https://doi.org/10.29309/TPMJ/2026.33.04.9620 www.theprofesional.com

ORIGINAL ARTICLE

# Prevalence of iron deficiency anemia in children with febrile fits.

Muhammad Khalid Khan[1], Zia Muhammad[2], Sabir Khan[3], Abdul Khaliq[4], Syed Mohsin Ali Shah[5], Misbah Ullah Khan[6]

**ABSTRACT… Objective:** To investigate the prevalence of IDA with febrile fits in children. **Study Design:** Cross-sectional study. **Setting:** Department of Pediatrics, Kyber Teaching Hospital, Peshawar. **Period:** September 1st, 2021 to March 1st 2022. **Methods:** A total of 149 children of both gender presenting with febrile fits were included in the study whereas, subjects with the history of electrolyte imbalance, hypoglycemia, meningitis, encephalitis, shigellosis, neurological deficiencies and seizures were excluded from the study. 5cc BD syringe was used by duty staff to drawn blood sample to access Hb, MCV level and serum ferritin levels. Hospital reports were analyzed and discussed with pathologist to access for IDA. **Results:** The average age of study participants was 2.590 ±1.12 years and range from 6 months to 5 years with male and female ratio is 76.5 % and 23.5% respectively. Mean duration of symptoms was 13.76±4.52 hours and 60.4% was the study participants were having IDA. **Conclusion:** The study highlights, 60.4% of study participants with febrile fits were have IDA, stressing on the need for early screening and intervention to treat this condition. Targeted nutritional strategies and further study are crucial to understanding the causal relationship and improving health outcome in children.

**Key words:** Anemia, Febrile Fits, Iron Deficiency Anemia, Pediatric.

**Article Citation:** Khan MK, Muhammad Z, Khan S, Abdul Khalid, Shah SMA, Khan M. Prevalence of iron deficiency anemia in children with febrile fits. Professional Med J 2026; 33(04):720-724. https://doi.org/10.29309/TPMJ/2026.33.04.9620

## INTRODUCTION

Despite the proposed link between Iron Deficiency Anemia (IDA) and febrile seizures (FS), the existing body of literature presents a somewhat conflicting array of evidence concerning both the strength and the causality of this relationship.[1] Various studies have reported a notably high prevalence of IDA in children who experience febrile seizures, while other investigations have not succeeded in establishing a statistically significant correlation between the two conditions.[2] The discrepancies observed in these findings may arise from a multitude of factors, including variations in the specific populations studied, differing diagnostic criteria utilized for both IDA and FS, as well as geographic disparities in dietary iron intake that could affect overall prevalence rates.[3] Furthermore, it is noteworthy that the majority of studies conducted thus far have primarily focused on either developed nations or specific populations within Asia[4], leaving a significant gap in the literature regarding data from South Asia, and more specifically from Pakistan. This lack of region-specific data constitutes a critical gap in our understanding, particularly given that nutritional deficiencies, the burden of infectious diseases, and genetic predispositions can vary widely across different populations and regions.[5,6] Additionally, the existing research often employs a range of differing methodologies for diagnosing IDA, which may include assessments such as serum ferritin levels[7], mean corpuscular volume (MCV)[8] and total iron-binding capacity (TIBC)[9] leading to considerable inconsistencies in the prevalence rates reported in the literature. These methodological variations complicate the interpretation of the findings, thereby underscoring the necessity for well-structured, region-specific research that can clarify and elucidate the potential association between IDA and FS.[10] Given the significant burden posed by both IDA and FS in developing regions, understanding the possible relationship between these two conditions holds considerable clinical and public health implications that cannot be overlooked. If it were to be established that IDA is indeed a contributing factor in the occurrence of FS, then the early identification and management of iron deficiency could serve as a vital preventive strategy, which may, in turn, lead to a reduction in the incidence of

1. MBBS, TMO Peadiatric, Khyber Teaching Hospital, Peshawar.
2. MBBS, FCPS (Peads), Associate Professor, Khyber Teaching Hospital, Peshawar.
3. MBBS, FCPS (Peads), Professor, Khyber Teaching Hospital, Peshawar.
4. MBBS, FCPS (Peads), Assistant Professor, Khyber Teaching Hospital, Peshawar.
5. MBBS, FCPS (Peads), TMO, Khyber Teaching Hospital, Peshawar.
6. MBBS, FCPS (Peads), Senior Registrar, Khyber Teaching Hospital, Peshawar.

**Correspondence Address:**
Dr. Zia Muhammad
Khyber Teaching Hospital, Peshawar.
zia.muhammad@kmc.edu.com

**Article received on:**
27/03/2025
**Accepted for publication:**
14/06/2025

febrile convulsions and the associated complications that can arise from such episodes.[11] The relevance of this study is particularly pronounced within the context of Khyber Pakhtunkhwa (KPK), Pakistan, where nutritional deficiencies persist as a major public health concern, driven by socioeconomic disparities, limited access to healthcare resources, and a host of other systemic challenges.[12]

By investigating the frequency of IDA in children presenting with febrile seizures, this research aims to generate evidence-based data that can effectively inform pediatricians regarding appropriate screening and management protocols that are specifically tailored to this population. The findings derived from this study have the potential to contribute significantly to the formulation of targeted nutritional intervention programs, ultimately aiming to enhance child health outcomes and improve the overall well-being of children within this region. Therefore, the study aims to investigate frequency of IDA in children with febrile fits presenting.

## METHODS

A Cross-Sectional Study was executed at the Department of Pediatrics, KTH, Peshawar, from the September 1st 2021 to March 1st 2022 after taking approval from ethical committee (CPSP/REU/PED-2019-020-5501). A sample size of 149 was calculated utilizing WHO sample size calculator, using 8% margin of error, 95% confidence level, and an anticipated prevalence rate of IDA standing at approximately 45% who experience febrile fits among children.[12] Non-probability consecutive sampling technique was using enrolled both gender children's having age ranged between 6 months to 5 years and who presented with febrile fits as defined. Conversely, individuals who exhibited a medical history indicative of electrolyte imbalances, encephalitis, meningitis, hypoglycemic episodes, shigellosis, neurological deficits, or any form of seizures were excluded. Infomecd consent was duly obtained form parents or caregivers of patients after comprehensive explanation regarding the study protocol. Percentage and frequency demographic information such as gender, age, duration of symptom was recorded. 5cc BD syringe was used by duty staff to drawn blood sample to access Hb, MCV level, hematocrit and serum ferritin levels. Hospital reports were analyzed and discussed with pathologist to access for IDA.

IDA was clinically classified as a hemoglobin level falling below 10 g/dL, and/or a serum ferritin level registering below 15 µg/L, and/or a mean corpuscular volume (MCV) that is less than 82 fL as determined by laboratory testing protocols.[13] Furthermore, febrile fits were specifically delineated as brief generalized seizures lasting less than 15 minutes that do not recur within a 24-hour timeframe in a febrile child, defined as having a temperature exceeding 100°F[14], who is otherwise neurologically intact and shows no signs of any neurological abnormalities before or after the seizure episodes, and who also does not present with any metabolic disturbances.

Data collected and analysis utilizing the IBM Statistical Package for the Social Sciences (SPSS) software, version 22, which facilitated a comprehensive examination of the findings. Results for quantitative variables, such as age and duration of complaints, were presented in the form of mean ± standard deviation (SD). In contrast, frequencies and percentages were calculated for qualitative variables, including gender and the prevalence of iron deficiency anemia among the participants. Furthermore, IDA was systematically stratified based on age, gender, and duration of complaints. A chi-square test was applied to evaluate statistical significance of the findings, with a p-value of less than 0.05 being deemed statistically significant.

## RESULTS

Mean age of participants was 2.59±1.12 years, and mean duration of symptoms was 13.76±4.52 kg. The gender distribution showed a predominance of males (76.5%) compared to females (23.5%). Additionally, iron deficiency anemia was observed in 60.4% of the participants, while 39.6% did not have the condition as showed in Table-I.

Prevalence of IDA was slightly higher in children older than three years (66.7%) compared to those aged 6 months to 3 years (58.8%), though this difference was not statistically significant (p=0.432). Gender-based stratification showed nearly identical proportions, with 60.5% of males and 60% of females

diagnosed with IDA (p=0.956). Similarly, symptom duration did not show a significant correlation with IDA, although a higher prevalence was noted in patients with symptoms lasting more than 12 hours (65.6%) compared to those with symptoms lasting 12 hours or less (52.5%) (p=0.112) as mention in Table-II.

**TABLE-I**

**Demographic characteristics of study population (n=149)**

| Demographics Variables (n=149) | Value |
|---|---|
| Age (years) (Mean ± SD) | 2.59±1.12 |
| Duration of Symptoms (Kg) (Mean ± SD) | 13.75±4.52 |
| **Gender [n (%)]** | |
| Male | 114 (76.5) |
| Female | 35 (23.5) |
| **Iron Deficiency Anemia [n (%)]** | |
| Yes | 90 (60.4) |
| No | 59 (39.6) |

**TABLE-II**

**Stratification of iron deficiency anemia with respect to gender, age, and duration of symptoms (n=149)**

| Variables | Iron Deficiency Anemia | | P-Value |
|---|---|---|---|
| | Yes | No | |
| **Age [n (%)]** | | | |
| 6 months to 3 years | 70(58.8) | 49(41.2) | 0.432 |
| >3 years | 20(66.7) | 10(33.3) | |
| **Gender [n (%)]** | | | |
| Male | 69 (60.5) | 45 (39.5) | 0.956 |
| Female | 21 (60) | 14 (40) | |
| Duration of Symptoms [n (%)] | | | |
| ≤12 hours | 31 (52.5) | 28 (47.5) | 0.112 |
| >12 hours | 59 (65.6) | 31 (34.4) | |

## DISCUSSION

The current investigation brings to light a notably high prevalence of iron deficiency anemia (IDA) within the pediatric demographic, revealing that an impressive 60.4% of the subjects included in the study have been officially diagnosed with this condition, thus highlighting a critical health concern. These findings are in concordance with previous research endeavors that have been carried out in comparable environments, reinforcing the notion that IDA is a prevalent issue among children.[15] In a notable study, the researchers reported a similar prevalence rate of 63% among children suffering from iron deficiency, which serves to further substantiate the results observed within our cohort of participants.[16]

Likewise, an investigation also illustrated a frequency of IDA at 51.3% among pediatric patients, thereby underscoring the extensive occurrence of this condition particularly in developing regions where nutritional deficiencies are more commonplace.[17] Upon stratifying the incidence of IDA according to age, it was revealed that there exists a marginally higher prevalence among children who are older than three years, documented at 66.7%, in comparison to their younger counterparts, who exhibited a prevalence rate of 58.8%; nevertheless, it is salient to note that this difference does not reach statistical significance. These findings stand in contrast to various reports suggesting that IDA is markedly more pronounced in younger children[18], attributed to their heightened nutritional requirements[19] and inadequate dietary intake.[20] This particular study contributes significantly to the pre-existing body of literature by reinforcing the considerable burden of IDA during early childhood, thus emphasizing the critical need for targeted nutritional interventions aimed at this vulnerable population.

In terms of gender-based analysis, the investigation did not uncover any significant disparities, revealing that 60.5% of male participants and 60% of female participants were affected by IDA, which indicates that this condition presents itself equally across both sexes. This observation aligns with earlier studies that have similarly reported the absence of substantial gender predisposition to IDA, suggesting that both boys and girls are equally at risk.[21] Nevertheless, some research endeavors have posited that there may be a slightly elevated prevalence of IDA in male children, which could be attributed to differences in growth patterns and iron metabolism between the sexes.[2,8] Furthermore, an analysis concerning the duration of symptoms and its correlation with IDA demonstrated a higher prevalence in children who experienced symptoms persisting for longer than 12 hours, recorded at 65.6%, in contrast to those who exhibited shorter symptom durations, which were found to be 52.5%. Although this observed trend implies a potential

correlation between prolonged symptoms and the incidence of IDA, it is crucial to acknowledge that the difference did not attain statistical significance (p=0.112). Similar findings have been documented in other investigations, emphasizing that prolonged illness may serve to exacerbate existing nutritional deficiencies, consequently leading to an aggravation of anemia-related symptoms.[22-24] Aggregate findings presented in this study add to the expanding body of evidence regarding the epidemiology of IDA, as well as its potential associations with various demographic and clinical factors that merit further exploration.

Despite the notable strengths inherent in this study, certain limitations warrant careful consideration and acknowledgment. To commence with, the cross-sectional design employed within this study inherently limits the ability to establish causal relationships between IDA and the variables that were examined throughout the research. Longitudinal studies featuring extended follow-up periods would undoubtedly provide a more comprehensive and nuanced understanding of the impact that IDA has on the overall health of children. Additionally, while the sample population was representative of pediatric patients residing in the region, the relatively modest sample size of 149 participants may constrain the generalizability of the findings derived from this research. Consequently, there is an evident need for larger multicenter studies to validate these results across a more diverse array of populations. Furthermore, it is imperative to note that the current study did not take into account potential confounding variables such as dietary intake, socioeconomic status, and comorbidities, all of which could significantly influence the prevalence of IDA among children. Future research endeavors should make concerted efforts to incorporate a more extensive range of variables to provide a holistic and comprehensive view of the determinants that contribute to IDA in pediatric populations. Nevertheless, the findings presented in the current study offer invaluable insights into the prevalence of IDA and its associated factors, thus serving as a foundational stepping stone for future research initiatives and public health interventions that are aimed at mitigating the burden of anemia in affected populations in in pediatric populations.

## CONCLUSION

Study concluded a high prevalence of IDA in children with febrile seizures (FS), emphasizing its clinical significance. While no statistically significant correlations were found with symptom duration, age, gender, findings highlight the need for early screening and intervention. Addressing IDA through targeted nutritional strategies and healthcare access can help reduce its burden in pediatric populations. Further research is essential to explore causal relationships and refine preventive measures.

## ACKNOWLEDGEMENTS

The authors would like to acknowledge the Medical Affairs Department of Getz Pharma for their technical support and assistance in the publication process.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## SOURCE OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.



## REFERENCES

1. Ashraf F, Babar H, Ahmed S, Shahwani NK, Rabnawaz K, Anis M, et al. **Frequency of iron deficiency anemia in children presenting with febrile fit.** Pak. J. Med. Health Sci. 2024; 18(6):33-35.
2. Awais M, Razzaq A, Ateeq S, Ullah H. **Association of iron deficiency anemia with febrile fits.** JPMI. 2022; 36(3):162-5.
3. Chaudhary BR, Malla KK, Gaire B. **Association of iron deficiency anemia with febrile seizure in children in a tertiary care hospital.** J. Nepal Health Res. Counc. 2021; 19(1):66-70.
4. Addil F, Rehman A, Najeeb S, Imtiaz H, Khan S. **Iron deficiency anemia in children with febrile seizures.** Syst Rev Pharm. 2021; 12(5):301-3.
5. Ahmed KA, Khan MA, Mughal IA, Shah SZ, Zia MS, Idrees A. **Prevalence of anemia in patients presenting with febrile fits.** Pak. J. Med. Health Sci. 2022; 16(07):211-2.
6. Batool S, Qamar N, Islam A, Jamal S. **Incidence of iron deficiency anemia among the children with febrile seizures.** TPMJ. 2022; 29(01):121-5.
7. Gaballah PW, Abosdera MM, Abou-Taleb AM. **Iron deficiency anemia in children with febrile convulsions: A case–control study at Sohag University Hospital.** Egypt. J. Hosp. Med. 2022; 88(1):4113-6.

8. Rashwan SM, Ahmed YA, Ibrahim AK, Kasem IA. **Association between iron-deficiency anemia and febrile convulsion in children.** Al-Azhar Assiut Med. J. 2022; 20(1):8-14.
9. Sulviani R, Kamarullah W, Dermawan S, Susanto H. **Anemia and poor iron indices are associated with susceptibility to febrile seizures in children: A systematic review and meta-analysis.** J Child Neurol. 2023; 38(3-4):186-97.
10. Zafar F, Ijaz SF, Sultan MA. **Association between iron deficiency anemia and first episode of febrile seizures in children aged 6-59 months.** PPMJ. 2022; 33(4):105-7.
11. Cilli H, Kılınç M, Göçmen O, Temel MT. **Evaluation of the relationship between iron deficiency anemia and febrile seizures.** Cam and Sakura Med J. 2024; 4(1):15-9.
12. Al Kenani AK, Al Mamory BH, Al Obaidi AF. **Iron-deficiency anemia as a risk factor for the first simple febrile convulsion.** Med J Babylon. 2022; 19(3):372-8.
13. Neyazuddin M, Nistane R. **Iron deficiency as risk factor for febrile convulsion and the association of iron deficiency anemia and febrile convulsion.** Asian J. Med. Sci. 2022; 13(11):140-5.
14. Sankar H, Shriram V, Elayaraja S. **An analysis on role of iron deficiency in febrile seizure among children in 6 months to 5 years: A case-control study.** J Family Med Prim Care. 2024; 13(12):5562-9.
15. Saeed M, Al Sumaili MH, Al Asmari BG, Saeed M, Tahir AM, Alrashdi AS, et al. **Association of simple febrile seizure with iron deficiency anemia in children: A case control study.** NJHS. 2024; 9(2):66-70.
16. Anwer U, Javed S, Mandokhail S, Zafar N. **Frequency of iron deficiency anemia as a risk factor for febrile seizures in children aged 6 months to 5 years.** JHRR. 2024; 4(1):1-5.
17. Turay S, Hanci F, Ozde S. **An overview of vitamin B12 and iron deficiencies as a risk factors in children with febrile seizure etiology.** Exp Biomed Res. 2021; 4(2):154.
18. Bakkannavar S, Faheem Y, Jaiswal A, Shergill K, Boppana K, Almansouri NE, et al. **Associative patterns between iron deficiency anemia and febrile seizures in the five to 60 months age group: A comprehensive systematic review.** Cureus. 2024; 16(3).
19. Madavi D, Kumar SB, Nashine N. **The association of iron deficiency anemia with simple febrile seizures in children less than 5 years age: A single centre, prospective, case-control study.** Sri Lanka J. Child Health. 2021; 50(1):75-82.
20. Elkafafy M, Sakr MM, Elsamanoudy MI, Al-samee A, Samir H. **Correlation between iron status and simple febrile seizures in children.** IJMA. 2021; 3(3):1714-8.
21. Moncada JP, Mieles AM, González AP, Manjarres VO, Florez NA, Torres LV, et al. **Development of febrile seizures in children with iron deficiency anemia.** ASJBCCR. 2022; 5(1):25.
22. Shaaib F, Esh A, Azab SF, Hafez S. **The relationship between iron deficiency anemia and febrile convulsions in infant and children.** ZUMJ. 2022; 28(6.1):143-7.
23. Mandal SK, Saumyen DE, Das R, Awati NJ, Dey N, Biswas A, et al. **Evaluating the association between iron deficiency anemia and febrile convulsion among children aged 6-60 months admitted to a Tertiary Care Hospital in Eastern India: A Case-Control Study.** Cureus. 2024; 16(4).
24. Mahmoud AT, Albassuoni MA, El-Behairy MA, Abd El Nabi SA. **Serum zinc and iron levels in children with febrile seizures.** Menoufia Med. J. 2021; 34(2):611-6.


| AUTHORSHIP AND CONTRIBUTION DECLARATION | |
|---|---|
| 1 | **Muhammad Khalid Khan:** Concept and study design. |
| 2 | **Zia Muhammad:** Drafting, critical revision. |
| 3 | **Sabir Khan:** Data acquisition. |
| 4 | **Abdul Khaliq:** Data interpretation. |
| 5 | **Syed Mohsin Ali Shah:** Revision of manuscript. |
| 6 | **Misbah Ullah Khan:** Data acquisition. |