

# The Risk of Iron Deficiency Anemia Contribution To Febrile Seizures Among Children (6-60) Months

Ahmed Makki Sahib \*, prof.Dr. Fatima Wanas Khudair \*\*, Dr. Ali J. Eidan \*\*\*

\* M.Sc. in Nursing, Department of Community Health Nursing, Faculty of Nursing, University of Kufa, Iraq.

\*\* Prof. Ph.D. in Community Health Nursing, Department Community Health Nursing, Faculty of Nursing, University of Kufa, Iraq.

\*\*\* Ph.D in Immunology, Department of Basic Science, Faculty of Nursing, University of Kufa, Iraq.

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**Abstract- Background:** Febrile seizure is the most common childhood seizure disorders, affecting 2% to 5% of children aged 6 to 60 months. Some studies have suggested iron deficiency a risk factor for febrile seizure. **Objectives:** to find out the correlation between iron deficiency anemia with febrile seizures. **Methodology:** A descriptive analytical design correlational study, samples were (50) cases and (50) controls, collected from AL Zahraa teaching hospital we measure the serum iron, serum ferritin, total iron binding capacity and transferrin saturation as well as we assess febrile seizures by developed questionnaire consists from 3 parts. **Results:** showed Association between iron deficiency anemia and febrile seizure; about (62%) of the patients and (32%) of control were diagnosed with positive iron deficiency anemia; while only (38%) of patients and (68%) of control showed negative results. Statistical analysis showed that there is a significant association between iron deficiency anemia and febrile seizure (chi square = 6.03 ; p value = 0.022) .**Conclusions:** Children febrile iron deficiency anemia is more likely to occur in seizures. iron deficiency anemia maybe considered a risk factor Predisposes infants to experiencing febrile seizures. serum Iron, serum Ferritin levels were significantly lower in children with febrile seizures than controls group.

**Index Terms-** Febrile seizures; iron deficiency; anemia; ferritin.

## I. INTRODUCTION

Febrile seizures (FS) are characterized as seizures that occur in children aged 6 to 60 months and are followed by fever above 38 ° C (100.4 ° F) and do not include symptoms of infections of the central nervous system. It is the most common cause of infant seizures, affecting 2-5 percent of children annually (Malla et al., 2015).

The Febrile seizures are one of the main causes of pediatric emergency room visits affecting up to one in every twenty children in different parts of the world. Febrile seizures are classified as: a simple febrile seizure is a primary generalized, usually tonic, fever-related, fever-related attack lasting up to 15 minutes and not repeated within 24 hours. The duration can last for a few seconds to minutes and A complex febrile seizure is longer (> 15 min), focal and/or occurring every 24 hours (VII, 2018).

Febrile seizures are associated with fever during childhood. They occur in 2% to 4% of all children in the United States and

Western Europe. Febrile seizures happen more often in boys than in girls (Moghaddam et al., 2016).

Iron deficiency (ID) is characterized as a reduction in the total body iron to the extent that iron stores are completely depleted and there is some degree of tissue ID (Uijterschout, 2015).

More than three billion people worldwide are affected making it the most common micronutrient deficiency. The cause is unclear but many of the disorders are also associated with an imbalance within the brain between excitation and inhibition (E / I) (Rudy & Mayer-Proschel, 2017).

(ID) ranks at the top of three global "secret hungers" (iron, iodine, vitamin A: sub-clinical deficiency without obvious signs of deficiency) with approximately one-fifth of the world's children in the developing world, iron being the most severe single-nutrient deficiency (Sultan et al., 2017).

There are no clear statistics on how many individuals worldwide are affected by iron deficiency, but ID is estimated to be present in most pre-school children and pregnant women in developing countries and at least 30–40% in developed countries when anemia is used as an indirect predictor of ID According to statistics from the World Health Organization (WHO) in 2001, 30% of children are affected by iron deficiency (Özdemir, 2015).

**Objectives of the study:** to find out the correlation between iron deficiency anemia with febrile seizures.

## II. METHODOLOGY

A non-probability sampling technique, purposive sample were (50) cases that male patients made up (66%) while female (34) ; and (50) controls were male (62%) ; and (38%) female, collected from AL Zahraa teaching hospital we measure the serum iron , serum ferritin, total iron binding capacity and transferrin saturation through devices called (Beckman coulter and minividis) as well as we assess febrile seizures by developed questionnaire consists from 3 parts (demographical data, clinical data and Analysis test).

## III. RESULTS

**Table (1) summarize of the socio-demographic data for studied samples (patients & control) groups.**

Items	Sub-groups	Control group Total = 50		Patients group Total = 50	
		Frequency	Percentage	Frequency	Percentage
<b>Age / Months</b>	6-19	20	40.0	23	46.0
	20-33	10	20.0	7	14.0
	34-47	9	18.0	9	18.0
	48-61	11	22.0	11	22.0
<b>Mean (Min-Max) : 26.98 (6-60)</b>					
<b>Length/Height (cm)</b>	45-62	2	4.0	1	2.0
	63-80	21	41.0	22	44.0
	81-98	15	30.0	16	32.0
	99-116	12	24.0	11	22.0
<b>Mean (Min-Max) : 84.22 (45-115)</b>					
<b>Weight (kg)</b>	7-12	22	44.0	23	46.0
	13-18	19	38.0	18	36.0
	19-24	9	18.0	9	18.0
<b>Mean (Min-Max) : 15.4 (6.8-23.1)</b>					
<b>Gender</b>	Male	31	62.0	33	66.0
	Female	19	38.0	17	34.0
<b>Residency</b>	Urban	40	80.0	43	86.0
	Rural	10	10.0	7	14.0
<b>Vaccine Status</b>	Yes	4	8.0	3	6.0
	No	46	92.0	47	94.0
<b>Breast feeding</b>	Yes	28	56.0	26	52.0
	No	22	44.0	24	48.0
<b>Artificial feeding</b>	Yes	15	30.0	14	28.0
	No	35	70.0	36	72.0
<b>Type of convulsion</b>	Generalization	N/A	N/A	47	94.0
	Focal	N/A	N/A	3	6.0
<b>Complexity of convulsions</b>	Simple	N/A	N/A	46	92
	Complex	N/A	N/A	4	8
<b>Convulsion Stop</b>	With Medication	N/A	N/A	1	2.0
	Without Medication	N/A	N/A	49	98.0

This Table shows statistical distribution of control by their socio-demographic data, it explains that the majority of the patients' subgroup are : those with ages between (6-19) years old (40%) ; those with a length ranging between (63-80) cm (41%) ; those with a weight ranging (7-12) kg (44%) ; male (62%) ; urban residence (80%) ; those that were not vaccinated (9%) ; and those with breast feeding (56%) .

while, The patients table show statistical distribution of patients by their socio-demographic data, it explains that the majority of the patients' subgroup are : those with ages between (6-19) years old (46%) ; those with a length ranging between (63-80) cm (44%) ; those with a weight ranging (7-12) kg (46%) ; while the lower percentages were recorded in : those with ages between (20-33) months old (14%) ; those with a length ranging between (45-62) cm (2%) ; those with a weight ranging (19-24) kg (18%) ; the mean , minimum , and maximum values of the age , length and weight

are as follows : 26.98 (6-60) months , 84.22 (45-115) centimeters and 15.4 (6.8-23.1) kilograms respectively .

The results of the current study also revealed that male patients made up (66%) while female (34%) ; those who live urban residents (86 %) while those in rural area constitute (14%); those who have not been vaccinated (94%), those that were fed with breast feeding (52%) ; those that had no artificial feeding (72%) .

As shown in table patients who have a generalized convulsions made up (94%) of the total population versus (6%) for

children with focal convulsions; the percentage of patients that had simple convulsions was (92%) while those with complex convulsions are only (8%) of the total population ; those that their convulsions are stopped without medications made up about (98%) of the total population while only (2%) of the total population did not stop unless using medications .

**Table (2): Association between iron deficiency anemia and febrile seizure.**

Diagnosis of iron deficiency anemia		Patients		Control		Chi Square (P value)
		Freq.	%	Freq.	%	
.	With IDA	31	62	16	32	6.03 (0.002)
.	Without IDA	19	38	34	68	

This table showed Association between iron deficiency anemia and febrile seizure; according to this table, about (62%) of the patients and (32%) of control were diagnosed with positive iron deficiency anemia ; while only (38%) of patients and (68%) of control showed negative results. Statistical analysis showed that there is a significant association between iron deficiency anemia and febrile seizure (chi square = 6.03 ; p value = 0.022) .

#### IV. DISCUSSION

According to the table (1)The mean age of onset in present study are within the 1st age groups is 26.98 with the FS occurrence is (46%) considered (6-19) months its agree with the study done by (Majumdar, 2012). comparable to the other studies(Gupta et al., 2015) found the mean age for FS was 28.41 months. Separate studies done by (Nikkhah et al., 2017) and (Lal et al., 2016). (Chandra, 2012) found the average convulsion age to be 17.9 months. It is commonly known that febrile seizures and first febrile seizures are more common in children under three years of age.

In the present study, there was a preponderance of male for febrile seizure. No matter the time of study or the design details; boys have consistently emerged with higher frequency of febrile seizures. Juvenile incidence ratios: girls ranged from 1.1:1 to 2:1(Gencer et al., 2016), (Majumdar, 2012). However present study finding male are more common than female, Whether there is a biological basis for gender-specific differences in susceptibility to febrile seizures, or whether boys are just getting more fever and are therefore at high risk, is not yet established. While the Residency of all the samples was children Who live Urban 86% and 14% was live in Rural.

In the literature receiving diphtheria, whole-cell pertussis and tetanus toxoid vaccine and measles, mumps and rubella vaccine were reported to be associated with a transiently increased risk of FS on the day of vaccination and 8-14 days after vaccination, as shown by (Offringa & Moyer, 2001) and

(Millichap, 2010) According to (Camfield et al., 2002) vaccination constitutes only 2.2% of the febrile seizure. No case was reported following routine vaccination in present study with iron deficiency.

Overall, FS that occurred after vaccination was not found in this study showed that children with vaccine status were 6 % and that the largest percentage was 94 % without this compatibility with study achieved (Seinfeld & Pellock, 2013).

The majority of FS, In present study generalization febrile seizures constituted 94% of the seizures while 6% were focal seizures; the generalized febrile seizure affecting the whole bod, on the other hand focal was involving the arm, leg, or face (or some combination) on only one side of the body, or eye deviation to one side this correspond with(Patterson et al., 2013) and (Majumdar, 2012).

Complexity of convulsions In a study of children with a Complexity of convulsions, There is a relative preponderance of single in a febrile episode most seizures were simple(92%), in present study which comparable to (Ueda et al., 2015), and the complex feature was (8%) but a higher incidence of multiple seizures has been observed in Malaysian children by (Ling, 2001). this findings of Complexity convulsions close to (Chung, 2014). On the other hand, table (2) reveal the relationship between iron deficiency anemia and febrile seizure, (62%) of the patients and (32%) of control were diagnosed with positive iron deficiency anemia ; while only (38%) of patients and (68%) of control showed negative results, Statistical analysis showed that there is a significant correlation between iron deficiency anemia and febrile seizure (chi square = 6.03 ; p value = 0.022) .

#### V. CONCLUSIONS

Febrile seizures are more common with male than female. Results suggest that IDA may be a risk factor for FS, IDA screening should be considered in infants with the first FS, The incidence of febrile seizure less than three years was higher as

compared to more than three years' age, and Children with FS were more Iron deficient in term of low Hb, low MCH, low MCV, low serum ferritin, low serum iron, high TIBC and low transferrin saturation.

#### REFERENCES

- [1] Camfield, P., et al. (2002). Antecedents and risk factors for febrile seizures Febrile seizures (pp. 27-36): Elsevier.
- [2] Chandra, N. (2012). The role of iron deficiency in febrile seizure.
- [3] Chung, S. (2014). Febrile seizures. Korean journal of pediatrics, 57(9), 384.
- [4] Gencer, H., et al. (2016). Relationship of Febrile Convulsion with Iron Deficiency Anemia and Zinc Deficiency. Journal of Academic Research in Medicine, 6(2).
- [5] Gupta, S., et al. (2015). Iron deficiency as a risk factor for febrile seizure: A case control study. PJSR, 8(2), 37-40.
- [6] Lal, V., et al. (2016). Association of iron deficiency anemia in children with febrile convulsions. Pakistan Journal of Neurological Sciences (PJNS), 11(3), 3-8.
- [7] Ling, S. (2001). Clinical characteristics and risk factors for a complex first febrile convulsion. Singapore medical journal, 42(6), 264-267.
- [8] Majumdar, R. (2012). Iron deficiency as a risk factor for first febrile seizure.
- [9] Malla, T., et al. (2015). Simple Febrile Convulsion and Iron Deficiency Anemia: A Corelation in Nepalese Children. American Journal of Public Health Research, 3(5A), p11-16.
- [10] Millichap, J. G. (2010). Prader-Willi Syndrome and Atonic Seizures. Pediatric Neurology Briefs, 24(11), 85.
- [11] Moghaddam, K. B., et al. (2016). Causes of Infectious Diseases Which Tend to Get Into Febrile Convulsion. Int J Infect, 3(1), e29861.
- [12] Nikkhah, A., et al. (2017). Differences in Mean Platelet Volume and Platelet Count between Children with Simple and Complex Febrile Seizures. Iranian journal of child neurology, 11(2), 44.
- [13] Offringa, M., & Moyer, V. A. (2001). Evidence-Based Case Review: An evidence-based approach to managing seizures associated with fever in children. Western journal of medicine, 175(4), 254.
- [14] Özdemir, N. (2015). Iron deficiency anemia from diagnosis to treatment in children. Turkish Archives of Pediatrics/Türk Pediatri Arşivi, 50(1), 11.
- [15] Patterson, J. L., et al. (2013). Febrile seizures. Pediatric annals, 42(12), e258-e263.
- [16] Rudy, M., & Mayer-Proschel, M. (2017). Iron deficiency affects seizure susceptibility in a time-and sex-specific manner. ASN neuro, 9(6), 1759091417746521.
- [17] Seinfeld, D. S., & Pellock, J. M. (2013). Recent research on febrile seizures: a review. Journal of neurology & neurophysiology, 4(165).
- [18] Sultan, T., et al. (2017). Iron deficiency anemia as a risk factor for simple febrile seizures. Pakistan Journal of Neurological Sciences (PJNS), 12(3), 36-40.
- [19] Ueda, H., et al. (2015). Clinical characteristics of seizures associated with viral gastroenteritis in children. Epilepsy research, 109, 146-154.
- [20] Uijterschout, L. (2015). Iron deficiency in childhood (Doctoral dissertation, Universiteit van Amsterdam [Host]).
- [21] vii, b. (2018). study of iron status in children presenting with febrile seizures in tirunelveli medical college hospital.

#### AUTHORS

**First Author** – Ahmed Makki Sahib, M.Sc. in Nursing, Department of Community Health Nursing, Faculty of Nursing, University of Kufa, Iraq.  
**Second Author** – prof.Dr. Fatima Wanas Khudair, Prof. Ph.D. in Community Health Nursing, Department Community Health Nursing, Faculty of Nursing, University of Kufa, Iraq.  
**Third Author** – Dr. Ali J. Eidan, Ph.D in Immunology, Department of Basic Science, Faculty of Nursing, University of Kufa, Iraq.

**Correspondence Author** – Ahmed makki sahib, e-mail ahmedmakki69555@gamal.com , Mobile / 009647811797572