

ASSOCIATION BETWEEN IRON DEFICIENCY ANEMIA AND FIRST EPISODE OF FEBRILE SEIZURES IN CHILDREN AGED 6-59 MONTHS

FAUZIA ZAFAR¹, SAMAR FATIMA IJAZ², MUHAMMAD ASHRAF SULTAN³

¹Post-Fellowship Women Medical Officer, Pediatrics, Jinnah Hospital Lahore, ²Assistant Professor, Pediatrics, King Edward Medical University/Mayo Hospital, Lahore ³Ex-Professor, Pediatrics, King Edward Medical University/Mayo Hospital, Lahore

ABSTRACT

Background: Febrile seizures are one of the most common types of seizure in children, affecting 2% to 5% of all neurologically healthy infants and children. Since fever can exacerbate the symptoms resulting from anemia, relationship between iron deficiency anemia and febrile seizure can be the main cause.

Objective: To determine the relationship between 1st episode of febrile seizures in iron deficient children aged from six months to five years.

Methods: This case control study was performed in Pediatrics department of King Edward Medical College in the duration of six months from January 2014 to June 2014. Two hundred and fifty patients of either sex, aged between 6-60 months, with first episode of febrile seizures were enrolled by non-probability convenient sampling. After obtaining demographic and clinical data, 125 children served as cases (Fever with seizures) while 125 children served as control (Fever with seizures). Hb, MCV, and MCHC, serum ferritin level of both cases and control was determined. Data was analyzed using SPSS 20. Odds ratio was found to find out the significant association between iron deficiency anemia and seizures episode in both groups. An odds ratio >1 was considered as significant.

Results: Iron deficiency anemia was present in 80(32%). Out of 125(50%), 34(27%) cases and 46(36.8%) controls have normal iron levels. There were 91(72.8%) of cases and 79(63.2%) of control who had low levels of iron in blood. The odds-ratio came out to be 1.55.

Conclusion: Considerable association was found of febrile convulsions in iron deficient growing age children. This predicts anemia as an important predictor of fever fit.

Key words: Anemia, Seizures, Children, Neurotransmitter

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Correspondence to: Fauzia Zafar,
Post-Fellowship Women Medical Officer,
Department of Pediatrics, Jinnah Hospital,
Lahore, Pakistan.

Email: peace_bird786@yahoo.com

INTRODUCTION

Febrile seizures are defined as those fever fits which occur in early stages of development from period of 6

months to 5 years with a normal body temperature which could not be the result of central nervous system, which can also occur without any history of seizures¹. It is one of the most common types of seizures which occur in developing age of the children and its accounts for two to five percent in healthy children.² Otitis media, roseola and human herpesvirus infection, shigella, or similar infections, are incriminated as causative factors of febrile seizures. Familial history of alcohol consumption, smoking and convulsions

especially in gestation could be linked with fever fits but exact cause is still unknown².

Iron deficiency anemia (IDA) is the common nutritional problem affecting 40-45% of the children of developing world like Pakistan³. Iron plays a significant role in neurotransmitter metabolism: monamine and aldehyde oxidase and studies proved lesser production of these in IDA especially during early phases of life and has been associated with behavioural and development disturbances. Since fever can exacerbate the symptoms resulting from anemia, linkage between IDA and febrile convulsions⁴.

Relationship of IDA and fever fit is yet to be established. Hartfield et al⁵ showed that iron deficient children had statistically significant association with iron deficiency anemia. Jun et al⁶ also concluded the similar results. Sharjeel et al² from Pakistan also favored the results concluding that children with febrile seizures are 1.93 times more likely to have iron deficiency anemia compared to febrile children without seizures. Contrary to it, Bidabadi et al⁷ suggested no positive association between IDA and febrile convulsions children as compared to control participants.

Keeping in view the age prevalence of iron deficiency anemia and febrile seizures, different research studies outcomes and audacity of published data from Pakistan, present study was designed for the determination of linkage between IDA and fever fits. This study will help in making recommendations for screening of IDA especially among children.

METHOD

A case-control study was designed in pediatrics department of King Edward Medical College in the duration of six months from January 2014 to June 2014. It was approved from review board of the hospital and consent was signed by the caregiver or children's parents. Children 6-60 months of age of either sex with first episode of febrile seizures, consistent with case definition fulfilling the inclusion criteria were enrolled for the study by non-probability convenient sampling. Febrile seizures are defined as those seizures which occur in early stages of development with normal body temperature which could not be the result of central nervous system, which can also occur without any history of seizures. IDA was defined with presence of any of hemoglobin level (Hb) <10.5mg/dl, mean corpuscular volume (MCV) <70 fl, mean corpuscular hemoglobin (MCHC) <28gm/dl, plasma ferritin

(<12ng/dl). An informed consent from father or mother was obtained and confidentiality was assured. Children having afebrile seizures, developmental delay or any neurological abnormality, children with known causes of anemia or on iron therapy were excluded from study. Sample size estimated using 95% confidence level, with 80% power of test with an expected incidence of iron deficiency anemia in 39% in cases and 28% in controls is 250. (Cases=125, Control=125). Among 250 children, 125 children served as cases while 125 children were taken as control. The case group included children with minor febrile illness having first episode of febrile seizures, consistent with case definition. The control group included children suffering from a minor febrile illness without seizures. Acute pharyngitis, adenitis, and otitis media was accepted as minor febrile illness. Control and cases were age and sex matched. Confounding variables like afebrile seizures, developmental delay, neurological abnormality, children with known causes of anemia or on iron therapy were controlled at data collection level. Data were recorded for age, sex, temperature peak at the time of admission and prior history of seizures. A 2ml heparinized sample of blood was drawn with aseptic measures for Hb, MCV, and MCHC while 1 ml non-heparinized serum sample was analyzed for serum ferritin level of both cases and control. Treatment was administered to each child according to individual merit. The data was collected on a specially designed proforma. Data were entered and analyzed by SPSS-20. Qualitative variables like sex and presence TV b of iron deficiency anemia were described by frequency and percentages. Quantitative variable like level of iron deficiency and age was described by Mean and standard deviation. Odds ratio was determined to find the relationship between IDA and fever fits in both study groups. >1odds ratio was considered significant.

RESULTS

There were 250 children enrolled with a mean age of 34.20±12.43 months. One hundred and thirty-five (54%) were males while 115 (46%) were females. When data was analyzed for presence of iron deficiency anemia, 70(68%) were reported having this disease. There was a big difference with respect to iron deficiency anemia in both groups i.e., cases and controls. It was calculated that out of 125(50%), 34(27%) cases and 46(36.8%) controlshad normal iron levels in blood. There were 91(72.8%) of cases and

79(63.2%) of control had IDA The odds-ratio came out to be 1.55.

Table I: Relationship between 1st episode of febrile seizures in iron deficient children (n=250)

Iron deficiency anemia	Cases	Control	Total
Yes	91(72.8%)	79(63.2%)	170(68.0%)
No	34 (27.2%)	46(36.8%)	80(32.0%)
Total	125(50.0%)	125(50.0%)	250 (100%)

Odds Ratio: 1.55

DISCUSSION

Results of present study have highlighted the positive relation between IDA and febrile convulsions in children. Various other studies have also documented considerable association of IDA with febrile seizures.^{5,6} In present study, mean age of participants and controls were 34.20±12.43 months. Higher incidence of IDA was found in boys (54%) as compared to girls (46%). Similar results have been documented by studies from Pakistan^{8,9}. On the other hand, few studies also showed some contradictory results.¹⁰ Another case control study determined the incidence of IDA and fever convulsions. Result of that study also showed significant association of IDA in fever fits' patients. Odd ratio of the present study was 1.55. These results were also inconsistent by other studies^{2,8,9}. Other Pakistani studies also highlighted the similar findings^{1,11,12}. Iron plays many important roles in metabolic pathways as well as in neurochemical enzymatic reactions. Thus, its deficiency could be an important determinant of febrile seizures in new born and developing age children. Few limitations are also present in present study including small size. A large, multinational study needs to be conducted to determine the relation between IDA and febrile convulsions.

CONCLUSION

Considerable association was found of fever fits in iron deficient children. This predicts anemia as an important predictor of febrile seizures.

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