ASSOCIATION OF IRON DEFICIENCY ANAEMIA WITH FEBRILE FITS

Muhammad Awais✉, Asma Razzaq, Saad Ateeq, Hakeem Ullah

Department of Pediatrics, Combined Military Hospital, Peshawar- Pakistan

Address for correspondence:
Muhammad Awais
Department of Pediatrics, Combined Military Hospital, Peshawar- Pakistan.

E-mail:
m.awais004@yahoo.com

Date Received:
March 27th, 2022
Date Revised:
July 7th, 2022
Date Accepted:
Aug 6th, 2022

ABSTRACT

Objective: To determine association of iron deficiency anemia with febrile fits among children between 6 months to 59 months.

Methodology: This case-control study was conducted at the Department of Pediatrics, Combined Military Hospital, Peshawar from January to December 2021. The study enrolled the sample via non-probability convenience sampling. A total of 190 samples were enrolled in this study with 95 as cases and 95 as controls. The cases were defined as the patients of either gender who were admitted to the pediatric unit with a diagnosis of 1st episode of febrile fits; while the controls were defined to be patients of either gender who were admitted to the pediatric unit with fever but without fits. A blood sample was collected for each patient laboratory investigation and a pre-designed Performa was used to extract the data. Data were analyzed using SPSS v.25.0, wherein after descriptive statistics, the association was measured using the odds ratio.

Results: The mean age of the sample was 3.54±2.112 years (cases: 2.76±1.44 years & controls: 4.31±2.384 years). In gender distribution, 116 (61.1%) were males and 74 (38.9%) were females. In temperature statistics, a mean of 102.771±1.4278 ^{o}F was recorded in all the patients (cases102.88±1.43 ^{o}F, controls: 102.66±1.422 ^{o}F). In total, 31 (16.3%) patients were diagnosed to be Iron deficiency anaemia [cases: 18/95 (18.9%), control: 13/95 (13.7%)] with an odds ratio of 1.475 showing an increased likelihood of iron deficiency anaemia in cases as compared to controls (p-value= 0.326).

Conclusion: The study concluded an insignificant association but a slightly positive likelihood of febrile fits with iron deficiency anaemia.

Keywords: Iron Deficiency Anaemia; Febrile; Fits.

INTRODUCTION

Febrile seizures are considered to be the most common type of seizures in young children.[1] However, the same is not related to any particular etiology which involves the central nervous system or any other metabolic disease.[1] Pediatric age group is one such strata of the people in which many such cases are presented; however, the same is self-limiting and benign. The literature shows that upper respiratory tract infection is one most common causes which trigger this condition, which is yet to be supported by additional data.[2] It is considered that these febrile seizures are mostly presented among the children within the age group of 3 to 5 years of age, who reports complaints of fever but without any defined cause.[3] These seizures are mainly divided into two different categories which are simple and complex, however, a third type has also come into existence called to be febrile seizure epilepticus.[3]

In total, there is about 2 to 5% of the pediatric population is affected by fits, wherein males are more affected than females with a ratio of about 1.4:1.[3] A national study at Karachi also reported same frequency of 2-5% presented in the pediatric unit.[4] Different patterns are being recorded in the literature which clearly demonstrates that children of Asian countries are more prone to this disease which may be due to the reason that the part of the world has more infections and febrile illness.[5] In diseases, meningitis is not found to be that much common among patient presenting to the emergency department directly after febrile fits, but is considered to be the most devastating disease leading to septicemia, shock, and even death and due to which meningitis is excluded at first instance whenever a patient is presented with fits.[6] Literature has reported different risk factors for the febrile fits in different parts of the world covering gender, age, family history, milestones and other relevant factors that may be involved in febrile fits.[7] In addition certain there are certain viral and bacterial infections, vaccines, and sometimes mineral are also contributes towards the febrile fits.[8]

This article may be cited as

Awais M, Razzaq A, Ateeq S, Ullah H. Association of iron deficiency anaemia with febrile fits. J Postgrad Med Inst 2022;36(3): 162-5. http://doi.org/10.54079/jpmi.36.3.3079

Iron deficiency is also considered a factor responsible for the febrile fits and the same is being proven in different literature published.[1] Literature suggest different number, wherein in one of the study conducted at Lahore Pakistan, on total 400 participants revealed that about 46.5% in cases and 28% among controls had iron deficiency with an odds ratio of 2.235.[9]

The rationale of the study is that it will fill the knowledge for unknown frequency of fits caused by the Iron deficiency anaemia in patients presenting with febrile fits. Furthermore, proper recording and extraction of results will also help our pediatricians and policy makers to take early remedial measures in the best interest of public. The study aims to determine association of iron deficiency anemia with febrile fits among children between 6 months to 59 months.

METHODOLOGY

This case-control study was conducted at Department of Pediatrics, Combined Military Hospital, Peshawar from 1st January to 31st December 2021. The study enrolled the sample via non-probability convenience sampling. To calculate the sample size, OpenEpi software was used, wherein for a confidence interval of 90%, power 80%, percent of unexposed with outcome 28%, percent of exposed with outcome 46.5%, and odds ratio of 2.235, a sample 190 was calculated with 95 in each group.[9] The cases were defined as the patients of either gender who were admitted to the pediatric unit with diagnosis of 1st episode febrile fits with age of 6 months to 59 months. All those with previous history of seizures or meningitis, diagnosed with an illness causing seizures, immuno-compromised states, presence of a ventriculoperitoneal shunt, history of trauma, electrolyte derangement, having metabolic diseases, and previously diagnosed anaemic patients were excluded. Iron Deficiency Anemia (IDA) was confirmed using three laboratory parameters: a hemoglobin (Hb) of 11g/dl or below, a hematocrit 6.83 mmol/l or below (32 percent or below), and Serum Ferritin of 12 µg/l or below.[10,11] The febrile fits were defined to be as convulsions that occur in a child who is between six months and five years of age and had a temperature greater than 100.4ºF (38ºC), while without fits, a child with this temperature or above was taken to be a febrile child. A pre-designed proforma was established to collect the data. After following all ethical guidelines, and taking consent from the parents/guardian of the child data was collected. A 2 cc disposable syringe was used for venipuncture and drawing the blood under full aseptic measures to do the required laboratory investigations. The extracted data was analyzed using SPSS v.25.0. Descriptive statistics were applied for numerical and categorical variable. To measure the association odd ratio was used after cross tabulation between cases and control with presence and absence of IDA.

RESULTS

The study analyzed about 190 patients as a whole having 95 cases and 95 controls with a mean age of 3.54±2.12 years (cases: 2.76±1.44 years & controls: 4.31±2.38 years). In gender distribution, 116 (61.1%) were males and 74 (38.9%) were females; in cases, 63 (66.3%) were males, 32 (33.7%) were females, while in controls, 53 (55.8%) were males, and 42 (44.2%) were females. In temperature statistics, a mean of 102.771±1.428ºF was recorded in all the patients (cases: 102.879±1.43ºF, controls: 102.66±1.42ºF). The details regarding the Mean±S.D of different laboratory measures are given in Table 1. In total, 31 (16.3%) patients were diagnosed to be iron deficiency anaemia [cases: 18/95 (18.9%), control: 13/95 (13.7%)] with an odds ratio of 1.475 showing an increased likelihood of Iron deficiency anaemia in cases, as compared to controls as given in Table 2.

In 95 cases, 76 (80%) had only single episode of fits while 19 (20%) had more than one episode of fits. In 89 (93.7%) cases, the seizures were simple, while in 6 (6.3%) cases the seizures were complex. In about 68 (71.6%) cases, the fits resolved spontaneously, while in 27 (28.4%) cases, medications were required for resolution.

DISCUSSION

This case-control study analyzed about 190 Patients with a mean age of 3.54±2.12 years. A male predominant data were analyzed for the association of iron deficiency anaemia (IDA) with febrile fits. In total, 16.3% of patients were diagnosed to be Iron deficiency anaemia (cases: 18.9%, control: 13.7%) with an odds ratio of 1.475 showing an increased likelihood of Iron deficiency

Table 1: Descriptive statistics regarding different laboratory investigations in cases and controls

Variable	Total (n=190)	Cases (n=95)	Control (n=95)
Hemoglobin (g/dl)	9.90±1.867	9.77±1.91	10.03±1.82
Hematocrit (%)	31.16±5.364	31.16±5.36	31.00±5.07
Serum Ferritin (µg/l)	108.39±401.96	51.80±209.04	164.98±524.12

Table 2: Descriptive statistics regarding different laboratory investigations in cases and controls

Variable	Iron Deficiency Anaemia		X^2	P-Value	Odds Ratio
	Yes	No			
Case	18 (18.9%)	77 (81.1%)	0.964	0.326	1.475
Control	13 (13.7%)	82 (86.3%)			

anaemia in cases as compared to controls (p-value: 0.326).

This study recorded that most of the patients presented had an age between 3 to 4 years, while cases presented had an age of fewer than 3 years. Similar results are noted in a national study conducted in Karachi and in a local study conducted at a different setting than this at Peshawar, wherein the cases had a mean age of fewer than 3 years.[12,13] Literature is quite evident that the earlier the age is the more the cases would be of febrile seizures and with age seizures due to fever decrease.[1,4,5] This study reveals a male predominance population among patients presented as cases or control with about more than 60% males gender in the study. However, other studies conducted at the national and local level also have male predominance but the population frequency is less than 60%.[11,14] The numbers aren't that much different but may be due to the influence of Covid-19 pandemic where parents avoided hospital consultations, so an uneven number was recorded.

This study recorded a mean temperature of 102.771±1.43ºF, which in line with the temperature recorded in other national studies as well.[15] This study recorded a mean of hemoglobin (Hb) as 9.90±1.87g/dl (cases: 9.77±1.91g/dl, control: 10.03±1.82g/dl), which is slightly different with the data recorded nationally and locally, wherein the Hb was mostly recorded to be above 10g/dl.[11-15] Similarly, this study also recorded some dis-similar values for hematocrit and serum ferritin as compared to other studies in the region, but all the recorded data in the literature for cases that has similar values less than normal.[13,15]

This study overall revealed a total of 16.3% of the patients diagnosed with IDA, which is quite less than the literature reported nationally and locally, wherein numbers vary from 30-45%.[11-15] The same variance in number is also shown in separate groups of the study as well. The main objective of the study was to associate IDA with febrile fits. This study recorded an insignificant association while moderately positive likelihood among cases for IDA. A meta-analysis that searched some 1875 similar articles and then analyzed 27 manuscripts, also showed a similar slightly moderate likelihood with an odds ratio of 1.52 for the development of IDA among cases as reported in this study.[16] Similarly, another meta-analysis reported by the researchers from Korea analyzed 17 articles and they also reported a moderately positive likelihood of IDA development as documented in this study.[1] In contrast, the regional studies reported a significant relation of IDA with cases as reported in two different private setups of District Peshawar, while this study reported an insignificant relationship.[13,14] The authors of the local studies just calculated significant association, while the literature is of view that in all such studies to quantify the power of positive likelihood, odds ratio was a better statistical test as applied in this study.

This single-center, yet properly planned and executed study, had a small sample in comparison with the prevalence of febrile fits. Furthermore, the study duration was small while the study center was a private one too which keeps the study population limited to a proportion. In this context, a multi-center, proper sampled, planned, and executed study involving different experts from the field of pediatrics and public health will further be beneficial to the cause.

CONCLUSION

The study concluded an insignificant association but a slightly positive likelihood of febrile fits with Iron Deficiency Anaemia

REFERENCES

1. Kwak BO, Kim K, Kim SN, Lee R. Relationship between iron deficiency anemia and febrile seizure in children: A systematic review and meta-analysis. Seizure. 2017;52:27-34. DOI: 10.1016/j.seizure.2017.09.009.
2. Dalbem JS, Siqueira HH, Espinosa MM, Alvarenga RP. Febrile seizures: a population-based study. J Pediatr (Rio J). 2015;91(6):529-34. DOI: 10.1016/j.jped.2015.01.005.
3. Hussain S, Tarar SH, Moin Ud Din Sabir. Febrile seizures: demographic, clinical and etiological profile of children admitted with febrile seizures in a tertiary care hospital. J Pak Med Assoc. 2015;65(9):1008-10.
4. Habib Z, Akram S, Ibrahim S, Hassan B. Febrile seizures: Factors affecting risk of recurrence in Pakistani children presenting at The Aga Khan University Hospital. J Pak Med Assoc. 2003;53:11-7.
5. Rehman N, Billoo AG. Association between iron deficiency anemia and febrile seizures. J Coll Physicians Surg Pak. 2005;15:338-40.
6. De Zárate MM, Del Castillo JG, Jiménez AJ, Salmerón PP, Roca FL, Tey JG, BORRÁS MR, Grinspan MR, LAMBERECHTS EJ, Esparza CI, MIR10 MM. Study INFURG-SEMES: epidemiology of infections treated in hospital emergency services and evolution during the last decade. Emergencias. 2013;25:368-78.
7. Mohebbi MR, Holden KR, Butler IJ. FIRST: A practical approach to the causes and management of febrile seizures. J Child Neurol. 2008;23(12):1484-8. DOI: 10.1177/0883073808319317.
8. Graves RC, Oehler K, Tingle LE. Febrile seizures: risks, evaluation, and prognosis. Am Fam Physician. 2012;85(2):149-53.
9. Sultan T, Hanif AI , Ali S. Iron deficiency anemia as a risk factor for simple febrile seizures. Pak J Neurological Sci. 2017;12(3):36-40.
10. Haemoglobin concentrations for the di-

agnosis of anaemia and assessment of severity. Who.int. [cited 2022 February 2]. Available from URL: https://www.who.int/vmnis/indicators/haemoglobin.pdf.
11. Iron Deficiency Anaemia; Assessment, Prevention, and Control: A guide for program managers 2001. [cited 2022 February 2]. Available from URL: https://www.who.int/nutrition/publications/en/ida_assessment_prevention_control.pdf.
12. Lal V, Kumar H, Hanif S, Parkash O, Arwani S. Association of iron deficiency anemia in children with febrile convulsions. Pak J Neurological Sci. 2016;11(3):2-8.
13. Khan SA, Salahuddin A, Noman MA. Association between iron deficiency anemia and febrile seizures. J Postgrad Med Inst. 2016;30(4):352-5.
14. Khan SA, Khan J, Gul MS, Akbar K, Farid A, Adnan M. Iron deficiency associated with febrile seizures. Rawal Med J. 2021;46(3):530-32.
15. Sultan T, Hanif AI, Ali S. Iron deficiency anemia as a risk factor for simple febrile seizures. Pak J Neurological Sci. 2017;12(3):36-40.
16. Habibian N, Alipour A, Rezaianzadeh A. Association between iron deficiency anemia and febrile convulsion in 3- to 60-month-old children: A systematic review and meta-analysis. Iran J Med Sci. 2014;39(6):496-505.

Author's Contribution

MA conceived the idea, designed the study, and wrote the manuscript. AR Contributed to data collection and revised the manuscript. SA and HU helped with data interpretation, revised the manuscript, and gave the final approval. Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of Interest

Authors declared no conflict of interest

Grant Support and Financial Disclosure

None

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.