ejpmr, 2022,9(5), 344-347

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

A STUDY OF IRON STATUS IN CHILDREN PRESENTING WITH FEBRILE SEIZURES FROM 6 MONTHS TO 60 MONTHS OF AGE GROUP IN AVMC, PUDUCHERRY

Anu M.S.[1], N. S. Raghupathy[2], V. Chandrubhaskar[3]* and M. Mathivanan[4]

[1]PG student, Department of Paediatrics, Aarupadai Veedu Medical College, Puducherry, India.
[2]Professor, Department of Paediatrics, India.
[3*]Associate Professor, Department of Paediatrics, Aarupadai Veedu Medical College, Puducherry, India
[4]Professor and HOD, Department of Paediatrics, Aarupadai Veedu Medical College, Puducherry, India.

***Corresponding Author: V. Chandrubhaskar**

Associate Professor, Department of Paediatrics, Aarupadai Veedu Medical College, Puducherry, India

Article Received on 15/03/2022 **Article Revised on 5/04/2022** **Article Accepted on 25/04/2022**

ABSTRACT

Background: The most common condition during childhood is febrile seizures. Several hypothesis suggest the pathogenesis of the condition is due to iron deficiency anemia. **Aim:** The aim of the study was to study the association between iron status and febrile seizures in children aged between 6- 60 months. **Methods:** This case control study was conducted between November 2019 and October 2021. A total of 100 subjects were included in the study after fulfilling the inclusion criteria and divided into 50 cases and 50 controls. The collected data was noted, given codes, entered using an MS. excel worksheet, and exported to SPSS. Data were analyzed using SPSS version 21. Data are presented as percentages in categories and then presented as tables and graphs. Chi-square and Pearson test for correlation were used for test of significance. **Results:** The mean age of the cases was 33± 16.49 months and controls were 36.6± 15 months. The study consisted of 60males and 40 females. Among the 50 cases, 46 had simple febrile seizure and 4 had complex febrile seizure. Among the cases, the mean Hb% was 10.49± 2.03g/dl, mean MCV was 71.3± 7.65µm^3, and mean MCH was 24.1± 2.89pg/l. The controls, mean hemoglobin was 10.87± 2.94g/dl, mean MCV was 73.2± 7.76µm^3, and mean MCH was 24.8± 3.37pg/l. In the cases, 46 had serum ferritin level >12µg/L. Lower hemoglobin levels increase the risk of febrile seizure which was statistically significant. MCV, MCH, and ferritin levels were associated with a febrile seizure which was statistically significant (P<0.001). **Conclusion:** The study concludes although anemia was not common in the cases the hematological parameters were associated with febrile seizures.

KEYWORD:- Febrile seizures, Serum ferritin, and Anaemia.

INTRODUCTION

Febrile seizures are the chief causes of pediatric emergency room visits affecting one in every 20 children around the world. Fever is routinely related to febrile seizures during childhood. Usually affecting boys more than girls.[1] Febrile seizure is the most persistent type of seizure during childhood which transpires in 2%- 5% percent of neurologically healthy kids. Close to 80% of febrile seizures are mostly simple and among them, 78% of these last for < 6 minutes.[2] Febrile seizures are benign most of the time & seldom lead to brain damage but it causes more emotional, physical, psychological stress to parents and impedes the family's quality of life.[3] Usually the rate of recurrence after 1st episode of febrile seizure below 1 year of age is 50%.[4]In India, nearly 70% of children between 6 to 60 months have anemia, among which>50% is iron deficiency anemia. A drop in the sr. ferritin levels are the indicator of iron deficiency that acts as a gauge of iron stockpile in the body.[5] Iron deficiency is a preventable & treatable cause that is proven to have strong association with febrile convulsions. The majority of the CNS enzymes are iron dependent for their purpose. In view of the above mentioned, this study was undertaken to determine the association between iron status and febrile seizures in children.

MATERIAL AND METHODS

This study is a case-control study which was conducted in the Department of Paediatrics, at AVMC& H, Puducherry from November 2019 to October 2021. Institutional ethical committee approval was obtained and case control study was done on 100 children aged 6-60 months whose parents were willing to give consent fulfilling the criteria of febrile seizures and fever children aged 6 months to 60 months excluding children associated with CNS infection, neurological diseases, Convulsion due to electrolyte imbalance, Drug toxicity, children already on iron supplements, History of epilepsy in the family. Of the 100 participants there were 50 cases

and 50 controls. Cases are children between the ages group 6- 60 months with febrile seizures. Controls are children between the ages group 6- 60 months with febrile illness without seizures.

Considering the prevalence of febrile seizures as 44.1% in a study by Ali D et al [6] the sample size was calculated for our study and simple stratified sampling was done and Age and sex matching, to the maximum limit to reduce confounding to the maximum. Venous blood was collected for serum ferritin levels, Hb%, MCV, MCH, and peripheral smear for 100 children. The collected data was noted, given codes, entered using an MS. excel worksheet, and exported to SPSS. Data were analyzed using SPSS version 21. Data are presented as percentages in categories and then presented as tables and graphs. Chi-square and Pearson test for correlation were used for test of significance.

RESULTS

Table 1 shows the age among the cases and controls. Among the cases 9 were between 6- 12 months, 13 between 13- 24 months, 12 between 25- 36 months, 9 between 37- 48 months, and 7 were between 49- 60 months. Among the controls 5 were between 6- 12 months, 11 between 13- 24 months, 15 between 25- 36 months, 12 between 37- 48 months, and 7 were between 49- 60 months. The mean age for cases was 33± 16.49 months and controls were 36.6± 15 months. The study consisted of 60 males and 40 females. Table 2 shows the haemoglobin distribution among the cases and controls. Table 3 shows among the cases the mean hemoglobin was 10.49± 2.03g/dl, mean MCV was 71.3± 7.65µm^3, and mean MCH was 24.1± 2.89pg/l. The controls, mean hemoglobin was 10.87± 2.94g/dl, mean MCH was 73.2± 7.76µm^3, and mean MCH was 24.8± 3.37pg/l. Table 4 shows among the cases 46 were above 12 and 4 below 12 and among the controls 43 had serum ferritin levels above 12 and 7 had levels below 12. Table 5 shows hemoglobin levels are associated with a febrile seizure which was statistically significant. Meaning lower hemoglobin levels increase the risk of febrile seizure. MCV and MCH levels are associated with a febrile seizure which was statistically significant (P<0.001). Serum ferritin was also associated with FS meaning decreased serum ferritin levels is a cause of iron deficiency anemia causing higher which can cause febrile seizures which were statistically significant.

DISCUSSION

The patients were divided into two groups, 50 cases, and 50 controls. The mean age among the cases was 33± 16.49 months and 36.6± 15 months in the controls. In the study by Soheila Z et al. among three hundred children who presented with febrile seizures the mean age was 26 months.[7] A study done by Md. Reza et al. reported a mean age of 25.34± 12.56 months among the cases and 24.78± 14.56 among the controls.[8] Another study by Alfredo P et al. reported the mean age of 15 months and a study by P Kumara et al. suggested the mean age as 17.5± 8.81 months.[9] Srinivasa S et al. study reported 60% were males and 40% females with the sex ratio being 1.4:1.[10] The study by Shreya G et al. suggested males were higher than females with the sex ratio being 1.6:1.[11] The present, 92% had a simple febrile seizure and 8% had a complex febrile seizure. The present finding can be compared to a study that suggested 93% had a simple febrile seizure and 7% had a complex febrile seizure.[12] Another study reported 88% had simple febrile seizures and 12% had complex febrile seizures.[13] Among the cases, the mean hemoglobin was 10.49± 2.03g/dl, mean MCV was 71.3± 7.65, and mean MCH was 24.1± 2.89pg/dl. The serum ferritin level among the cases, 46 patients levels were above 12 and 4 were below 12 with the mean among the cases being 20.86± 5.59. The study by Ghasemi F et al. suggested febrile convulsions have been associated with anemia.[14]The study by Bhatia R et al. suggested among 27 cases 18 had Hb levels below 10.5 g/dl, 18 had low serum ferritin levels and MCV level was low in 12 cases.[15] Md. Reza et al. in their study reported in the cases group the mean Hb level was 11.45± 1.34 and mean serum iron was 42.62±28.02.[10] Another study by Vaswani et al. reported the mean serum ferritin was reduced significantly in the febrile seizure group. The study also reported there was no significant difference between MCV and MCH.[16] The study by Mujamdhar et al. reported the mean Hb was 8.92 grams, Mean MCV was 67.03 fl, and mean MCH was 30.66 pg/dl.[17] The study by Daoud et al. suggested in the febrile seizure group the serum ferritin levels were lower when compared with the control group.[18] The study by Rajat G et al. reported among the febrile seizure group of 60 patients 20 had high serum ferritin levels and 26 had normal levels.[19] The study by Momen et al. showed the significance between cases and controls about Hb, MCV, MCH, and serum ferritin levels which can be compared with the present findings.[20]A study by Abdurrahman et al. also suggested significant statistics about Hb, MCV, MCH, and serum ferritin levels between the cases and controls.[21] Hartfield et al. suggested hemoglobin levels and MCV levels; significance was noted between the febrile seizure group and febrile non-seizure group.[22]The study by Narges H et al. reported between the febrile seizure group and iron status was significant.[23]

Table 1: Demographic distribution of subjects.

Age	Cases (n=50)	Controls (n=50)
6- 12 months	09 (18%)	5 (10%)
13- 24 months	13 (26%)	11 (22%)
25- 36 months	12 (24%)	15 (30%)
37- 48 months	9 (18%)	12 (24%)

49- 60 months	7 (14%)	7 (14%)
Total	50 (100%)	50 (100%)
Mean age	33± 16.49 Months	36.6± 15 Months
Sex	**Cases**	**Controls**
Males	28 (56%)	32 (64%)
Females	22 (44%)	18 (36%)
Total	50 (100%)	50 (100%)

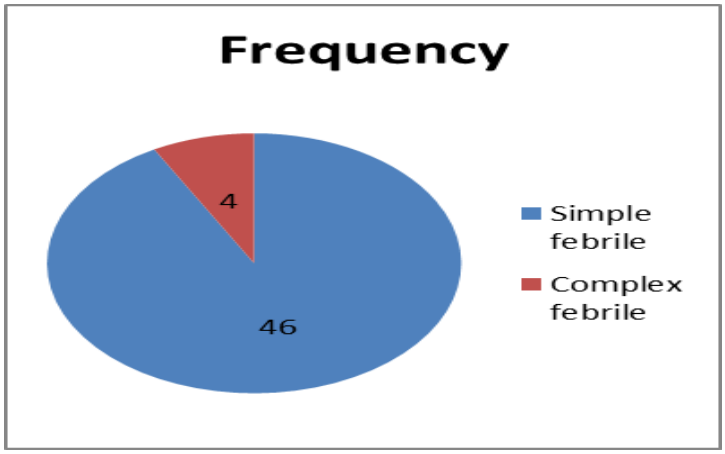

Figure 1: Type of seizure among cases.

Among the 50 cases 46 had simple febrile seizure and only 4 had complex febrile seizure as shown in figure 1.

Table 2: Distribution of subjects according to hemoglobin levels.

Hemoglobin levels	Cases	Controls	p-value
<8 (g/dl)	1 (2%)	1 (2%)	**<0.001***
8- 10 (g/dl)	16 (32%)	16 (32%)	
10.1- 12 (g/dl)	29 (58%)	27 (54%)	
12.1 (g/dl)	4 (8%)	6 (12%)	
Total	50 (100%)	50 (100%)	

Table 3: Mean distribution of Hb%, MCV, and MCH.

Parameters	Cases	Controls	p-value
Mean Hb	10.49± 2.03	10.87± 2.94	**<0.001***
Mean MCV	71.3± 7.65	73.2± 7.76	**<0.001***
Mean MCH	24.1± 2.89	24.8± 3.37	**<0.001***

Table 4: Distribution according to serum ferritin.

Serum ferritin	Cases	Controls	p-value
<12	4 (8%)	7 (14%0	**<0.001***
>12	46 (92%)	43 (86%)	
Total	50 (100%)	50 (100%)	
Mean	20.86± 5.59	21.96± 7.56	

Table 5: Association between iron deficiency and febrile seizure

Association	Mean	SD	95% CI		p-value
			Lower	Upper	
Haemoglobin* Febrile seizure	9.872	1.46	9.455	10.288	<0.001*
MCV* Febrile seizure	72.20	7.76	70.00	74.411	<0.001*
MCH* Febrile seizure	23.80	3.37	22.841	24.758	<0.001*
Serum ferritin* Febrile seizure	20.96	7.566	18.811	23.112	<0.001*
***Level of significance: <0.05**					

CONCLUSION

Hemoglobin levels are associated with a febrile seizure which was statistically significant. Meaning lower hemoglobin levels increase the risk of febrile seizure.MCV, MCH, and Sr. Ferritin levels are associated with a febrile seizure. Early detection or identification can help in preventing neurological damage and morbidity.

ACKNOWLEDGEMENT: None

Conflict of interest: Nil

Funding: Nil

REFERENCES

1. Moghaddam, K. B. Causes of Infectious Diseases Which Tend to Get Into Febrile Convulsion. Int J Infect, 2016; 3(1): e29861.
2. Chandrasekhar RV, Sasibhushan G, Vijaya Lakshmi B. Iron deficiency as a risk factor for febrile seizures. Inter J Pediatric Res, 2016; 3(4): 269-73.
3. Gupta S, Agarwal N, Maheshwari M. Iron Deficiency as a risk factor for febrile seizures – a case-control study. PJSR, 2015; 8(2): 37-40.
4. Nasehi MN, Abbaskhanian A, Omran MRS. Association between iron deficiency anemia and febrile seizure: a systematic review and meta-analysis. J Pediatr Rev, 2013; 1(2): 13-8.
5. Kimber RJ, Rusaki Z, Blunden RW. Iron deficiency and iron overload: serum ferritin and serum iron in clinical medicine pathology, 1983; 15: 497-503.
6. Ali D, Yousef V, Kourosh S and Afshin F. Febrile seizures: Etiology, Prevalence, and Geographical variation. Iran J Child Neurol, 2014; 8(3): 30-37.
7. Soheila Zareifer et al. association between iron status and febrile seizures. Seizure, 2012; 21: 601-603.
8. Md. Reza, Davood K, MahalaMadani and Hamed H. The relationship between iron deficiency and febrile convulsion: A case-control study. Global Journal of Health Sciences, 2016; 8(2): 185-189
9. Alfredo P,SansorR,ImpagliazzoN,etal.Iron Deficiency and febrile convulsion :case control study in children under 2 years.BMJ, 1996; 313: 343
10. Kumari PL, Nair MK, Nair SM, Kailas L, Geetha S. Iron deficiency as a risk factor for simple febrile seizures--a case-control study. Indian Pediatr, 2012; 49: 17-9.
11. Srinivasa S and Sai Praneeth Reddy. Iron deficiency anemia in children with simple febrile seizures. CurrPediatr Res, 2014; 18 (2): 95-98.
12. Talebianet al.. Febrile seizure and anemia. Iran J child neurology, 2007; 31-33.
13. Bidabadi et al. Association of iron deficiency anemia and first febrile convulsion: a case-control study. European J of epilepsy, 2009; 18(5): 347-351.
14. Ghasemi F, Valizadeh F, Tace N. Iron-deficiency Anemia in children with a febrile seizure. A case-control study. Iran Journal of Child Neurology, 2014; 8(2): 38-44.
15. Dr. Ravi Bhatia, Dr. Gunjan Bhatia; Iron status and its relation to simple febrile seizures in children; Indian Journal of Basic and Applied Medical Research, 2015; 5(1): 342-345
16. Vaswani et al. Iron deficiency as a risk factor for first febrile seizures. Indian paediatrics2010;47:437-439
17. MK Hassan2, LC Kundu3, SK Saha4, P Begum5, AS Lucky6; Low Serum Ferritin is a Risk for Febrile Convulsion in Children; Faridpur Med. Coll. J., 2016; 11(2): 44-46.
18. Daoud et Al. Iron status: a possible risk factor for the first febrile seizure. Epilepsia, 2002; 43(7): 74043.
19. Rajat G, Alpa G, Neerul P, and Anita S. study the iron status in children with febrile seizure: A hospital-based cross-sectional study. International Journal of Contemporary Pediatrics, 2020; 7(9): 1844-1848
20. Momen AA, Nikfar R, Karimi B. Evaluation of iron status in 9-month to 5-year-old children with febrile seizures: a case-control study in the southwest of Iran. Iran J Child Neurology, 2010; 4: 45–50
21. Abdurrahman KN, Ficms MD, Al-Atrushi A, Ficms M. The association between iron deficiency anemia and first febrile seizure: a case-control study. Duhok Med J., 2010; 4: 60–6
22. Hartfield DS, Tan J, Yager JY, Rosychuk RJ, Spady D, Haines C, et al. The association between iron deficiency and febrile seizures in childhood. Clin Pediatr, 2009; 48: 420–6
23. Narges H, Abbas A and Abbas R. Association between iron deficiency anemia and febrile convulsion in 3- to 60-month-old children: A systematic review and meta-analysis. Iranian Journal of Medical Sciences, 2014; 36 (9): 496-505.