

Relationship between Serum Vitamin D Levels and Simple Febrile Seizures in Children

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Abstract

Background and Aim: A few studies have documented the occurrence of hypocalcaemia seizures caused by vitamin D deficiency in kids and vitamin deficiency rickets in kids with recurrent febrile seizures. In order to determine whether vitamin D levels and febrile seizures are related, researchers looked at vitamin D status in children aged 6 months to 5 years who had their first episode of a febrile seizure.

Material and Methods: The current study is a case control analysis carried out in the paediatrics department in collaboration with the casualty and occupational therapy departments at the Dr. Kiran C. Patel Medical College and Research Institute, Bharuch, Gujarat. The inclusion criteria included fever-related seizures, brief episodes lasting less than 15 minutes, no subsequent seizures within 24 hours, a child who was otherwise neurologically healthy and free of any neurological abnormalities both before and after the seizure episode, and an age range of 6 months to 5 years. Each instance was compared to a control who had the same age as the patient, was the same sex, and experienced a brief fever but no seizures. The scientists classified the various levels of vitamin D deficiency using standards from the 2017 Indian Academy of Paediatrics guidelines.

Results: A total of 150 patients and 150 controls were included in the investigation. Vitamin D levels and febrile seizures correlated significantly ($p < 0.01$) and strongly. People with low vitamin D levels (12–20ng/ml) had a three times ($OR=3.03$) higher likelihood of having febrile seizures than those with normal vitamin D status, while those with low vitamin D levels (12ng/ml) had the highest risk.

Conclusion: Among patients with uncomplicated febrile seizures, vitamin D deficiency was prevalent. Accordingly, it may be inferred from the current study that there is a connection between vitamin D deficit and uncomplicated febrile seizures, and that vitamin D insufficiency may even be a risk factor for such seizures.

Keywords: Children, Hypocalcaemia, Simple febrile seizures, Vitamin D.

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Introduction

Febrile seizures, the most common type of epilepsy in children, cause parents and other caretakers great concern. Despite being extremely common, they remain one of the

least understood childhood disorders. A febrile seizure is one that occurs in a child between the ages of six and sixty months, has a fever of 38 degrees Celsius or higher, is

unrelated to a metabolic imbalance or a central nervous system illness, and has never happened before.[1,2] Simple FSs (SFSs) are generalized seizures that last less than 15 minutes, only happen once within the first 24 hours, don't show any atypical symptoms during the postictal trial, and last less than 15 minutes. Generalised seizures that last longer than 15 minutes, recur within the first 24 hours of the initial seizure, take the form of focal seizures, or are accompanied by pathological abnormalities in the postictal interval are referred to as "complicated FSs" (CFS).[3,4]

An uncomplicated febrile seizure occurs in 2–5% of children with neurological disorders that are neurologically normal. Thirty percent of kids experience it again after the first episode and fifty percent after the second. Age under one year, fever lasting less than twenty-four hours, a temperature between 38 and 39 degrees Celsius (100.4 and 102.2 degrees Fahrenheit), complex febrile seizures, nursery, male gender, and low serum sodium at the time of presentation are risk factors for recurrence of febrile seizures.[5-8]

A common public health issue around the globe, particularly in underdeveloped nations, is vitamin D deficiency. When a person is experiencing rapid growth, like in infancy and adolescence, vitamin D insufficiency is more prevalent. There is growing worry that a lack of vitamin D may be the cause of febrile seizures. With an estimated 1 billion cases worldwide, vitamin D deficiency is a serious health issue for children. It affects children in India to a prevalence of 50–90%. Vitamin D may also have anticonvulsant properties and lower the severity of seizures in mice who had chemically induced seizures, according to several experimental animal studies.[9,10]

A few studies have shown that children with repeated febrile seizures can develop vitamin

D insufficiency rickets and hypocalcaemia convulsions as a result. Researchers examined the vitamin D status of children aged 6 months to 5 years who experienced their first episode of a febrile seizure in order to ascertain whether vitamin D levels and febrile seizures are connected.

Materials and Method

The current study is a case control analysis carried out in the paediatrics department in collaboration with the casualty and occupational therapy departments at the Dr. Kiran C. Patel Medical College and Research Institute, Bharuch, Gujarat. Two years were spent doing the study. The study's age range for the included age group was from 6 months to 5 years. Prior to the study's launch, the ethical clearance certificate was received after the study's details were presented to the institute's ethical committee. Before including the included children in the study, the parent(s) was/were notified of it and given the opportunity to sign an informed consent form. A parent's signature or left hand thumb impression was obtained, and the inspecting doctor answered any questions or ambiguities in the local language.

The parent(s) of the enrolled children were informed about the study before the children were included, and their informed consent was obtained in writing. The inspecting doctor addressed any questions or ambiguities in the local language and obtained a parent's signature or left hand thumb impression.

The inclusion criteria included fever-related seizures, brief episodes lasting less than 15 minutes, no subsequent seizures within 24 hours, a child who was otherwise neurologically healthy and free of any neurological abnormalities both before and after the seizure episode, and an age range of 6 months to 5 years.

Children with atypical febrile seizures, afebrile seizures, any signs of CNS infections, illnesses, neurodevelopmental delays, individuals who had previously experienced febrile seizures, individuals who had clinical signs of rickets, and individuals with specific liver, renal, or endocrine disorders were excluded from the study.

Each instance was compared to a control who had the same age as the patient, was the same sex, and experienced a brief fever but no seizures. Both study groups' parents gave their informed consent. A trained lab technician drew 5 ml of blood from a peripheral vein from each participant. In order to measure the amounts of 25-hydroxyvitamin D in blood samples, cold boxes between 2 and 8 oC were used to transport the samples to an authorised laboratory. The scientists classified the various levels of vitamin D deficiency using standards from the 2017 Indian Academy of Paediatrics guidelines. According to these factors, adequate levels are those that are >20ng/ml, insufficient levels are those that are between 12 and 20ng/ml, and deficient levels are those that are.[11,12]

Results

The study included a total of 150 cases and 150 controls. Cases had a mean age of 25.9 18.6 months, whereas Controls had a mean age of 26.10 15.6. Most cases and controls belonged to the 6 to 24 month age range. In both cases and controls, there were 96 more males than females, or a male to female ratio of 1:0.7.

Twenty of the individuals exhibited vitamin D deficiency among the cases. Forty-eight subjects' levels of vitamin D were normal, compared to 88 whose levels fell into the inadequate range. Similar to the cases in the experimental group, 80 participants in the control group had normal levels of vitamin D whereas 10 participants had insufficient levels.

Vitamin D levels and febrile seizures correlated significantly ($p < 0.01$) and strongly. People with low vitamin D levels (12–20ng/ml) had a three times (OR=3.03) higher likelihood of having febrile seizures than those with normal vitamin D status, while those with low vitamin D levels (12ng/ml) had the highest risk.

Table 1: Distribution of cases and controls according to vitamin D status

Vitamin D	Cases	Control
Deficient	22	12
Insufficient	88	58
Normal	40	80
Total	150	150

Table 2: Association of Vitamin D with febrile seizures

Vitamin D	Cases	Controls	Total	Crude	OR
Deficient	20	10	30	5	5
Insufficient	88	58	146	4.04	4.04
Normal	40	80	120	2	2

Discussion

The most frequent kind of paediatric seizures that result in ER visits is febrile seizures. There is mounting evidence that vitamin D can modify several cell metabolisms and influence gene expression, which can affect

the attack of febrile seizures. To present, no research has been conducted to determine whether vitamin D intake is related to simple febrile seizures.[13]

Males were more frequently reported to have febrile seizures in the current study than females. The same results were discovered by Pour H *et al.* (2012) in a study on the demographics and underlying causes of febrile seizures.[14] Males were observed to have febrile seizures at a higher rate than females in a 2017 study by Pathan HG. Researchers examined the vitamin D level of children having their first episode of febrile seizures in this study. Compared to merely 39.1% of the individuals in the control group, they discovered that 59.5% of the patients had insufficient levels of vitamin D. 13.5% of cases had vitamin D insufficiency, as opposed to 6.8% of patients in the control group.[15]

The largest risk was associated with vitamin D deficiency (12ng/ml), and those with inadequate vitamin D status (12–20ng/ml) were three times more likely to experience febrile seizures than those with adequate vitamin D status (20ng/ml). In order to determine whether there is any correlation between vitamin D levels and uncomplicated febrile seizures, Shariatpanahi G *et al* did a pilot investigation in Tehran, Iran in 2015–16.[16]

The study found that patients with uncomplicated febrile seizures had a significant frequency of vitamin D deficiency. Their investigation was limited by a lack of control. The current study's findings are similar to those of their study in that people with uncomplicated febrile seizures had a high prevalence of vitamin D deficiency, even though our investigation of the association is more promising. To establish a clear link between a vitamin D deficit and febrile seizures, more analytical research must be done.

Conclusion

Among patients with uncomplicated febrile seizures, vitamin D deficiency was prevalent. Accordingly, it may be inferred from the

current study that there is a connection between vitamin D deficit and uncomplicated febrile seizures, and that vitamin D insufficiency may even be a risk factor for such seizures. To demonstrate this association, additional research with a larger sample population is advised.

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