

Iron Deficiency Anaemia in Children Presenting with Febrile Seizures

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ABSTRACT

Aim: To record the frequency of iron deficiency anemia in children presenting with febrile seizures

Methods: This multi-centre case-control study was conducted at Department of Paediatrics, Fauji Foundation Hospital Lahore and Bolan Medical College Hospital Quetta during 1st June 2016 to 31st December 2016. One hundred diagnosed cases of febrile seizure of either gender between 6-60 months of age, we excluded all those cases already under treatment of iron deficiency anemia, history of afebrile seizures, CNS infection by CSF examination, CNS malformation, malnourished children, history of premature birth, low birth weight and developmentally delayed children. Demographic profile of the participants was recorded.

Results: Out of 100 cases, 38(38%) were between 6-30 months of age while 62(62%) were between 31-60 months of age, mean±SD was calculated as 34.28±10.12 months, 45(45%) were male and 55(55%) were females. Frequency of iron deficiency anemia in children presenting with febrile seizures was recorded in 17(17%).

Conclusion: The frequency of iron deficiency anemia in children presenting with febrile seizures is on a considerable level and needs attention for its timely eradication.

Keywords: Iron deficiency anemia, Febrile seizures, Association

INTRODUCTION

By far febrile seizure (FS) are the most frequent childhood occurring in 2-5% children admitted with neurological health issues¹. It is defined as a seizure associated with fever (Temp >38°C) without central nervous system infection (with normal CSF findings) and acute metabolic abnormalities, in 6 months to 5 years old children with no history of previous afebrile seizures². 33% of the population globally suffers from iron deficiency. It affects organs and systems of the body but anaemia is the commonest clinical manifestation.

Iron deficiency affects the development of brain and other mechanisms including delayed maturation of myelin, altered development of hippocampus neurons, delayed visual and auditory evoked potentials while other changes in synaptic neurotransmitter systems e.g., Dopamine, Norepinephrine, Glutamate, serotonin and Gamma-Amino Butyric Acid (GABA) are responsible for these symptoms^{3,4}. Parallel to this, fever may exacerbate negative effects on the brain due to iron deficiency⁵.

Previous studies regarding correlation with iron deficiency and febrile seizure are found with conflicting results^{1,6,7}. Most of the trials compared iron

levels in children with fever with or without seizure. Keeping in view the variation of rate of febrile levels in children with or without seizures. Keeping in view the variation of rate of febrile seizures and iron deficiency anaemia, we planned this study so that the association between the two may be evaluated again and recorded in our population.

SUBJECTS AND METHODS

This was a multi-centre case-control study which was conducted simultaneously at Department of Paediatrics, Fauji Foundation Hospital Lahore and Bolan Medical College Hospital Quetta during 1st June 2016 to 31st December 2016. In our study, we enrolled 100 diagnosed cases of febrile seizure of either gender between 6-60 months of age, we excluded all those cases already under treatment of iron deficiency anemia, history of afebrile seizures, CNS infection by CSF examination, CNS malformation, malnourished children, history of premature birth, low birth weight and developmentally delayed children. Demographic profile of the participants was recorded. A 5 cc blood in a sterilized syringe was drawn from the children with the help of paramedical staff and sent to the hospital laboratory to record the iron deficiency anaemia.

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RESULTS

Age distribution of the patients was done, 38(38%) were between 6-30 months of age while 62(62%) were between 31-60 months of age, mean±SD was calculated as 34.28±10.12 months (Table 1). Patients were distributed according to gender showing that 45(45%) were male and 55(55%) were females (Table 2). We found the frequency of iron deficiency anaemia in children with febrile seizures was 17(17%) while 83(83%) had no iron deficiency anaemia (Table 3).

Table 1: Age distribution (n=100)

| Age (months) | n | %age |
|--------------|----|------|
| 6-30 | 38 | 38 |
| 31-60 | 62 | 62 |

Table 2: Gender distribution (n=100)

| Gender | n | %age |
|--------|----|------|
| Male | 45 | 45 |
| Female | 55 | 55 |

Table 3: Frequency of iron deficiency anaemia in children presenting with febrile seizures (n = 100)

| Iron deficiency anaemia | n | %age |
|-------------------------|----|------|
| Yes | 17 | 17 |
| No | 83 | 83 |

DISCUSSION

Worldwide febrile seizures and iron deficiency anemia are the commonest diseases in children and these diseases are common in our country also. Iron insufficiency causes neurological disturbances including poor attention span, behavioural changes and learning deficits. However, it may also be correlated with some other neurological disorders like febrile seizures.

This study was conducted with the view to clarify the ambiguity regarding frequency of iron deficiency anemia in febrile seizure as previous studies have shown considerable variation in results (ranging from 31.2% to 5.3%) so that the relationship of febrile seizures and iron deficiency anemia can be better evaluated.

In our study, out of 100 cases, 32(32%) were between 6-30 months of age while 68(68%) were between 31-60 months of age with mean was 34.28±10.12 months, 45(45%) were male and 55(55%) were females. Frequency of iron deficiency anemia in children presenting with febrile seizures was recorded in 17(17%) while 83(83%) had no febrile seizures.

The findings of our study are lower than a recent study¹ revealed that iron deficiency anemia was 22% in children with febrile seizure, while another study

recorded 31.2%⁶, which is also higher than reported in our study, on the other hand, these statistics were recorded as 15%⁷ which shows agreement with our results. A local study conducted in Faisalabad⁸ showed that only 5.3% of the patients with febrile seizures are iron deficient while another study done in Rawalpindi showed a statistically significant relationship between febrile fits and low serum ferritin (P Value 0.028)⁹. These findings are also in contrast with our results.

Kobrinsky et al⁸ showed that the threshold for febrile seizure is decreased by iron-deficiency, whereas Daoud et al⁹ found that serum ferritin levels was higher in patients with febrile illness with no seizures than in patients with febrile seizure. While some workers have reported the direct correlation between iron-deficiency anaemia and febrile convulsions in children, but our Iranian colleagues proved that the opposite was true. Similarly Bidabadi and Mashouf¹² also found no correlation and febrile convulsions.

We are of the view that iron deficiency anaemia is positively correlated with febrile seizure in children. However, our population is prone to this morbidity for 15% of the cases. Our findings provide evidence based information for further strategies in management of febrile seizures.

CONCLUSION

We concluded that the frequency of iron deficiency anaemia in children presenting with febrile seizures is on a considerable level and needs attention for its timely eradication.

REFERENCES

1. Fallah R, Tirandazi B, Akhavan Karbasi S, Golestan M. Iron Deficiency and Iron Deficiency Anemia in Children with Febrile Seizure. *IJPHO* 2013;3:19-23.
2. Yadav D, Chandra J. Iron deficiency: beyond anemia. *Indian J Pediatr* 2011;78(1):65-72.
3. Johnston MV. Iron deficiency, febrile seizures and brain development. *Indian Pediatr.* 2012;49(1):13-4
4. Carvalho AG, Lira PI, Barros Mde F, Aléssio ML, Lima Mde C, Carbonneau MA. Diagnosis of iron deficiency anemia in children of Northeast Brazil. *Rev Saude Publica.* 2010;44(3):513-9.
5. Idro R, Gwer S, Williams TN, Otieno T, Uyoga S, Fegan G. Iron deficiency and acute seizures: results from children living in rural Kenya and a meta-analysis. *PLoS One.* 2010;5(11):e14001.
6. Khalid N, Abdurrahman, Akrem M. The association between iron deficiency anemia and first febrile seizure: a case-control study. *Duhok Medical Journal* 2010;4:60-4.
7. Hartfield DS, Tan J, Yager JY, Rosychuk RJ, Spady D, Haines C. The association between iron deficiency

- and febrile seizures in childhood. *Clin Pediatr* 2009;48(4):420-6.
8. Kobrinsky NL, Yager JY, Cheang MS, Yatscoff RW, Tenenbein M. Does iron deficiency raise the seizure threshold? *Journal of Child Neurology* 1995;10: 105–9.
 9. Daoud AS, Batieha A, Abu-Ekteish F, Gharaibeh N, Ajlouni S, Hijazi S. Iron status: a possible risk factor for the first febrile seizure. *Epilepsia* 2002;7:740–3.
 10. Pisacane A, Sansone R, Impagliazzo N, Coppola A, Rolando P, D'Apuzzo A. Iron deficiency anemia and febrile convulsions: case-control study in children under 2 years. *BMJ* 1996;313(7053):343.
 11. Momen AA, Hakimzadeh M. Case-control study of the relationship between anemia and febrile convulsion in children between 9 months to 5 years of age. *Sci Med J Ahwaz University of Medical Sciences*. 2003;1(4):54-50
 12. Bidabadi E, Mashouf M. Association between iron deficiency anemia and first febrile convulsion: a case-control study. *Seizure* 2009;18:347–351.