



ORIGINAL ARTICLE

Incidence of iron deficiency anemia among the children with febrile seizures.

Samina Batool¹, Nadia Qamar², Akasha Islam³, Saman Jamal⁴, Qurat-ul-Ain Rana⁵

Article Citation: Batool S, Qamar N, Islam A, Jamal S, Rana Qurat-ul-Ain. Incidence of iron deficiency anemia among the children with febrile seizures. Professional Med J 2022; 29(1):121-125. <https://doi.org/10.29309/TPMJ/2022.29.01.6591>

ABSTRACT... Objective: To determine frequency of iron deficiency anemia among the children having febrile seizures. **Study Design:** Descriptive Cross Sectional study. **Setting:** Pediatric Unit Allama Iqbal Memorial Teaching Hospital Sialkot. **Period:** September 2020 to February 2021. **Material & Methods:** Total 70 children were studied with age six months to 10 years with either gender presenting with febrile seizures. All data of the patients was documented including demographic data like age, gender, residential area, educational status, socioeconomic status and clinical findings at the time of presentation like fever, fits and duration of symptoms etc. Blood hemoglobin and ferritin level were tested of each patient to evaluate iron deficiency anemia. **Results:** There were 65.7% male and 34.3% female cases in this study. Age range of the patients was 6 months to 10 years with mean age of 4.36 ± 2.71 years. Most of the children (60%) were below three years of age. Mostly children belonged to low and middle socioeconomic status with the frequency of 42.8% and 45.7% respectively. Iron deficiency anemia was found in 38.6% cases. Majority of the mothers were illiterate (65%). There were 44.3% cases from rural areas and 55.7% from urban area. **Conclusion:** Iron deficiency anemia is a common problem among children with febrile seizures, younger than 03 years and belonging to rural areas. Illiterate mothers, is an important risk factor of iron deficiency anemia in their children.

Key words: Febrile Seizures, Hemoglobin Level, Iron Deficiency Anemia, Low Socioeconomic Status, Illiterate Mothers

INTRODUCTION

Febrile seizure is defined as a seizure associated with fever >38 degree centigrade among the children with 6-60 months of age in the absence of central nervous system infections or electrolyte abnormalities and no previous history of afebrile convulsions.^{1,2} Febrile seizures is a very common disorder with the prevalence of 2%-5% among young children.³ Complex febrile seizure is defined as a seizure episode lasting more than 15 minutes, focal seizure or recurring within 24 hours.⁴ Prevalence of iron deficiency anemia in Pakistan is 33.2% among children.⁵ Micro-nutritional deficiency and genetic factors are the basis of pathogenesis of this condition.⁶ Iron deficiency anemia leads to delay myelination of neurons especially in hippocampus, abnormality in release of neurotransmitters like Serotonin, Gamma-amino butyric acid and Dopamine and abnormal body metabolism.⁷

Apprehension and increased parental anxiety due to seizures is found in 2%-4% patients.⁸ It puts a burden of cost on the family, society and health system. There is high chance of recurrence of seizures with the frequency of 30% after first episode and 50% after second episode of seizures.⁹ According to A WHO report about 25% of world population is suffering from anemia and half of them have iron deficiency anemia.¹⁰ IDA is especially found in certain groups like toddlers, adolescent females, elderly and women in reproductive age. In USA 2.7% toddlers 1-2 years old suffer from IDA.¹¹

Many studies are being done to find out precipitating factors of iron deficiency anemia. In our country data related to it is not sufficient. We conducted this study to document our experience. This study conducted in our population provides very useful data which will help us to anticipate

1. MBBS, FCPS, Senior Registrar Pediatric, Allama Iqbal Memorial Teaching Hospital Sialkot.
2. MBBS, MCPS, Consultant Pediatric, Allama Iqbal Memorial Teaching Hospital Sialkot.
3. MBBS, Postgraduate Resident Pediatric, Allama Iqbal Memorial Teaching Hospital Sialkot.
4. MBBS, Postgraduate Resident Pediatric, Allama Iqbal Memorial Teaching Hospital Sialkot.
5. MBBS, Postgraduate Resident Pediatric, Allama Iqbal Memorial Teaching Hospital Sialkot.

Correspondence Address:

Dr. Samina Batool
Department of Pediatric
Allama Iqbal Memorial Teaching Hospital
Sialkot.
saminabatool19@gmail.com

Article received on: 17/05/2021
Accepted for publication: 05/08/2021

seizures, diagnose it and manage it promptly.

MATERIAL & METHODS

This is a descriptive cross sectional study conducted at pediatric unit Allama Iqbal Memorial Teaching Hospital Sialkot. Study was commenced in September 2020 and completed after six months in February 2021. Sample size was calculated using WHO sample size calculator. Non-probability consecutive sampling technique was used for the selection of patients. Total 70 children of either gender with age range of 06 months to 10 years having febrile seizures were included in this study. Informed consent was taken from all the guardians of children for including their children in this study. Ethical approval was taken from the institutional review board prior to conducting this study (CERC-652). Children already taking iron supplementation, diagnosed cases of thalassemia syndrome, children with cerebral palsy or with developmental delay, diagnosed cases of epilepsy, having meningitis or encephalitis (CSF proven) and those having metabolic fits due to hypocalcemia and hypoglycemia were excluded from the study. Three milliliter venous blood was taken in a serum vial and 02 ml of blood taken in EDTA tube for testing hemoglobin and ferritin levels to diagnose iron deficiency anemia. Children with hemoglobin level <11 g/dl and serum ferritin level <12 ug/L were labelled as having iron deficiency anemia. All the collected data was documented on a predesigned performa.

Data analysis was done using SPSS-20 software. Means and standard deviation were calculated for quantitative variables like age, hemoglobin level, ferritin level and disease duration. Frequency and percentages were calculated for qualitative variables like gender, residential area and socioeconomic status. P-value ≤ 0.05 was considered statistically significant. Chi square test was applied on the data and results were presented in tabular and graphical form.

RESULTS

Total 70 children were studied having age of 6 months to 10 years with mean age of 4.36 ± 2.71 years. There were 27 cases with iron deficiency

anemia. Out of these 27 children with IDA 17 (62.9%) were <05 years and 10(37.1%) were having age ≥ 05 years. Out of them 16 (59.3%) children were male and 11 (40.7%) were female children. Out of 31 children from rural areas 15(48.4%) were having IDA while 16 (51.6%) were not having IDA. Similarly out of 39 children from urban areas 12 (30.7%) were suffering from IDA while 27 (69.2%) were not having IDA. In our study group 08(26.7%) and 14 (43.7%) cases respectively from low and middle socioeconomic status were having iron deficiency anemia (IDA) (Table-I).

Patients Characteristics	Iron Deficiency Anemia		P-Value
	Yes (n=27)	No (n=43)	
Residential Area			
Rural ((n=31)	15 (55.6%)	16 (37.2%)	0.011
Urban (n=39)	12 (44.4%)	27 (62.8%)	
Socioeconomic Status			
Low (n=30)	08 (29.6%)	22 (51.2%)	0.023
Middle (n=32)	14 (51.8%)	18 (41.8%)	
High (n=08)	05 (18.5%)	03 (07%)	
Maternal Educational Status			
Illiterate (n=20)	13 (48.1%)	07 (16.3%)	0.018
Literate (n=50)	14 (51.9%)	36 (83.7%)	
Age			
< 05 years (n=42)	17 (63%)	25 (58.1%)	0.015
≥ 05 years (n=28)	10 (37%)	18 (41.9%)	
Gender			
Male (n=46)	16 (59.3%)	30 (69.8%)	0.052
Female (n=24)	11 (40.7%)	13 (30.2%)	
Table-I. Characteristics of the patients in the study group. (n=70)			

Most of the children in our study group belonged to either illiterate family (28.5%) or educational status of their parents was just primary (10%) or elementary (18.6%). 12.8% children's parents were having secondary education, 14.3% intermediate and 15.7% did graduation or higher qualification (Figure-I).

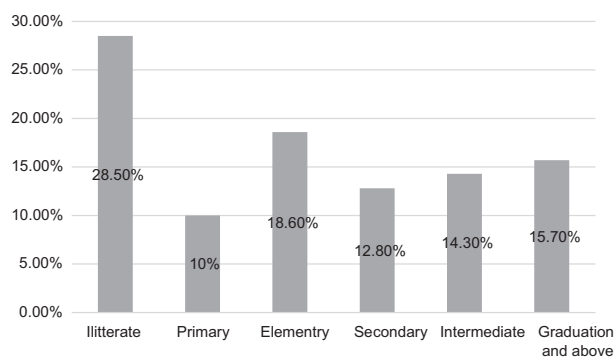


Figure-1. Educational status of the patients in the study group. (n=70)

DISCUSSION

According to a study conducted by Harding et al determined prevalence of anemia among children <5 years old in Pakistan and Nepal as 62.5% and 46.4% respectively.¹² He stated that anemia was severe among children <6 months of age and prevalence of anemia was higher among children having anemic mothers as compared to non-anemic mothers. A study conducted in Iran by Nazari et al on 1700 children concluded that prevalence of iron deficiency anemia (IDA) among the children in Iran was 18.2%, and anemia was more common among boys (17.7%) than girls (14.4%). In their study iron deficiency was found in 27.7% cases, showing high prevalence rate.¹³ A study conducted in Azad Jammu & Kashmir Pakistan reported prevalence of anemia in 47.7% children, including 40.4% children with mild anemia, 43.2% with moderate anemia and 16.4% were suffering from severe anemia. They found that major risk factors of anemia were rural areas, socioeconomic status, parental education and mother's knowledge about balanced diet and anemia.¹⁴ A local study conducted by Surani et al reported prevalence of IDA among 28.1% children, including 56.2% boys and 43.7% girls, 62.5% children belonged to illiterate parents, 75% were living in rural areas while 81.2% were having age <03 years and 18.7% with age > 03 years. In their study 12.5% anemic children having low, 81.2% middle and 6.2% were having high socioeconomic status. Poor socioeconomic status, residence in rural areas, male gender, illiterate parents and younger age of children were risk factors of iron deficiency anemia.¹⁵

In our study 38.6% children were having iron deficiency anemia including 62.9% <5 years and 37.1% with age > 05 years, 55.5% belonged to rural areas and 44.4% belonged to urban areas. A study conducted in Khyber Pakhtunkhwa Pakistan reported IDA in 37.1% school going children including 63.8%, including 47.4% with lower socioeconomic status, 37.2% with middle status and 15.3% having higher status. Mild anemia was present in 82.2%, moderate type of anemia in 14.4% and severe type of anemia in 3.4% children.¹⁶

Ahmed et al reported 18.6% prevalence of anemia among children in first year of school. He stated that iron deficiency without anemia is much frequent among school going children.¹⁷ Deficiency of micronutrients is very common in Pakistan among the children with age 06-59 months. Out of these micronutrients, Zinc, Iron and Vitamin-A deficiency is very common.¹⁸ Micronutrients deficiency is associated with increased morbidity and mortality.¹⁹ Poor nutritional status and chronic infections are common risk factors of iron deficiency anemia in our country due to under developed health system in rural areas and high illiteracy rate.²⁰ Educational status of parents especially mothers play significant role in determining health of their children.²¹

There are few limitations of this study including small sample size and there was no comparison group with healthy children for comparison of the results. This study does not rule out causes of iron deficiency anemia like diseases or nutritional deficiency etc. All children in this study were given iron supplement and they were not evaluated for recurrence of febrile seizures in this study.

CONCLUSION

Iron deficiency anemia is a common problem among the children with febrile seizures especially in younger age of (<05 years). Children from rural areas and those with low socioeconomic status have increased risk of iron deficiency anemia. Educational status of parents is also a very important risk factor of IDA. Early diagnosis and treatment of IDA will lead to better physiological

and mental growth of children.





Copyright© 05 Aug, 2021.

REFERENCES

1. Leung AK, Hon KL, Leung TN. **Febrile seizures: An overview.** *Drugs in context.* 2018; 7. <https://dx.doi.org/10.7573%2Fdic.212536>.
2. El-Masry HM, Sadek AA, Hassan MH, Ameen HH, Ahmed HA. **Metabolic profile of oxidative stress and trace elements in febrile seizures among children.** *Metabolic brain disease.* 2018 Oct; 33(5):1509-15. <https://doi.org/10.1007/s11011-018-0258-7>.
3. DeLoughery TG. **Iron deficiency anemia.** *Medical Clinics.* 2017 Mar 1; 101(2):319-32. <https://doi.org/10.1016/j.mcna.2016.09.004>.
4. Mantadakis E, Chatzimichael E, Zikidou P. **Iron deficiency anemia in children residing in high and low-income countries: risk factors, prevention, diagnosis and therapy.** *Mediterranean Journal of Hematology and Infectious Diseases.* 2020; 12(1). <https://dx.doi.org/10.4084%2FMJHID.2020.041>.
5. Cococcioni L, Pensabene L, El-Khouly S, Chadokufa S, McCartney S, Saliakellis E, Kiparissi F, Borrelli O. **Ferric carboxymaltose treatment for iron deficiency anemia in children with inflammatory bowel disease: Efficacy and risk of hypophosphatemia.** *Digestive and Liver Disease.* 2021 Mar 26. <https://doi.org/10.1016/j.dld.2021.02.017>.
6. Andriastuti M, Ilmana G, Nawangwulan SA, Kosasih KA. **Prevalence of anemia and iron profile among children and adolescent with low socio-economic status.** *International Journal of Pediatrics and Adolescent Medicine.* 2020 Jun 1; 7(2):88-92. <https://doi.org/10.1016/j.ijpam.2019.11.001>.
7. Maiti D, Acharya S, Basu S. **Recognizing missed opportunities to diagnose and treat iron deficiency anemia: A study based on prevalence of anemia among children in a teaching hospital.** *Journal of family medicine and primary care.* 2019 Mar; 8(3):899. https://dx.doi.org/10.4103%2Fjfmmpc.jfmmpc_81_19.
8. Ergul AB, Turanoglu C, Karakukcu C, Karaman S, Torun YA. **Increased iron deficiency and iron deficiency anemia in children with zinc deficiency.** *The Eurasian journal of medicine.* 2018 Feb; 50(1):34. <https://dx.doi.org/10.5152%2Feurasianjmed.2017.17237>.
9. Gurunathan D, Swathi A, Kumar MS. **Prevalence of iron deficiency anemia in children with severe early childhood caries.** *Biomedical and Pharmacology Journal.* 2019 Mar 25; 12(1):219-25. <https://dx.doi.org/10.13005/bpj/1630>.
10. Roganović J, Starinac K. **Iron deficiency Anemia in children.** *Curr Topics Anemia.* 2018 Feb 7; 47:47-71.
11. André HP, Sperandio N, Siqueira RL, Franceschini SD, Priore SE. **Food and nutrition insecurity indicators associated with iron deficiency anemia in Brazilian children: A systematic review.** *Ciencia & saude coletiva.* 2018; 23:1159-67. <https://doi.org/10.1590/1413-81232018234.16012016>.
12. Harding KL, Aguayo VM, Namirembe G, Webb P. **Determinants of anemia among women and children in Nepal and Pakistan: An analysis of recent national survey data.** *Maternal & child nutrition.* 2018 Nov; 14:e12478. <https://doi.org/10.1111/mcn.12478>.
13. Nazari M, Mohammadnejad E, Dalvand S, Gheshlagh RG. **Prevalence of iron deficiency anemia in Iranian children under 6 years of age: A systematic review and meta-analysis.** *Journal of blood medicine.* 2019; 10:111. <https://dx.doi.org/10.2147%2FJBM.S196102>.
14. Habib N, Afzal A, Arooj S, Farid S. **Socio-Cultural Risk Factors of Anemia among Children under Five Years of Age in District Muzaffarabad, Azad Jammu & Kashmir, Pakistan.** *Journal of Pharmaceutical Research International.* 2020 Nov 27:100-12. <https://doi.org/10.9734/jpri/2020/v32i3030911>.
15. Surani MK, Yousuf M, Saleem K, Khan S, Ahmad M, Altaf MS. **Iron deficiency anemia among children with febrile seizures.** *The Professional Medical Journal.* 2020 Sep 10; 27(09):1922-6. <https://doi.org/10.29309/TPMJ/2020.27.09.4426>.
16. Din JU, Yousafzai AM, Khan RA, Ullah M, Khan SU, Khan S, Ullah R. **Iron deficiency anaemia in school age children of District Tank Khyber Pakhtunkhwa Province, Pakistan.** *Children.* 2019 Oct 1; 12:13.
17. Ahmad MS, Farooq H, Maham SN, Qayyum Z, Waheed A, Nasir W. **Frequency of anemia and iron deficiency among children starting first year of school life and their association with weight and height.** *Anemia.* 2018 Apr 10; 2018. <https://doi.org/10.1155/2018/8906258>.
18. Khatoon S, Ahmed A, Yousaf S. **Iron deficiency anemia in Pakistan: Celiac disease an underlying cause.** *Journal of Ayub Medical College Abbottabad.* 2018 Sep 1; 30(3):372-6.
19. Wieser S, Brunner B, Tzogiou C, Plessow R, Zimmermann MB, Farebrother J, Soofi S, Bhatti Z, Ahmed I, Bhutta ZA. **Societal costs of micronutrient deficiencies in 6-to 59-month-old children in Pakistan.** *Food and nutrition bulletin.* 2017 Dec; 38(4):485-500. <https://doi.org/10.1177%2F0379572117720012>.

20. Kwak BO, Kim K, Kim SN, Lee R. **Relationship between iron deficiency anemia and febrile seizures in children: A systematic review and meta-analysis.** Seizure. 2017 Nov 1; 52:27-34. <https://doi.org/10.1016/j.seizure.2017.09.009>.
21. Jang HN, Yoon HS, Lee EH. **Prospective case control study of iron deficiency and the risk of febrile seizures in children in South Korea.** BMC pediatrics. 2019 Dec; 19(1):1-8. <https://doi.org/10.1186/s12887-019-1675-4>.

AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Samina Batool	Topic selection and data collection, Abstract and recording.	
2	Nadia Qamar	Data collection.	
3	Akasha Islam	Data analysis, Data composing.	
4	Saman Jamal	Data collection.	
5	Qurat-ul-Ain Rana	Found additional literature for information.	