron levels in cases were significantly lower as compared to that in controls (p <0.01). TIBC value is significantly higher in cases as compared to control (p <0.01). **Conclusion:** The findings suggest that a considerable percentage of children having febrile seizures suffer from iron-deficiency anemia and low serum iron. This means the low serum iron and the presence of anemia can serve as a reinforcing factor for febrile seizures in children.

Keywords: Iron deficiency anemia, Risk factor, Febrile seizure

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INTRODUCTION

The term febrile seizures is used for under 5 years children with temperature of 38°C or higher without cerebral infection or metabolic imbalances.^{1, 2} The duration of fever is less than 15 minutes in simple febrile seizures also called generalized tonic clonic.³ While the distinguishing features of complex febrile seizures are their focal location, duration less than 15 minutes and recurrence within 24 hours.⁴ Another condition which has longer duration of more 30 minutes of seizure attack is called status epilepticus.⁵ In pediatric practice febrile seizure is a major challenge due to high prevalence in under 5 years age children and its recurrent nature. The awareness about complications of febrile seizure is increased in recent times.⁶ In Europe the incidence of febrile seizures is 2-5% in 6 months to 5 years children⁷ but it higher in Asian children (5-10%).⁸ The problems associated with this condition are the risk of aspiration and psychological trauma to both parent and child.⁹ Iron deficiency anemia is most common condition in which human body is lacking enough mineral iron. In developing countries upto half of the preschool population are affected by iron deficiency anemia.^{10, 11} Iron deficiency anemia can be prevented and treated easily. Iron is required for hemoglobin synthesis as well as for enzymes participating in neurochemical reactions.¹² The features of iron deficiency anemia are attention deficit, poor memory, leaning disability, retarded motor activity and behavioural imbalance.¹³

Literature has reported positive association between iron deficiency anemia and febrile seizures in children of less than five years age.^{1, 14} The proposed mechanism can be iron deficiency may alter the seizure threshold of a child.¹⁰ Studies reported frequency of iron deficiency in patient with febrile seizures to 63% in India⁹ and 51.3% in Iran.¹⁴ The rationale of this study was to find out frequency of iron deficiency anemia in children with febrile seizures. As no local data is available so this study will help in providing local data on this important aspect of iron deficiency anemia in children with febrile seizures. As iron deficiency anemia is preventable and treatable, it will help in the prevention and management of febrile seizures.

MATERIAL AND METHODS

This Descriptive observational study conducted in the Department of Paediatrics, after taking the approval of the protocol review committee and institutional ethics committee. Cases (n=100) were patients with typical febrile convulsions between 1 year to 5 years (AAP clinical practice guidelines). A control group (n=100) was selected from age and sex matched children admitted with febrile illness but without a seizure. Hematological investigations include Haemoglobin, MCV, MCH, RDW, Serum Ferritin, Serum Iron, TIBC and Peripheral blood smear. Anthropometrical data collection includes weight, recorded on an electronic weighing scale; Measurement of length and

height using infantometer and stadiometer respectively; Head circumference was measured using a plastic tape measure by cross tape method; IAP weight for age classification was used to grade protein-energy malnutrition.

Inclusion criteria

- Age between 1 year to 5 years
- The temperature of 38 degree Celsius (100.4 o F) or higher
- Not the result of central nervous system infection or any Metabolic imbalance.

- Occur in the absence of a history of priorafebrile seizure.
- Primarily generalized, usually tonic-clonic.
- Lasting for a maximum of 15 min.
- Not recurrent within a 24 hrs period.

Exclusion criteria

- Children with neurological infection.
- Children with developmental delay.
- Children on iron therapy.
- Children with previous febrile/afebrile seizure.

RESULTS

Table-1: Distribution of cases according to hemoglobin levels

Haemoglobin Level(gm/dl)	Cases	Controls
No anemia (≥ 11 gm/dl)	14(14%)	75(75%)
Anemia		
Mild anemia (10-10.9gm/dl)	25(25%)	11(11%)
Moderate anemia (7-7.9gm/dl)	56 (56%)	11(11%)
Severe anemia (<7gm/dl)	5(5%)	3(3%)

Table 1 shows that 86% (n=86) children had Hb <11 gm/dl from the case group as compared to 25%(n=25) in control group with significant p-value (p <0.01). The proportion of cases with anemia was significantly higher as compared to that of controls (p=0.015).

HEMATOLOGICAL PARAMETERS

Table-2: Hematological parameters

Parameters	Cases		Controls		P-Value
	Mean	S.D.	Mean	S.D.	
Hb(gm/dl)	9.26	1.37	10.75	1.45	<0.01
MCV(fl)	68.87	6.85	16.67	2.95	0.04
MCH(pg)	22.96	2.15	23.83	3.47	0.04
RDW	18.14	3.78	15.17	2.36	0.04

Table 2 shows, mean hemoglobin level and MCV in cases were significantly lower as compared to that in controls (P=0.04). RDW value is significantly higher in cases as compared to control (P=0.04). No significant difference between the two groups was observed with respect to mean MCH levels (P=0.04). serum ferritin and serum iron levels in cases were significantly lower as compared to that in controls (p <0.01). TIBC value is significantly higher in cases as compared to control (p <0.01).

DISCUSSION

A total of 200 subjects were included in the study. The case group comprised 100 children admitted with the first episode of simple febrile seizure and 100 children in the control group of the matched age gender with febrile illness but without seizures and without iron supplements. In the present study, the majority of subjects in both groups were males. Sex analysis reveals that 64% were males and 36% females in the case group. Leela Kumari et al¹⁵ also reported 53% of male children in their study. In the present study, characteristics studied were temperature, weight (Kg), height (Cm), nutritional status among which mean temperature was found to have a difference between cases and control but was not statistically significant (p-value = 0.37). This is in accordance to study by ModaresiM et al¹⁶ Vaswani et al¹⁷ and Daoud et al¹⁸ who although reported a higher incidence of high temperature in case group but it was not statically significant. The incidence of

anemia was higher among cases as compared to controls. This difference was statistically significant (p<0.01). Other workers of the field as Derakhshanfar et al¹⁹ and Modaresi M et al also reported a statistically significant difference from the control group. The iron status components were measured (Hb, MCV, MCH, RDW, serum iron, ferritin, and TIBC) among cases and controls. In the present study, it was found that the mean ferritin and serum iron levels in the FS group were significantly lower than the corresponding levels in the control group (p < 0.01). Daoud et al reported that the mean level of ferritin in cases with first febrile seizure is significantly lower than that in a control group. Pisacane et al²⁰ compared the levels of serum iron among controls and patients with FS, and they reported that iron deficiency anemia is significantly more frequent among the cases than among the controls.

CONCLUSION

The findings suggest that a considerable percentage of children having febrile seizures suffer from iron-deficiency anemia and low serum iron. This means the low serum iron and the presence of anemia can serve as a reinforcing factor for febrile seizures in children.

REFERENCE

- Ghasemi F, Valizadeh F. Iron-deficiency anemia in children with febrile seizure: a case-control study. *Iran J Child Neurol* 2014;8(2):38.
- Vaswani RK, Dharaskar PG, Kulkarni S, Ghosh K. Iron deficiency as a risk factor for first febrile seizure. *Indian Pediatr.* 2010;47(5):437-9. doi: 10.1007/s13312-010-0080-8. Epub 2009 Sep 3. PMID: 19736364.
- Sadeghzadeh M, Khoshnevis Asl P, Mahboubi E. Iron status and febrile seizure- a case control study in children less than 3 years. *Iran J Child Neurol.* 2012;6(4):27-31. PMID: 24665277; PMCID: PMC3943016.
- Miri-Aliabad G, Khajeh A, Arefi M, Miri-Aliabad F. Iron status and iron deficiency anemia in patients with febrile seizure. *Zahedan J Res Med Sci (ZJRMS)* 2013; 15(9): 14-17.
- Abbaskhanian A, VahidShahi K, Parvinnezhad N. The association between iron deficiency and the first episode of febrile seizure. *Int J Pediatr* 2010; (1):862897.
- Beard JL, Felt B, Schallert T, Burhans M, Connor JR, Georgieff MK. Moderate iron deficiency in infancy: biology and behavior in young rats. *Behav Brain Res.* 2006 Jun;170(2):224–32.
- Habib Z, Akram S, Ibrahim S, Hasan B. Febrile seizures: factors affecting risk of recurrence in Pakistani children presenting at the Aga Khan University Hospital. *J Pak Med Assoc* 2003;53(1).
- Beard JL, Connor JR. Iron status and neural functioning. *Ann Rev Nutr.* 2003;23:41–58.
- Kumari PL, Nair M, Nair S, Kailas L, Geetha S. Iron deficiency as a risk factor for simple febrile seizures-a case control study. *Indian Pediatr* 2012;49(1):17-9.
- Zareifar S, Hosseinzadeh HR, Cohan N. Association between iron status and febrile seizures in children. *Seizure* 2012;21(8):603-5.
- Sherjil A, us Saeed Z, Shehzad S, Amjad R. Iron deficiency anaemia—a risk factor for febrile seizures in children. *J Ayub Med Coll Abbottabad* 2010;22(3):71-3.
- Herjil A, us Saeed Z, Shehzad S, Amjad R. Iron deficiency anaemia—a risk factor for febrile seizures in children. *J Ayub Med Coll Abbottabad* 2010;22(3):71-3.
- Vaswani RK, Dharaskar PG, Kulkarni S, Ghosh K. Iron deficiency as a risk factor for first febrile seizure. *Indian Pediatr* 2010;47(5):437-9.
- Billoo A. Association between iron deficiency anemia and febrile seizures. *J Coll Physician Surg* 2005;15(6):338-40.
- Kumari PL, Nair MK, Nair SM, Kailas L, Geetha S. Iron deficiency as a risk factor for simple febrileseizures-a case control study. *Indian Pediatr.* 2012;49(1)17-19. doi: 10.1007/s13312-012-0008-6
- Modaresi M, Mahmoudian T, Yaghini O, Kelishadi R, Golestani H, Tavasoli A, et al. Is Iron Insufficiency Associated With Febrile Seizure?- Experience in an Iranian Hospital. *J Compr Ped.* 2012;3(1)21-24. doi:10.17795/compreped-6946
- Vaswani RK, Dharaskar PG, Kulkarni S, Ghosh K. Iron deficiency as a risk factor for first febrile seizure. *Indian Pediatr.* 2010;47(5)437-439. doi:10.1007/s13312-010-0080-8
- Daoud AS, Batiha A, Abu-Ekteish F, Gharaibeh N, Ajlouni S, Hijazi S. Iron status- a possible risk factor for the first febrile seizure. *Epilepsia.* 2002;43(7)740-743. doi: 10.1046/j.1528-1157.2002.32501.x
- Derakhshanfar H, Abaskhanian A, Alimohammadi H, ModanlooKordi M. Association between iron deficiency anemia and febrile seizure in children. *Med Glas (Zenica).* 2012;9(2)239-242.
- Pisacane A, Sansone R, Impagliazzo N, Coppola A, Rolando P, D'Apuzzo A, et al. Iron deficiency anaemia and febrile convulsions- case-control study in children under 2 years. *BMJ.* 1996;313(7053)343.