

Original Research Article


Estimation of Hb, MCV, MCH variations in different types of febrile seizures

J. Rukmani¹, C. Krishnamurthy^{2*}, Syed Ali Fathima³

¹Associate Professor, ²Professor, ³Senior Resident

Department of Pediatrics, Government Tirunelveli Medical College, Tirunelveli, India

*Corresponding author email: krisnishtham@gmail.com

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Abstract

Introduction: Febrile seizures are seizures that occur between the age of 6 and 60 months with a temperature of 38°C (100.4°F) or higher, that are not the result of central nervous system infection or any metabolic imbalance, and that occur in the absence of a history of prior afebrile seizures.

Aim of the study: To Estimate the HB, MCV, MCH variations in different types of Febrile Seizures.

Materials and methods: This case-control study was conducted at the Department of Pediatrics, Tirunelveli Medical College Hospital, Tirunelveli, from 2017-2018. All cases of febrile seizures which include both simple febrile and complex febrile seizures between the age group of 6 and 60 months. The control group includes the children in the same age group with fever but without seizures

Results: Among 75 children presenting with febrile seizures, 52 children were presenting with simple febrile seizures (69.3%) and 23 children were presenting with complex febrile seizures. Average mean Hb level in those children presenting with febrile seizures was 10.37 gm. Average mean Hb level in children those who do not have febrile seizures was 11.48 gm. The p-value between the mean Hb level of 2 groups was less than 0.001 which is statistically significant. In children with febrile seizures, the mean MCV was 70.83. In children, those who do not have febrile seizures the mean MCV was 77.89 which was higher than those of children having febrile seizures. The difference between the two groups was statically significant. Average mean of MCH in children with febrile seizures (23.69) was lower than the children those who are presenting without febrile seizures (27.58). Thus the p-value was less than 0.001 which was statistically significant.

Conclusion: The hemoglobin levels were significantly lower in the case group compared to the control group. The present study concluded anemia as a risk factor for febrile seizures and emphasizes the importance of prevention and timely intervention and management of Iron deficiency anemia in children to decrease mortality and morbidity associated with febrile seizures.

Key words

Anemia, Febrile Seizures, Hemoglobin, Mean Corpuscular Volume, Mean Corpuscular Hemoglobin.

Introduction

The World Health Organization estimate iron deficiency anemia is the main cause for anemia; the affected population is in between 500 million and 2 billion people across the world [1]. In developing countries, Iron deficiency anemia is the most common nutritional deficiency and hematological disease of childhood, mostly between 6 months and 24 months of age, 46-66% of all children under 60 months of age are anemic, amongst which almost 50% comprise of iron deficiency [2]. Iron is a nutritional element which is needed for the synthesis of hemoglobin and is also essential for some enzymes that are involved in neuro-chemical reactions such as myelin formation, brain energy metabolism, some neurotransmitters and also for some enzyme metabolism as monoaminoxidase and aldehydoxidase [3]. The expression of enzyme cytochrome C oxidase, which is a marker of neuronal metabolic activity is reduced in iron deficiency. So, iron deficiency anemia can alter the seizure threshold of an infant and a child [4]. Neurological symptoms such as poor attention, weak memory, the delayed motor developmental and behavioral disturbance caused by iron deficiency anemia are well-known. Studies have also observed that fever aggravates the negative effects of iron deficiency on the brain, that is iron deficient children may have an increased risk of occurrence of febrile seizures and may also influence the type and duration or recurrence of seizures [5]. So, it could be possible that iron deficiency anemia may predispose to other neurological disturbances like irritability, weak memory etc. along with febrile seizures [6]. The observed percentage of febrile seizures is 2 to 4% of all infants and that of recurrence in children with less than 1 year of age is around 50% and 28% for those older than 1 year of age. Majority of the cases of febrile seizure are found to occur in the age group 14 to 18 months which directly overlaps with the age group of 6 months

to 24 months which has a maximum occurrence of iron deficiency anemia [7].

Materials and methods

This case-control study was conducted at the department of pediatrics, Tirunelveli medical college hospital, Tirunelveli, from 2017-2018. All cases of febrile seizures which include both simple febrile and complex febrile seizures between the age group of 6 and 60 months were studied. The control group includes the children in the same age group with fever but without seizures. After informed consent, a detailed history was taken, and physical examination was done, then the venous blood sample was collected and sent to the pathology department for investigation. To diagnose iron deficiency following investigations were done, which included, Hemoglobin estimation (Hb), MCV and MCH.

Anemia is defined as Hemoglobin concentration <11g/dl. Microcytosis is defined as MCV below the age-corrected normal values for erythrocytic volumes (MCV of 70 fl/ml in children <2 years, of 73fl/ml in children 2-4 years, 75 fl/ml in children 5-7 years).

Inclusion criteria: Aged between 6 months to 60 months, Presenting with febrile seizures including both simple and complex febrile seizures, including both 1st episode and recurrent episodes of febrile seizures.

Exclusion criteria: Any chronic systemic illness (Cardiac, Renal, Metabolic, Malignancy, Rheumatological) Neurodevelopmental delay, previous afebrile seizures, acute CNS infection, children on iron therapy.

Statistical analysis: The data were analyzed and interpreted according to the type of variables. The continuous variables were analyzed in terms of mean and interpreted by student's t-test. The

discontinuous variables were described in terms of percentages and interpreted by χ^2 (Chi-square) test.

Results

Among 75 children presenting with febrile seizures, 52 children were presented with simple febrile seizures (69.3%) and 23 children were

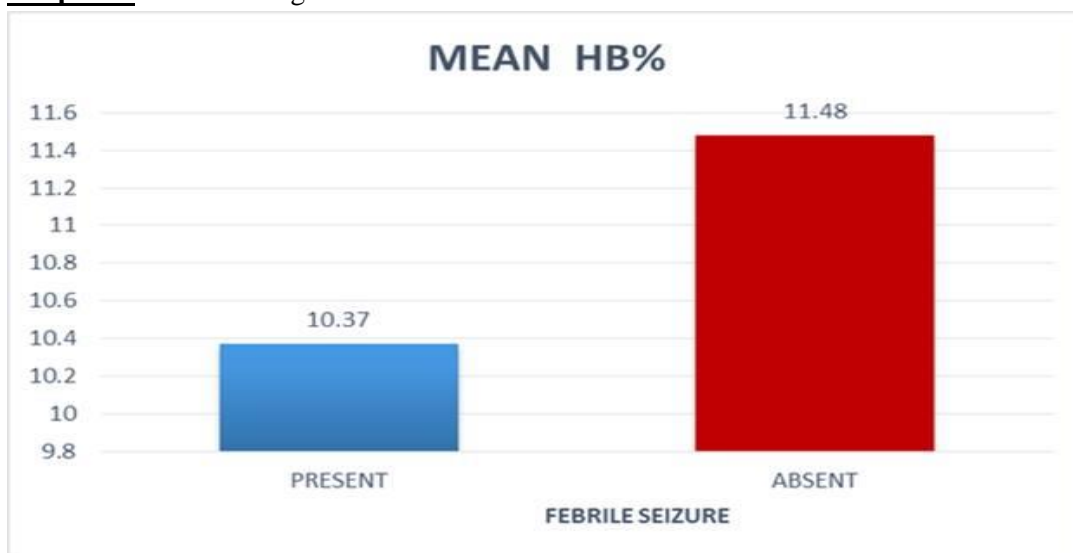
presenting with complex febrile seizures (**Graph – 1**).

Average mean Hb level in children those who are presenting with febrile seizures was 10.37 gm. Average mean Hb level in children those who do not have febrile seizures was 11.48 gm. The p-value between the mean Hb level of 2 groups was less than 0.001 which was statistically significant (**Graph – 2**).

Graph – 1: Types of seizures in study population.



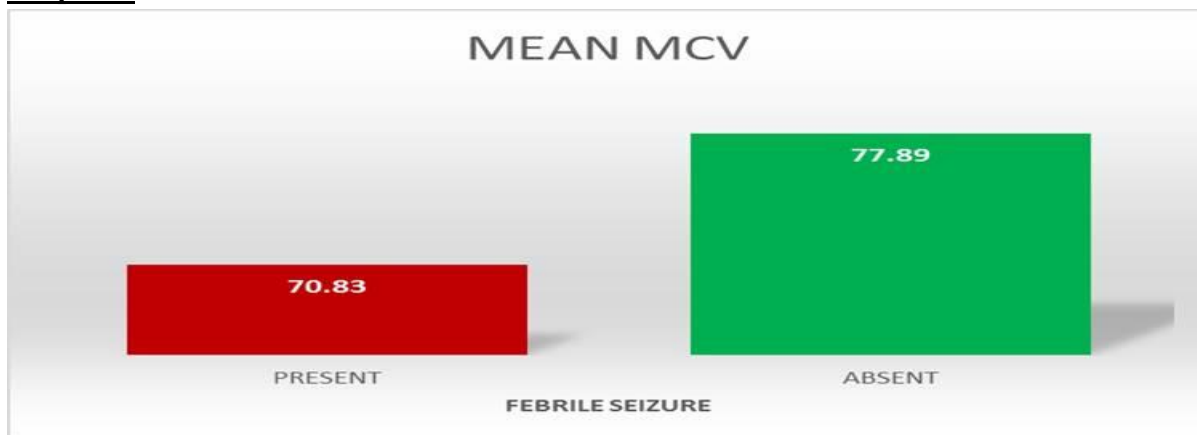
Graph – 2: Mean hemoglobin level.



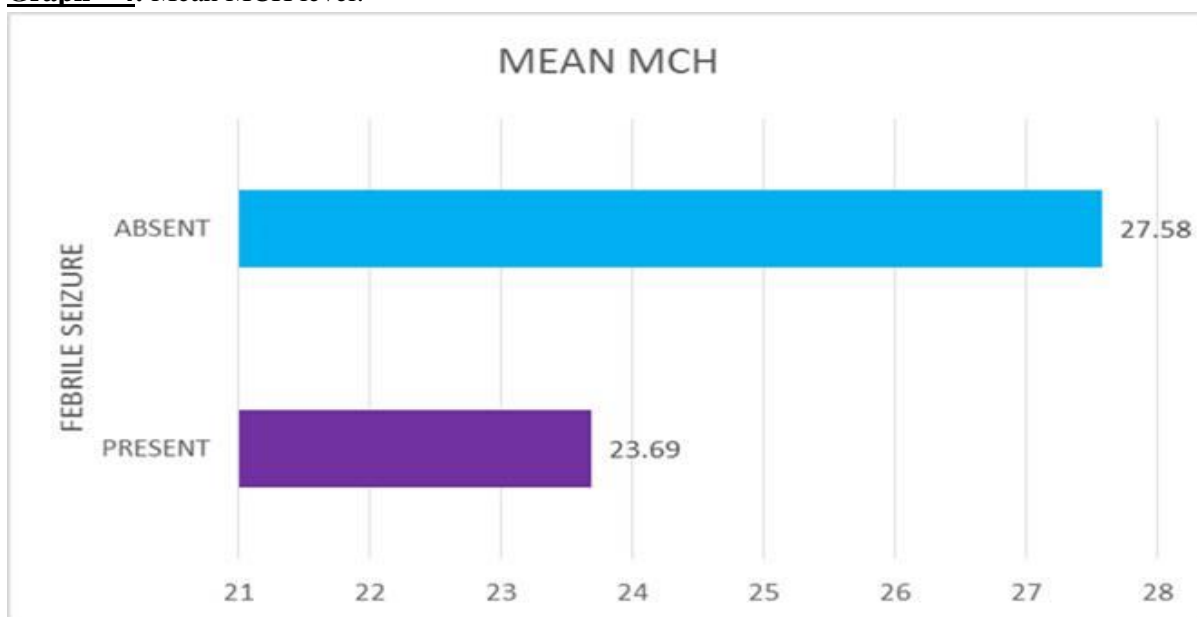
In children with febrile seizures the mean MCV was 70.83. In children, those who do not have febrile seizures the mean MCV was 77.89 which was higher than those of children having febrile seizures. The difference between the two groups was statistically significant (**Graph – 3**).

Average mean of MCH in children with febrile seizures (23.69) was lower than the children those who are presenting without febrile seizures (27.58). Thus the p-value was less than 0.001 which was statistically significant (**Graph – 4**).

Graph – 3: Mean MCV level.



Graph – 4: Mean MCH level.



Discussion

Febrile Convulsions (FC) refer to the convulsions that occur in children between the ages of 6 months and five years, with a body temperature of 38°C or higher not resulting from Central Nervous System (CNS) infection or any metabolic imbalance without any prior afebrile seizures. This condition occurs in 2-5% of the children who are neurologically healthy. The precise cause of FC is not known, but several genetic and environmental factors have been implicated [8]. The maximum age of FC occurrence is 14-18 months, which overlaps with the maximum prevalence of Iron Deficiency Anemia (IDA) which is 1-2 years old. In our study 52 (69.3%) among 75 cases had presented

with simple febrile seizures and 23 (31.7%) among 75 cases had presented with complex febrile seizures [9]. Our study clearly shows that the hemoglobin level, MCH, MCV, levels show significant differences between the two groups thus approving the theory that iron deficiency anemia is a trigger for febrile seizures. MCV was significantly low with a p-value of 0.007 [10]. Serum Ferritin showed low value among the seizure group. Serum iron showed significantly low value in the seizure group. Many of previous studies also show this type of varied results for various parameters [11]. Among the 75 cases of febrile seizures, the mean Hb level in cases with simple febrile seizures was 10.1 gm and those with complex febrile seizures, the mean Hb level

is 11gms. In children with febrile seizures, the mean MCV was 70.83 and the mean Hb in controls was 77.89 which was higher than those of children having febrile seizures [12]. Average mean of MCV in children with simple febrile seizures was 69.84 and those with complex febrile seizures were 73. Average mean of MCH in children with febrile seizures was 23.69 gm. Average mean of MCH without febrile seizures was 27.58 gm. Average mean MCH in cases with simple febrile seizures was 23.07 gm. Average mean MCH in cases with complex febrile seizures was 25.08 gm [13, 14, 15].

Conclusion

The hemoglobin levels were significantly lower in the case group compared to the control group. The present study concluded anemia as a risk factor for febrile seizures and emphasizes the importance of prevention and timely intervention and management of Iron deficiency anemia in children to decrease mortality and morbidity associated with febrile seizures. Thus far, the combined results of the case-control studies suggest that iron deficiency anemia is associated with a moderately increased risk of FC in children, particularly in areas with low and moderate prevalence of anemia. Future work should be carried out on interventional studies and the implication for public health.

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