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The effect of vit D_3 deficiency on increased incidence of convulsion in epileptic patients

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Abstract

Epilepsy is a common neurological disorder affecting all age groups We sought to assess the longitudinal effect of antiepileptic drug on serum 25-hydroxyvitamin D [25(OH)D], with recurrent attack of epileptic fits. The study consisted of two parallel, 1-year, prospective, randomized, dose-ranging trials conducted in two groups of ambulatory patients, for 46 patients based on clinical presentation of the patient together with confirmed diagnosis by EEG. The patients improved when maintenance dose of Vit D3 with daily taken to restore the normal level, with measurements for all patient 95 % of patient recovered from an epileptic fits with increase the level of Vit D3 to the normal value. In conclusions, majority of the patients should be treated with an escalating regimen of vitamin D, with doses varying between 400 and 15,000 IU/day.

Keywords: Epilepsy, Vitamin D3, Anti-conversant, Deficiency

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Introduction

Homeostasis of calcium, phosphate, and magnesium. In this group, the most important compounds are vitamin D2 [ergocalciderol] and vitamin D3 [cholecalciferol] [1]. Epilepsy is a common neurological disorder affecting all age groups, which are mainly important for the bone health, muscle strength, immune function, and neurotransmission in the central nervous system in healthy children [2-4].

Epilepsy is a common neurological disorder affecting all age groups. It is one of the world's most prevalent non-communicable diseases [5].

A number of medications are currently used in the treatment of epilepsy. The older AED's are Phenobarbital (PB), Phenytoin (PHT), Carbamazepine (CBZ), Primidone (PRM), and Sodium valproate (VPA) and Clonazepam (CZP). Newer medication is Lamotrigine (LTG), Topiramate (TPM), Clobazam (CLB), Oxcarbazepine (OXC) and Levetericitam (LEV).

Use of antiepileptic drugs (AED's) has acute and chronic side effects. There are no indicator whether to supplement calcium and vitamin D in a patient with epilepsy from day of initiation of AED therapy or whether a base line data of markers of bone formation, resorption and vitamin D levels are imposed.

Moreover, studies so far have been cross sectional studies or longitudinal studies with patients previously on AED therapy. We therefore sought to assess the longitudinal effects of antiepileptic drug on serum 25-hydroxyvitamin D [25(OH) D levels and parameters of bone mineral metabolism before and after AED therapy [6-8].

Regarding vitamin D deficiency, a population-based study estimates a prevalence of 15% in the general pediatric population, with data referring to the United States [9]. Considering the subjects using antiepileptic drugs, there is evidence that supports a prevalence above 70% in the pediatric population [10]. Subclinical disease is characterized by biochemical abnormalities (reduced serum levels of calcium and 25-hydrovitamin D and high parathyroid hormone levels), reduction in bone mineral density and changes in bone biopsy findings In a study conducted with members of the board of directors of the American Academy of Neurology, it was found that around 40% of pediatric neurologists routinely screen for bone mineral disease, 40% prescribe calcium and vitamin D to patients who already have the disease, and only 9% prophylactically prescribe calcium and vitamin D to subjects using antiepileptic drugs [11, 12].

Competence criteria

The inclusion criteria were as follows: studies published in, English, published on any date, and evaluating patients aged one year to 38 years who were using antiepileptic drugs. Data related to patients who were receiving vitamin D supplementation or medications that act on the metabolism of this vitamin, those with a diagnosis of comorbidities that alter vitamin D metabolism (e.g., kidney, liver, gastrointestinal or endocrine disease, smoker, alcoholic) were excluded from this study, review articles, and studies with incomplete or data not published in full were excluded. Routine biochemical investigations including hematological test, renal function tests, liver function tests and serum electrolytes was done in all subjects. Together with Electroencephalography (EEG) was done in all patients. Neuroimaging with either Computerized tomography scan or Magnetic resonance imaging of the brain was done in focal convulsion and in late onset epileptic fit.

Materials and Methods

The study consisted of two parallel, 1-year, prospective, randomized, dose-ranging trials conducted in two groups of ambulatory patients: one group of children 1-12 years and other adolescents and adults 13 – 38 years old, on long-term anticonvulsant medication therapy. Subjects were randomly allocated to maintenance vs physiologic replacement doses of oral vitamin D3.

The maintenance dose in both age groups was 400 IU/day, and the physiologic replacement dose was 2,000 IU/day in adults and1,000 IU/day in children.

This study was conducted in Al muthanna governorate for period from October 2020 to October 2021, for 46 patients based on clinical presentation of the patient together with confirmed diagnosis by EEG. The study included for 46 patients with history of long-standing epileptic fits.

For all the patients we measured the level of Vit D3 at the first visit and continue to follow up the level every one month.

Statistical Analysis

SPSS 22 programming was used. ANOVA test was cultivated for amount information. The Chi test or Fisher-exact tests were utilized for the unmitigated information. A p value < 0.05 was considered statistically significant.

The Results

This study of 46 patients. There was 32 male and 14 female, the range of the age at diagnosis of epilepsy with Vit D3 deficiency was (1- 38 years).

Among the study participants all the patients with normal brain on CT or MRI study and all complaining of generalized epileptic fits.

In group 1 (1 year -12 years)we started with 1000 iu of Vit D3 daily for 32 patients (69.5%) with the level of Vit D3 less than 13 ng\ml ,while the group 2 aged (13 years – 38 years) involved 14 patients (30 %) in which the level of Vit D3 less than 15 ng\ml treated with 2000 iu\ daily. Table 1

Table 1.

The level of Vit D3 according to the age

Age	Number	%	Vit D3 level
1 – 12 years	32	69.5 %	Less than 13 ng\ml
13 – 38 years	14	30.4 %	Less than 15 ng\ml

The patients improved when maintenance dose of Vit D3 with daily taken to restore the normal level. 31 patients in group 1 (67.3 %) has completely recovered from episodes of epileptic fits ; while 13 patients (28.2 %) in grope 2 are recovered. With measurements for all patient 95 % of patient recovered from an epileptic fit with increase the level of Vit D3 to the normal value. Table 2

Table 2.

presents of recovery according to the groups.

Age of the patients	Dose of Vit D3	Number of the patients improved	%
1 – 12 years	1000 iu	31	67.3 %
13 - 38	2000 iu	13	28.2 %

Discussion

The objective of this study was to investigate the associations between vitamin D levels and various factors related with epilepsy, including type and number of anticonvulsants and seizure variables, as well as patient's gender. There is still controversy in the scientific literature about normal levels of vitamin D3, partly because of the differences in serum levels between ethnic groups [13]. That the use of antiepileptic drugs may result in 25-hydroxyvitamin D deficiency and consequent worsening of bone health in patients with epilepsy [14].

This study recognized that vitamin D deficiency or insufficiency is common in children with epilepsy. The duration of anticonvulsant use was associated with 25(OH) D3 levels, which were expatiate lower in patients who had taken anticonvulsants for more than 2 years than in patients who had taken them for less than 2 years. One previous study showed that patients who took anticonvulsants for more than 2 years had normal vitamin 25(OH) D3D levels [15].

A recent review suggested that optimal levels of vitamin D for all outcomes are approximately 30 ng/ml [16].

Patients on polytherapy demonstrated significantly lower 25(OH)D3 levels than patients on monotherapy in a previous study [15]. However, we noted no difference in 25(OH)D3 levels between patients receiving mono- and polytherapy [17].

The levels of serum vitamin D have been found to be significantly decreased in children with newly diagnosed epilepsy in comparison to healthy children and about half of epileptic

children have decreased vitamin D levels [18]. Obesity is a risk factor for vitamin D deficiency in epileptic children, as the fat-soluble vitamin D can be extensively stored in the adipose tissue [19].

The optimal dose of vitamin D to be given to patients with epilepsy has been, to date, unclear. Several lines of evidence, including the current study, suggest that a high doses may be preferable to lower doses, both in adults and children [20]. A recent study on vitamin D status in adult patients with epilepsy documented that patient consuming enzyme-inducing antiepileptic drugs (e.g., carbamazepine, phenobarbital, phenytoin, primidone) had a higher prevalence of vitamin D deficiency compared to the patients who were not taking enzyme-inducing antiepileptic drugs [22, 23].

Conclusion

Vitamin D deficiency are neglected clinical situations in the context of long-term use of antiepileptic, It was recently recommended that patients should be treated with an escalating regimen of vitamin D, with doses varying between 400and 15,000 IU/day.

Ethical Approval

The study was approved by the Ethical Committee. It was conducted in accordance with the ethical standards of the Helsinki Declaration of 1975, as revised in 2008.

Conflicts of Interest

The author declare that he has no competing interests.

Funding

None

Study registration

Not required.

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