

STUDY OF VITAMIN D LEVELS IN EPILEPTIC CHILDREN IN AGE GROUP OF 2-16 YEARS

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ABSTRACT

Epilepsy is a common neurological disorder in childhood. A number of medications are used in the treatment of epilepsy. Antiepileptic drugs (AEDs) are known to exert deleterious effects on vitamin D metabolism. Its deficiency state in epileptics can lead to difficult seizure control as vitamin D is said to have anti-epileptogenic activity in addition to its known role in calcium metabolism. Correction of vitamin D deficiency may help in decreasing the morbidity as well as seizure frequency. The purpose of this prospective observational study was to determine vitamin D status in these children. 70 children aged 2-16 years with epilepsy on AEDs were assessed for vitamin D levels. The results showed that the vitamin D levels in this study population were significantly low. Hence, it is recommended that vitamin D supplementation in these children is necessary to reduce the seizure frequency and vitamin D deficiency related morbidity.

Keywords: 25OH vitamin D, Epilepsy, Antiepileptic drugs.

INTRODUCTION

Medical literature has recently focused attention on the impact of vitamin D on various aspects of health [1]. Besides its pivotal role in calcium homeostasis and bone mineral metabolism, it is now recognized to subservise [2] a wide range of fundamental biological functions. The association between vitamin D, antiepileptic drugs (will be henceforth referred to as AEDs), and bone health in individuals with epilepsy has been recognized for more than 30 years [3,4]. Although few comparable data are available for children, adults with epilepsy are known to be at significantly increased risk for vitamin D deficiency, compared with the general population [5]. Seizures themselves pose a risk for injury, including fractures; and the added co-morbidity of poor bone health increase this risk, especially in children with who suffer from seizures with motor manifestations, as well as those with impaired motor function and coordination [6]. Many AEDs are inducers of hepatic cytochrome P450 metabolism. It has been postulated that these AEDs result in increased hepatic metabolism of vitamin D, leading to low vitamin D levels [7]. However, non-enzyme inducing AEDs have also been associated with low vitamin D levels and in turn with poor bone health. Therefore, although the newer AEDs are less-potent enzyme inducers than older AED, they are not necessarily inert in bone metabolism. Studies have reported variable changes in bone mineral density (BMD) and vitamin D levels in children taking AEDs [8]. Studies have been carried out linking seizure frequency and vitamin D deficiency *per se*, in children [9]. We aimed to describe the prevalence of and risk factors for vitamin D deficiency among children with epilepsy on AEDs.

METHODS

A cross-sectional study was carried out from August 2012 to July 2014 at Dr. D.Y. Patil Hospital, a tertiary care hospital in Kolhapur. Children in the age group of 2-16 years suffering from epilepsy and on AEDs attending the pediatric outpatient department (OPD) or admitted in the ward were included in the study group and were subjected for assessment of vitamin D levels. 2 ml of peripheral venous blood was drawn after taking informed consent. Samples were sent to laboratory and analysis was done for (25[OH] D) by CLEA method. Children with metabolic bone disease, renal and hepatic impairment, endocrine disorders and those on vitamin D supplements were excluded. The children with epilepsy who are seizure free and off medication for 3 or more years were also excluded.

RESULTS

Of the 70 patients studied, majority were in the age group of 2-6 years (36 patients accounting for 51.4%) and least were in the age group of 12-16 years (13 patients accounting for 18.6%) (Fig. 1).

50 (71.4%) children had vitamin D levels <20 ng/ml. 15 (21.5%) children had vitamin D levels 21-29 ng/ml and 5 (7.1%) children had vitamin D levels >30 ng/ml (Fig. 2).

There were total 47 patients in monotherapy category of which 33 patients had vitamin D levels <20 ng/ml (70.2%), and 23 patients in polytherapy category of which 17 patients had vitamin D levels <20 ng/ml (73.9%) (Table 1). There was no statistical significance found in vitamin D deficiency with polytherapy versus monotherapy ($p=0.81$).

It was seen that the risk of vitamin D deficiency increased, as the duration of AED usage increased, which was statistically significant ($p=0.013$) (Table 2).

It was seen that vitamin D levels were significantly low in patients with indoor ambulation as compared to those with an outdoor ambulation; this was statistically significant ($p=0.017$) (Table 3).

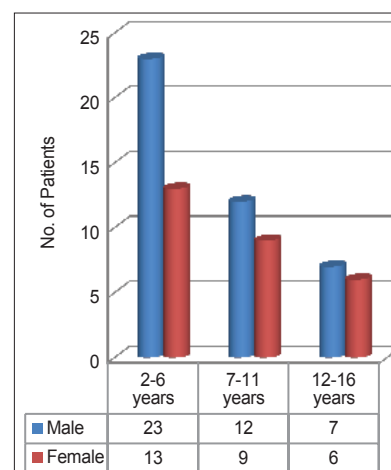


Fig. 1: The age and sex distribution of cases

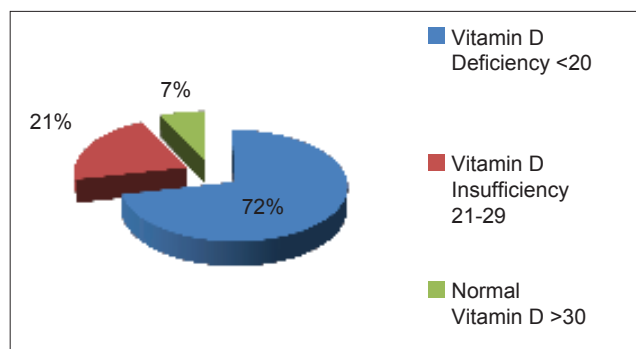


Fig. 2: The levels of vitamin D in patients

Table 1: Vitamin D levels with number of AED used

	<20 ng/ml	21-30 ng/ml	>30 ng/ml	Total
Monotherapy	33	10	4	47
Polytherapy	17	5	1	23

AED: Antiepileptic drugs

Table 2: Vitamin D levels with duration of AED usage

Duration	<20 ng/ml	21-30 ng/ml	>30 ng/ml	Total
<24 months	18	13	2	33
24-48 months	17	2	2	21
>48 months	15	-	1	16

AED: Antiepileptic drugs

Table 3: Vitamin D levels with ambulatory status

	<20 ng/ml	21-30 ng/ml	>30 ng/ml	Total
Indoor	26	2	1	29
Outdoor	24	13	4	41

DISCUSSION

Vitamin D is an essential nutrient that maintains the homeostasis of calcium and phosphorous in the body. The importance of vitamin D was recently emphasized when it was reported that it has several non-skeletal physiological functions too. Research has shown that adult epilepsy patients on AEDs can exhibit deficiency of vitamin D. In pediatric patients, however, controversies still remain regarding the effect of AEDs on vitamin D levels.

The present study was conducted in DY Patil Hospital, Kolhapur from November 2012 to August 2014. It included 70 children, in the age group of 2-16 years, with epilepsy and on AEDs who attended the pediatric OPD and also those who were admitted in the ward. Serum 25 (OH) vitamin D levels were evaluated in these patients.

The objectives of this study were: (1) To know the vitamin D levels in epileptic children on AED, (2) to study the association between vitamin D levels and number as well as duration of AEDs used and the ambulatory status of patient.

The study showed that the serum [25(OH) D] levels were significantly lower in epileptic patients. The study showed that the serum [25(OH) D] levels were significantly lower in patients who had taken anticonvulsants for more than 48 months than in patients

who had taken them for <48 months ($p=0.013$). One previous study showed that patients who took anticonvulsants for more than 2 years had normal vitamin [25(OH) D] levels, although BMD was found to be decreased; these authors mentioned the possibility of high vitamin D intake among the experimental group. However, we ruled out any vitamin supplementation in our study.

It was seen that vitamin D levels were significantly low in patients with indoor ambulation as compared to those with an outdoor ambulation ($p=0.017$).

We observed that there is no difference in serum [25(OH) D] levels with the number of AED used ($p=0.81$).

The possibility of vitamin D deficiency in children and adolescents taking AED should be considered. This is especially important in (i) patients who have been taking AED for more than 2 years, (ii) pediatric patients with mental retardation or developmental delay who may have more indoor ambulatory status, (iii) patients taking other hepatic enzyme inducing drugs.

The limitation of the study was that serum vitamin D levels were not assessed before AED use, and there was no control group.

CONCLUSION

We found vitamin D deficiency to be highly prevalent among children with epilepsy on AED. The high prevalence of hypovitaminosis D suggests that, almost all children with epilepsy are at risk. Increased duration of AED therapy and indoor ambulation was associated with increased risk of vitamin D deficiency. Increased attention on the part of both pediatric neurologists and pediatricians to vitamin D status among children with epilepsy is warranted as vitamin D has a vast impact on health of children other than bone health such as reducing the frequency of seizures, immunity, autoimmune disease and malignancy to mention a few.

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