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ORIGINAL ARTICLE

Role of 25 (OH) Vitamin D, Calcium, Iron and Zinc as Early Markers for Diagnosis of Febrile Seizers in Infants and Children

Mohamed El-Sayed Hamed [1], Magdy Mohammed Ibraheim [2], Abdalla Masoud Mohammed El-Sayed Omar*[1], Atef Khalil [1]

[1] Pediatrics Department, Faculty of Medicine, Zagazig University, Egypt
[2] Biochemistry Department, Faculty of Medicine, Zagazig University, Egypt

Corresponding author:
Abdalla Masoud Mohammed El-Sayed Omar

Email:
Yayaozil21322@gmail.com

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ABSTRACT

Background: Febrile seizure (FS) is the most common neurologic disorder in the pediatric age group. Low serum levels of 25 (OH) Vitamin D, calcium, iron and zinc would adversely affect the development and progression of the disease. We aim to evaluate the role of 25 (OH) Vitamin D, calcium, zinc and iron as early markers for diagnosis of febrile seizures in infants and children. Methods: The study included 50 children with Febrile Seizures, from 6 months to 6 years old. During a seizure, the temperature varies between 38.5 and 40.2°C. A respiratory tract infection and fever were present in 50 children of similar age and sex at the same time, with temperatures ranging from 38.5 to 40.2°C and no prior history of FS or epilepsy. Febrile seizure group was subdivided to Simple febrile seizures (SFS), Complex febrile seizures (CFS), and Status epilepticus (SE). Serum calcium, zinc, iron, and Vitamin D3 (OH) were measured. Radiological investigations include MRI Brain and EEG. **Results:** There was significant difference between both groups regarding S. Calcium, serum iron, Vit D and Zinc. Among different types of seizures; there was no statistically significant difference regarding S. Calcium, serum iron, Vit D and Zinc. **Conclusions:** Significant correlation was found between FS and serum 25-hydroxy vitamin D level deficiency and insufficiency, decreased serum zinc levels, decreased serum iron and Hb levels less than 10.5gm/dL.

Keywords: Febrile Seizures, Vitamin D, Calcium, Zinc and Iron.

INTRODUCTION

In general, Febrile seizures are described as seizures that happen in children between the ages of 6 months and 5 years who have a with fever of more than 38°C degrees Celsius (100.4°F) but no sign of an intracranial cause (such as an abrupt electrolyte imbalance, metabolic illness,

trauma, or intoxication) and do not have any other symptoms of seizures. This definition distinguishes "febrile seizures" from "convulsions with fever" **[1].**

The American Academy of Pediatrics (AAP) has announced a consensus definition of febrile seizures as brief (15 min) generalized seizures with a fever higher than 38°C (100.4°F), not recurrent within 24 hours, occurring in febrile children between the ages of 6 and 60 months who do not have an intracranial infection, metabolic disorder or history of prior afebrile seizures **[2].**

Simple febrile seizures (SFS) and complicated febrile seizures (CFS) are two categories of febrile seizures based on the length and frequency of convulsions. Simple febrile seizures, which persist for roughly 15 minutes and are caused by a specific illness such a respiratory or digestive infection, account for about 70–75% of febrile seizures. More than 1 seizure occurs during each episode of febrile convulsions, which account for 20–25% of cases and have a life span of 15–30 minutes **[3].** During an infection, status epilepticus lasts longer than 30 minutes and happens repeatedly as well as randomly **[4].** Simple febrile seizures are benign, but complicated febrile seizures (CFS) and status epilepticus (SE) are more likely to develop into more severe conditions such temporal lobe epilepsy in later life **[5].**

There have been numerous suggested theories, however the precise etiology of febrile seizures is still unknown. It is thought that its process involves both genetic and environmental components **[6].** Seizures may result from a number of circumstances that stimulate the central nervous system (CNS) including fever, electrolyte imbalances, certain diseases and head trauma **[7].** The immature brain's response to temperature in febrile seizures is age-dependent. The youngster is more susceptible to febrile seizures as they mature because of an increase in neural excitability **[8]**.

Globally and especially in underdeveloped nations, vitamin D insufficiency is a major public health issue. The stages of fast growth, such as infancy and adolescence, are when vitamin D insufficiency is more prevalent **[9].** The CNS contains vitamin D receptors all over it. In the developing brains of children and newborns, vitamin D is crucial for the health of neurotransmission **[10].**

An alteration in the ions in the cell microenvironment may result from fever, according to some studies. Potassium, sodium, calcium and iron ions are identified in aberrant amounts during the onset of FS, which could be a sign of a high-risk condition **[3].** Certain neurotransmitters like monoamine oxidase and aldehydeoxidase, require iron to operate properly. The risk of febrile seizures may rise if there is anemia as iron deficiency **[11]**.

Several early studies have demonstrated that selenium deficiency Saghazadeh et al **[12].** Magnesium and scalium both raise the possibility of febrile seizures **[13].** A risk factor for febrile seizures is zinc deficiency **[14].** The brain contains large amounts of zinc, which may play a part in synaptic neurotransmission. Gamma Amino Butyric Acid (GABA) production is controlled by zinc, which also inhibits excitatory neuronal discharge by enhancing the action of NMDA (N-methyl D-aspartate) receptors **[15].** The objective of the current study was to evaluate the role of vitamin D, calcium, iron and zinc in early diagnosis of febrile seizures and their relation to the clinical behavior and possible prediction of future disease outcome and complications.

METHODS

After protocol approval by our Local Ethics Committee (IRB), this case-control study was carried out at Zagazig University Pediatric Hospital and Benha Specialized Pediatric Hospital during the period from October 2021 to October 2022. Blood sample collection and data collection were authorized in writing by parents or legal guardians. The study's protocol adhered to the Helsinki Declaration, which is the World Medical Association's code of ethics for research on humans.

Sample size was calculated as follow: finding that mean ±SD of vitamin D among febrile children without seizures is 84.4±11.3 and among febrile children with seizures is 41.9± 11.8, so sample size is calculated by open-epi program to be 100 patients (50 patients in each group) with confidence level of 95% and power of test 80% diagnosed according to the 2011 American Academy of Pediatrics criteria **[2]**. Ages between 6 months and 6 years were the inclusion requirements. When the body temperature reached 38°C or above, seizures started to occur. acute upper respiratory tract infection's primary ailment. Electroencephalogram (EEG) and computed tomography (CT) of the head results that are normal. Intravenous fluid treatment prior to hospital admission was a disqualifying factor. Stomach flu or other conditions may benefit from zinc therapy. Seizures may be brought on by metabolic issues or an infection of the head. The study included 50 selected children with Febrile Seizures, from 6 months to 6 years old. Between 38.5 and 40.2°C is the temperature when having a seizure. The EEG and cranial CT MRI were also normal. The study did not include any brain illnesses or infectious diseases of the central nervous system. Diagnosis was made according to American Academy of Pediatrics [2]. Positive control group; 50 randomly chosen children of similar age and sex who presented with fever and respiratory infection between the ages of 6 months and 6 years, with a temperature ranging from 38.5 to 40.2 °C and no prior history of FS or epilepsy.

According to the frequency of seizures, the study cases were divided into three groups: Simple febrile seizures (SFS), 42 cases with generalized seizures lasting less than 15 minutes, not occurring again within 24 hours or during the same illness and not accompanied by postictal neurological abnormalities. Six CFS cases with extensive febrile seizures, this group represents FS with atypical features, which include focal-onset seizures, prolonged seizures lasting more than 15 minutes and recurrent seizures on the same day. When a seizure lasts more than thirty minutes or recurs within thirty minutes without a break in open awareness, it is defined as status epilepticus (SE).

Patient's history and clinical examination, investigations as well as radiological findings for every case were recorded and tabulated. Laboratory investigations include routine investigations together with assay of serum calcium, zinc, iron and Vit D3 (OH). Electroencephalograms (EEG), magnetic resonance imaging (MRI) and brain imaging are all examples of radiological studies.

A peripheral blood sample of 8 mL from each case and control group was taken and serum was extracted by centrifugation at 3,500 rpm for 5 minutes. Immediately after being separated, the serum was kept at -70°C. Blood samples were taken from the FS group within an hour of the seizure occurring. The study group's gender, age, body temperature, length of fever, frequency of seizures and duration of seizures were all noted. In the control groups, sex, age and temperature were noted.

Using the Hitachi 7600-020 automatic biochemical analyzer, the levels of serum calcium and serum iron were measured. The concentrations of pro-inflammatory cytokines (IL-6) and anti-inflammatory cytokines (IL-10) were measured using a commercially available enzyme-linked immunosorbent assay kit (Milliplex MAP (ELISA) kit, human cytokine/chemokine magnetic bead panel-immunology multiplex assay, Cat. #HCYTOMAG-60 K, EMD Millipore Corp.,Burlington, MA, US).

The serum procalcitonin (PCT) was determined with the Swiss Roche Cobas E601 electrochemiluminescence immunoassay analyzer. The calibration solution, reagents, and quality control products were all provided by Roche.

Statistical analysis:Data collected over time, basic clinical examinations, lab investigations, and outcome measures were coded, documented, and analyzed using Microsoft Excel software. After that, data were imported into SPSS version 20.0, a statistical analysis application for the social sciences. If a two-tailed test result had a P-

value of less than 0.05 and greater than 0.001, it was deemed statistically significant.

RESULTS

Table 1: showed that there was no statistically significant difference between cases and control groups regarding other age and sex ($p > 0.05$). Upper respiratory tract infection, acute bronchitis, acute follicular tonsillitis and gastroenteritis are the most common primary diseases in both the case and control groups. Regarding the primary disease, there was a statistically significant difference between the two groups ($p \leq 0.05$).

Table 2: demonstrates that there was a CRP difference between the two groups that was extremely statistically significant ($p \leq 0.001$).

Table 3: showed that there was highly statistically significant difference between both groups regarding Hb, MCV, MCH, PLT ($p \leq 0.001$). There was statistically significant difference between both groups regarding TLC ($p \leq 0.05$).

Table 4: showed that there was a highly statistically significant difference in CRP (<5) between the two groups ($p \leq 0.001$). Regarding AST, there was a statistically significant difference between the two groups ($p \leq 0.05$).

Table 5: showed that there was highly statistically significant difference between both groups regarding Serum Ca, Serum iron, Vit D and Zinc ($p \leq 0.001$).

Table 6: showed that all cases and control have normal MRI and EEG.

Table 7: showed that among different types of seizures; there was no statistically significant difference regarding Serum Ca, Serum iron, Vit D and Zinc ($p > 0.05$).

Table 1: Some demographic data among the studied groups

Variable	Cases group (N=50)		Control group (N=50)	t-test		P-value
Age (months):						
Mean ± SD	27.5± 18.3		27.9 ±19.9	-0.122		0.902
Median	21		21.5	(MW)		
Range	2-67		6-72			
Variable	N	%	N	%	$\chi 2$	P-value
Sex:						
Male	28	56	27	54	0.04	1
Female	22	44	23	46		

t test and Chi square ($\chi 2$) test were used .MW: Mann Whitney test

Table (2): The current primary disease among the studied cases and control groups.

Item		Type of febrile seizures			Total	Control group	X^2	p-value		
		SFS	CFS	SE	No.	%	No.	%		
Primary disease	Upper respiratory tract infection & acute bronchitis	18	2	1	21	42	39	78	17.5	0.003 (S)
	Pneumonia & bronchopneumonia	6	1	-	7	14	2	4		
	Acute follicular tonsillitis	8	-	-	8	16	3	6		
	Acute suppurative otitis media	3	-	-	3	6	0	0		
	Gastroenteritis	6	1	-	7	14	6	12		
	Urinary tract infection	2	1	1	4	8	0	0		
Total					50		50			

Table (3): CBC among the studied group

Variable	Cases group (N=50)	Control group (N=50)	t-test	P-value
Hb -Mean ± SD -Range	 10.5 ±0.77 9.5-13	 11.5± 1.1 9.5-13.5	-5.5	0.000 (HS)
MCV -Mean ± SD -Range	 71.5 ±4.5 65-81	 78.5 ± 4.9 65-81	-7.5	0.000 (HS)
MCH -Mean ±SD -Range	 22.4 ±3.9 17-30	 26.5± 3.1 19-31	-5.7	0.000 (HS)
PLT -Mean ±SD -Range	 187460±54928 111000-316000	 200.1 ± 44.8 123-321	24.1	0.000 (HS)
TLC -Mean ±SD -Range	 8.8 ±2.9 5-14.3	 8.7±.1.8 5-12	2.4	0.017 (S)

Table (4): Other laboratory measures among the cases group

Variable	Cases group (N=50)	Control group (N=50)	t-test	P-value
CRP (<5) -*Mean ± SD* -*Median* -*Range*	14.7 ±19.4 0.5 0.5-57	3.7± 3.6 2.5 0.5-11	3.9 (MW)	0.000 (HS)
Urea -*Mean ± SD* -*Range*	20.3 ±4.5 12-39	21.3 ± 6.4 12-30	-0.86	0.390
Creatinine -*Mean ±SD* -*Range*	0.59 ±0.16 0.3-0.9	0.55± 0.16 0.3-0.9	1.3	0.203
ALT -*Mean ±SD* -*Median* -*Range*	19 ±8.6 17 9-37	19.8 ± 7.9 16 10-34	-0.49	0.619
AST -*Mean ±SD* -*Median* -*Range*	37.5 ±15.7 33.5 18-74	44.2± 15.7 40 22-74	-2.1	0.036 (S)

Table (5): Specific Laboratory measures among the studied group

Variable	Cases group (N=50)	Control group (N=50)	t-test	P-value
S. Ca (mg/dl): • *Mean ± SD* • *Range*	9.3 ±0.95 7.3-11.2	10.1± 0.91 7.9-11.6	-4.1	0.000 (HS)
S. iron (mg/dl): • *Mean ± SD* • *Median* • *Range*	54.4 ±20.6 54 23-91	79.8 ± 22.4 81 27-117	-5.9 (MW)	0.000 (HS)
Vit D3 (mg/ml): • *Mean ±SD* • *Median* • *Range*	19.9 ±18.4 12.1 7.1-78	37.5± 20.3 35.5 7-90	-4.6 (MW)	0.000 (HS)
Zinc (ug/dl): • *Mean ±SD* • *Median* • *Range*	46.8 ±22.1 38 22-112	69.9 ± 22.2 68.5 28-111	-5.2 (MW)	0.000 (HS)

Table (6): Imaging among the studied group

Variable	Cases group (N=50)		Control group (N=50)	
	N	%	N	%
MRI: • *Normal*	50	100	50	100
EEG: • *Normal*	50	100	50	100

This table shows that all cases and control have normal MRI and EEG.

Table (7): Specific Laboratory measures among cases group

Variable	Seizures group			F-test	P-value
	SFS group (N=43)	CFS group (N=5)	SES group (N=2)		
S. Ca (mg/dl): • *Mean ± SD* • *Range*	 9.4 ± 0.98 7.3-11.2	 9.2 ±0.79 8.2-10	 8.6± 0.4 8.3-8.9	0.697	0.503
S. iron (mg/dl): • *Mean ± SD* • *Median* • *Range*	 54.4 ± 19.9 54 23-90	 52 ±23.5 54 31-89	 61.5 ± 41.7 61 32-91	 0.147 (K)	 0.694
Vit D3 (mg/ml): • *Mean ±SD* • *Median* • *Range*	 20.4 ± 19.5 11.1 7.7-78	 15.2 ±9.5 9.2 7.1-26	 20.5 ± 3.5 20.5 18-23	 0.177 (K)	 0.838
Zinc (ug/dl): • *Mean ±SD* • *Median* • *Range*	 46 ± 21.9 38 22-112	 59.4 ±24.9 45 38-98	 32 ± 7.1 32 27-37	 1.3 (K)	 0.281

K: Kruskal-Wallis test

DISCUSSION

The most prevalent neurological condition seen in children is febrile seizure (FS), which affects this age group. One in every 25 children in the population will reportedly have at least one seizure while they are still very young [16]. The age of the child affects when FS first appears. In the current study, more than 50% of cases were under 2 years. Only 8% of cases were in the 6th year. There is slight male predominance (M/F ratio is approximately 1.3 /1.0). The mean age was 27.5± 18.3 months. Regarding sex, there was no statistically significant difference between the case and control groups (p> 0.05). Approximately similar data were reported by Patterson et al [17] who stated that the incidence of febrile seizures is higher in boys; however, different regions have shown variations in these numbers. Also, Canpolat et al [18] reported that male-to-female ratio was approximately 1.6 to 1.0 in cases of FS.

Based on the severity of the FS, its method of onset, its length, its recurrence, its seizure semiology, including the presence of post-

ictal events and the incidence of inter-ictal neurologic symptoms, FSs can be characterized as simple (typical), complicated (atypical) or prolonged (febrile status epilepticus) [19]. Frequent or intermittent febrile seizures without regaining consciousness for more than 30 minutes during the inter-ictal state define the most severe type of complex febrile seizures, febrile status epilepticus [20]. In this study SFS was observed in 43 cases (86%), about 50% under the age of 3 years, CFS in 5 cases (10%), all cases under the age of 2 years while SE in 2 cases (4%), at age of 2-4 years. Nearly similar data were reported by Shinnar, et al [21] who discovered that just 5% of fever seizures were categorized as febrile status epilepticus and that roughly 70% of febrile seizures were simple, while 25% were complex. Also Canpolat et al [18] stated that simple febrile seizures account for about 80-85% of all febrile seizures.

Among cases group in this study; the mean age at 1st attack was 19.9± 12.8 months. The mean fever was 39.3 ± 0.5. During seizures, the temperature was between 38.5-39.5 ^{0}C in 64% of cases and between 39.6-40.5^{0}C in 36% of cases. Regarding the current attack, 28% of them were 1 hour ago. In agreement with these findings, Tarhani et al [22] in a study included 77 children with febrile seizures, reported that the mean temperature during seizures was 38.41 ± 0.83 °C. Similar findings were reported by Berg [23] who concluded that FS is more related to the rapidity of rising temperature than high temperature level itself.

Regarding recurrence of seizure episodes among the cases of the current study, there was highly statistically significant association between the type of febrile seizures (SFS, CFS, SE) and number of seizures. In 66% of instances, a seizure attack happened once, twice and three times, respectively. The first seizure episode was mostly observed in children under the age of 2 years (60%). The type of seizures was generalized in 94% of cases, while focal seizures observed in only 6% of cases. The type of febrile seizures and the type of seizures (Generalized, Focal) were also found to be strongly statistically associated ($p \leq 0.001$). Family history of FS was positive in 7 cases (14%), while family history of epilepsy was positive in only 2 cases (4%). No relation of FS to smoking, perinatal asphyxia and intrauterine growth retardation. In agreement with these findings, Kumar et al [24] investigated the risk factors linked to the recurrence of febrile seizures in Indian children and included 528 children. They came to the conclusion that family history of febrile seizures, younger age at first seizure, brief duration of fever previous to the first febrile seizure, lower temperature at initiation and shorter duration of fever are risk factors for the recurrence of febrile seizures in children.

Seizures brought on by a fever have many different causes. Most experts agree that underlying genetic predisposition, environmental circumstances and a sensitivity of the developing central nervous system to the effects of fever are the causes of febrile seizures [8].

In this study, 21 cases (42%) presented with upper respiratory tract infection and acute bronchitis, 7 cases (14%) presented with pneumonia and bronchopneumonia, 8 cases (16%) presented with acute follicular tonsillitis, 7 cases (14%) presented with gastroenteritis, 3 cases (6%) presented with acute otitis and 4 cases (8%) presented with urinary tract infection. More than 60% of cases had acute follicular tonsillitis, acute bronchitis, upper respiratory tract infection and pneumonia. The predominant primary disease is upper respiratory tract infection, acute bronchitis, acute follicular tonsillitis and Gastroenteritis. Such data were approximately correlated with many previous studies. Additionally, there was a very statistically significant difference in CRP (5) between the case and control groups in the current investigation ($p \leq 0.001$). Between the two groups, there was an AST difference that was statistically significant ($p \leq 0.05$). This supports the possible role of infection in pathogenesis of FS.

According to Han et al [25] who examined trends in febrile seizures and viral infection in Korean children, febrile seizures were most common from late spring to early summer and

influenza virus and enterovirus were the most frequently associated viruses.

Also, Millichap J.C and Millichap J.J [26] reported that the most common underlying conditions of FS are respiratory tract infections and gastroenteritis. Approximately 80% of febrile seizures are brought on by viral illness. The most common causes of febrile seizures include influenza A, human coronavirus and roseola infantum (exanthem subitum).

In the present study, all cases and control groups showed no febrile seizure-specific EEG and MRI findings. Similar data were reported by Maytal et al [27] who concluded that there is no proof that an EEG can be used to determine whether a kid would develop epilepsy following a straightforward febrile episode.

In this study serum iron levels were low in 72% of cases and normal in 28% of cases. Hb levels were less than 10.5 gm/dl in 70% and more than 10.5 gm/dl in 30% of cases. The mean serum iron was 54.4 ±20.6 mg% in case group compared to 79.8 ± 22.4 mg% in the control group. The cutoff point for serum iron was 49.4 mg%. There was highly statistically significant difference between cases and control groups regarding Hb, MCV, MCH, PLT ($p\leq 0.001$). There was statistically significant difference between both groups regarding TLC ($p\leq 0.05$). Such findings were correlated with some previous studies. In a case-control study involving 307 kids between the ages of 6 months and 6 years, Soheilipoor et al [28] calculated Hb, Hct, RBC count, MCV, MCH and MCHC in case and control groups and discovered that anemia was lower in febrile children with seizures than in febrile children without seizure. In a different cross-sectional study involving 100 Egyptian children (50 children with febrile convulsions as the study group and 50 febrile children without convulsions as the control group), Abdel Hameed et al [29] discovered that the mean HB value, MCH, MCV, MCHC, iron and ferritin were significantly lower in the cases than that in the control group. They also reported considerably lower zinc levels in cases compared to the control group. Low zinc and iron levels were found to be potential risk factors for febrile convulsions, they determined.

In this study, 25 (OH) Vit D deficiency was detected in 44% of cases, Vit D insufficiency was detected in 50% of cases and normal in only 6% of cases. The mean serum 25 (OH) Vit D was 19.9 ±18.4 in cases group compared to 37.5± 20.3 in control group. The cutoff value for 25 (OH) Vit D was 10.5 µg/mL. Serum zinc level was below normal in 54% of cases, while zinc level was normal in 26% of cases. The mean serum zinc was 46.8 ±22.1in cases group compared to 69.9 ± 22.2 in control group. The cutoff value for serum zinc was 35.5 µg/dL. Serum calcium level was normal in 84% of cases. Slightly decreased calcium levels (7.8-8.5 mg) were noticed in only 16% of cases. The mean serum calcium was 9.3 ±0.95 in cases group compared to 10.1± 0.91 in control group. The cutoff value for calcium was 9.9mg. Regarding the serum levels of calcium, iron, 25-hydroxyvitamin D and zinc, there were remarkably statistically significant variations between the case and control groups (p 0.001). There was no statistically significant variation in the serum levels of calcium, iron, vitamin D and zinc across the various types of seizures ($p> 0.05$).

Meesters et al [30] reported a 13-month-old boy had three bouts of complicated febrile seizures, which is consistent with the findings of the current investigation. Severe hypocalcemia was discovered via investigations. After two years of monitoring, the patient's serum calcium was normalized while receiving calcium and vitamin D supplements. Although there had been several febrile episodes, the youngster had not experienced any convulsions.

A prospective observational study on 223 kids between the ages of 7 and 59 months who had uncomplicated febrile seizures was also done to support the findings of the current investigation. The amounts of serum 25-hydroxyvitamin D were calculated. Of the children who experienced uncomplicated febrile seizures, 43.5% had insufficient vitamin D, 30.85% had insufficient vitamin D and 25.56% had normal levels. According to

the scientists, uncomplicated febrile seizures are substantially connected with vitamin D insufficiency, although seizure recurrence is not tied with it [31].

Also, in a case-control study that compared vitamin D3 levels in 50 epileptic children treated with valproic acid with 50 healthy children chosen from children visiting the hospital for routine checkups as the control group, Abdullah and Mousheer [32] found that there was a higher prevalence of vitamin D3 insufficiency in epileptic children receiving valproate monotherapy compared to healthy children. They recommend vitamin D3 supplementation for all epileptic youngsters, even before utilizing anti-epileptic medicines.Contrary to the research's conclusions, in a study involving 104 children (51 patients had fever without seizures and 53 patients experienced febrile seizures), Heydarian et al [10] came to the conclusion that there was no statistically significant difference between the two groups' serum vitamin D levels. They suggested that additional clinical research be done to assess the connection between febrile seizures and serum vitamin D levels.

Arul et al [15] evaluated and examined serum zinc levels in 40 children with febrile seizures (simple and complicated), as well as 40 age and sex-matched feverish children who did not have convulsions, in a cross-sectional investigation. In the cases and controls, the mean serum zinc concentrations were 83.8±33.1µg/dL and 116.3±30.3µg/dL, respectively (p = 0.002). When the serum zinc level is less than 63µg/dL, hypozincemia is thought to exist. The scientists came to the conclusion that serum zinc concentrations were considerably lower in children who experienced febrile seizures.When Hosseini et al [33] calculated the serum zinc levels in the case and control groups, they found that children with febrile seizures had lower serum zinc levels. To perform the study, 41 patients with simple and complex FS served as the case group and 41 febrile kids without seizures served as the age- and sex-matched control group. Moreover, in research with 100 children, Rabbani et al [34] found low serum zinc levels in kids who had febrile seizures and came to the conclusion that zinc deficiency might be a risk factor for febrile seizures in children. In

a related study, Taherya et al [35] came to the conclusion that there is a sizable amount of evidence suggesting children who experience febrile convulsions during a seizure episode have hypozincemia. They suggested doing extensive prospective studies to measure the serum zinc levels in children at risk for febrile convulsions both in healthy states and prior to the onset of a seizure. Common childhood ailments like febrile seizures usually go away on their own. It appears that a combination of environmental and genetic variables, particularly frequent virus infections in young children, causes febrile seizures. The prevalence of febrile seizures and the potential for long-term sequelae like recurrence, afebrile seizures and epilepsy make them clinically significant presentations in children, despite being benign and requiring minimum care.

CONCLUSIONS

Significant correlation was found between FS and serum 25-hydroxy vitamin D level deficiency and insufficiency, decreased serum zinc levels, slightly lower calcium levels (< 9.9 mg%), decreased serum iron levels and Hb levels less than 10.5 gm/dl. Also, highly statistically significant correlation to increased CRP levels. There was no statistically significant relationship between the different forms of febrile seizures and serum levels of Hb%, Ca, iron, vitamin D or zinc.

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