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Research Paper

Bone and Growth Status in Children with Epilepsy: A Hospital Bases Study

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ABSTRACT:

BACKGROUND:

Children with epilepsy have a high burden of physical comorbidity, and they experience poor long-term medical outcomes even after remission of their epilepsy. Little is known about types of these comorbidities and their occurrence in children epilepsy in Iraq.

OBJECTIVE:

The aim of this study to assess bone and growth status in children with epilepsy.

PATIENTS AND METHODS:

A cross sectional case-control study was conducted in Children Welfare Teaching Hospital, in the period from November 2018 to October 2019. The study included 40 children diagnosed with epilepsy and another 40 healthy children, age- and sex-matched. The following parameters were measured in both groups: body weight, height, body mass index (BMI), bone mineral density (BMD) and vitamin D level.

RESULTS:

In the epileptic children group, 28(70%) males and 12 (30%) females were reported. The predominant epilepsy type was focal 30 children (75%). Among the epileptic children, sixteen (40%) epileptic patients were placed on monotherapy treatment, while 24 (60%) were placed on polytherapy The level of Alkaline Phosphatase and phosphorus level was significantly higher in epileptic patients than in controls while there were no significant difference in calcium levels between patients and control groups. On the other hand, vitamin D found to be lower in epilepsy children with statistical significance. The growth parameters (weight, height and body mass index) show no significance between patent and control groups, the standard normal distribution (Z-score) of DXA scan also show no significance in both groups.

CONCLUSION:

The children with epilepsy and on treatment with AEDs are at higher risk of hypovitaminosis D, There were no significant radiological changes (measured by DXA scan) in the epileptic children placed on AEDs for at least one year, in comparison to the healthy children.

KEY WORD: epilepsy, growth,children, bone, antiepileptic.

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INTRODUCTION:

Epilepsy is a brain disorder characterized by a continuous ability to generate seizures that associated with neurobiological, psychological, cognitive, and social consequences. About 50 million people are estimated to be affected by epilepsy all around the world according to (WHO) with more than 85% are living in the developing countries, and about 4.7 million of them are living in the Eastern Mediterranean region. [1-2]

The presence of comorbidities associated with epileptic patent should be looking for at each stage of classification, that is important to identify, diagnose, then managing and dealing that comorbidities. The comorbidities associated with epilepsy can be classified into types [3]; neurological, psychological & physical. The children with epilepsy may complain from comorbidities as a result of epilepsy itself, or the adverse effect of its treatment. Most common adverse effects of the AEDs including allergy, cytopenia, electrolyte changes and renal and/or hepatic impairments and bone loss which are noticed and may be reversible after stopping the antiepileptic medications use. For persons with long period on AEDs treatment, it should supply with sufficient amount of vit D and calcium and BMD screening is warranted especially patent who have underling bone disease or its risk factors [4].

The osteoporosis in children age group cannot be identified, and associated risk of fracture difficult to be expected, from the pediatric BMD or their associated Z-scores as scanned by DXA. The 2007 ISCD Official Position Statement order that the osteoporosis in pediatric age group cannot be diagnosed basis on densitometric criteria alone, unlike adult, because WHO's DXA-based definitions of osteopenia and osteoporosis in adulthood depend on T-scores, T<-1.0 and T<-2.5, respectively [5].

The preferable adjectival terminology in childhood is as that, when a bone mineral density (BMD) or bone mineral content (BMC) Z-scores are between -1.0 and -1.9, "at risk for low BMD or BMC for chronologic age" is suggested. When a BMD or BMC Z-scores are less than or equal to -2.0, "low BMD or BMC for chronologic age" is suggested. The term "osteopenia" and "osteoporosis" should never appear in pediatric DXA reports without significant history of fracture[5].

The body height growth in epileptic children notes that been retarded which mention in few studies. The children with epilepsy have reduced mean height percentile compared with controls children, which was negatively correlated with the epilepsy types, duration, and the degree of seizure control [6].

The current study was conducted aiming to study the growth status (weight, height and BMI) in children with epilepsy and to assess the comorbidity of bone status according to laboratory (serum Ca^{++}, serum P^{+++}, ALP and serum vitamin D level) and radiological (DXA scan) in children with epilepsy in addition to the associated risk factors for the above comorbidities.

PATIENTS AND METHODS:

A case-control study was conducted in Children Welfare Teaching Hospital/ Medical City Complex, in the period from November, 2018 to October, 2019. The children were enrolled in the study and divided into two groups; **Patients**: included 40 epileptic patients, 28 males (70%) and 12 females (30%) diagnosis made by history, examination and investigation whom receiving antiepileptic drugs for duration of one year and above. **Control**: included 40 children apparently healthy with sex and age matched to the epileptic patients group and without any history of epilepsy.

The inclusion criteria of the patients' group included ambulatory child, aged 3-18 years, whose epilepsy started at age equal and older than three years who were placed on one or more antiepileptic drugs for equal or longer than one year.

The exclusion criteria included patients with any disease that may represent a risk factor to the studied comorbidities in addition to the epilepsy itself, like diabetes mellitus, chronic liver disease, chronic renal disease, endocrine disorder, bone disease, cerebral palsy (or cerebral palsy-like disorders), metabolic or mitochondrial disorders, or patients who received chronic supplementations like vitamin D or calcium. A written consent was taken from the caregivers of the Children in both groups after explaining the goal of this study.

Eligible cases were interviewed, their growth parameters were measured and blood samples were collected. In a random way, most of the cases were sent from private clinic and some were met in the outpatients' clinics. Special data collection form for patients was designed to gather information that include: age, gender, age of onset of epilepsy, type of seizures and, type and duration of epilepsy, electrophysiology (EEG), brain magnetic resonant imaging (MRI) findings and the types, doses and duration of old and new anti-seizures medications. The control group represented sex and age-matched children patients who were admitted or visited Children Welfare Teaching Hospital (CWTH) in the wards or the clinics respectively, because of acute infection (pneumonia, meningitis, acute gastroenteritis, urinary tracts infection.....etc) without having known underling illness or chronic disease, additional no chronic medication was recited.

Body parameters (weight and height) were measured by the same device for all children (patients and control groups) using Seca device, while Body Mass Index for age, height for age and weight for age are measured according to CDC growth charts.

Blood samples drawn from each child (patient and control) by two gel tubes with two milliliters collected in each tube. The tests requested were one gel-tube samples were sent for biochemical profiles like serum calcium, phosphorus and alkaline phosphatase in the same day by Dimension RXL max from Siemens. All those investigations were performed in Children Welfare Teaching Hospital's lab or Teaching Labs'. The other gel-tube samples were sent for measuring Vitamin D level in plasma by centrifuging the blood samples for fifteen minutes, saving the serum in plane tube in - 8 C° in the refrigerator and then shipped them as a 20-samples package to a private lab at distant intervals.

Vitamin D was measured dy 25 hydroxy

Vitamin D. Recently RCPCH has provided guidance on the optimal levels of Vitamin D.[7] Deficiency: serum level of 25 hydroxy Vitamin D under 25nmol/L (<10ng/dl). Insufficiency: serum level of 25 hydroxy Vitamin D between 25 and 50nmol/L (10-20ng/dl). Sufficient levels: serum level of 25 hydroxy Vitamin D above 50 nmol/l (>20ng/dl).

Bone density was assessed by DXA (Dual Energy X-Ray Absorptiometry) scan which was measured via Stratos device (Turkish M rachis from DMS normality curves) in Baghdad Teaching Hospital where the child was placed in supine position with the lower limbs partially raised to reduce lumbar lordosis for the examination of lumbar area of the spine (L1-L4). The total number in each group was forty children, nevertheless, one child in the patients' group could not do DXA image due to his hyperactivity even with trial of sedation, and two children included in the control could not do it because transient maintenance period of the DXA device. The parameters measured in the DXA were: Z-score = [Patient's BMD value Age-matched mean value]/ Age-matched standard deviation. Average bone mineral density=measured by optical density per square centimeter of bone surface by imaging. [8]

Statistical analysis was performed with Microsoft Excel (2007) and Statistical Package for Social Sciences (SPSS) version 20. Continuous variables were presented as mean±Standard Deviation (SD) and categorical variables were presented as frequency and relative frequency and percentage. Chi-squared, when applicable, and Fisher's Exact Tests were used to test the significant association between categorical variables and Student's T test was used to test the significant differences between two continuous variables. Pearson correlation was used to test the significant of correlation between variables. Pearson correlation coefficient, r, is a dimensionless index that ranges from -1.0 to +1.0 inclusive and reflects the extent of a linear relationship between two data sets. P value of < 0.05 was considered significant

RESULTS:

Comparison related to demographic data (age, gender, weight, height, and body mass index) between the patients' and control groups, there were no significant differences as P value was more than 0.05 (Table 1).

Table 1: Comparison between cases and controls regarding demographic characteristics.

Characteristics			Patients (n=40)	Controls (n=40)	P value
Age (in years)		Range: Mean±SD	3-16: 8.1± 2.8	3-14: 9.4 ± 2.96	0.06*
Sex		Males Females	28 (70%) 12 (30%)	28 (70%) 12 (30%)	-
Weight (Kg)	3-6 y	Mean ± SD	16.7 ± 2.9	17.2 ± 2.6	0.8*
	>6-12y		30.4 ± 9.2	28.1 ± 7.5	0.3*
	>12y		58.5 ± 21.9	47.6 ± 14.4	0.3*
Height (cm)	3-6 y	Mean ± SD	103 ± 7.1	106.5 ± 5.8	0.4*
	>6-12y		128.9±10.4	131.9±12.4	0.3*
	>12y		154.75±13.1	152.6 ± 5.3	0.7*
BMI	3-6 y	Mean ± SD	15.8 ± 2.3	15.1 ± 1.3	0.5*
	>6-12y		18.1 ± 4.5	16.4 ± 5.3	0.2*
	>12y		23.8 ± 5.3	20.3 ± 5.3	0.3*

** The differences were statistically not significant; Student T test P value > 0.05,*

According to epilepsy type, there were 30 (75%) patients with partial type, 10 (25%) with Sixteen (40%) patients were placed on one (AED), while 24 (60%) were placed on polytherapy (Table 2).

Table 2: Clinical characteristic of the epileptic patients' group and disease duration.

		No.	%
Type of epilepsy	Generalized	0	0
	Focal	30	75
	Syndromic	10	25
Type of Therapy	Monotherapy	16	40
	Polytherapy	24	60
Duration of disease (years)	Range: Mean±SD	1-14: 4.2 ± 2.8	

The serum level of Alkaline Phosphatase and phosphorus showed that significantly higher in patients than in controls (P=0.00007 and 0.002 respectively) while there were no significant differences in calcium levels between patients and control. On the other hand, vitamin D level found to be lower in epilepsy children with statistical significance (P=0.00001) as shown in table 3.

Table 3: Comparison between patents and controls group according the lab results.

Characteristics		Patients (n=40)	Controls (n=40)	P Value
ALP	Range Mean ± SD	55-539 245.6 ± 101.1	75-256 170.2 ± 45.03	0.00007*
P^{+++}	Range Mean ± SD	2.75-6.2 5.2 ± 0.7	2.3-6.2 4.6 ± 0.9	0.002*
Ca^{++}	Range Mean ± SD	8.6-10.5 9.6 ± 0.4	5.4-14 9.2 ± 1.2	0.08
Vitamin D	Range Mean ± SD	2.68 – 26 11.3 ± 4.2	18 -29.5 24.1 ± 2.7	0.00001*

** The differences were statistically significant; Student T test ; P value <0.05*

Eight (20.5%) children with low bone mineral density state and 31(79.5%) with normal bone density were detected in the patients group and nearly similar findings 8 (21.1%) versus 30 (78.9%)) were detected in the control group with no significant statistical difference. Patients with epilepsy had no significantly lower mean of bone mineral density status (BMD) and Z- score in comparison with the control group as shown in table 4.

Table 4: Comparison between bone mineral density and Z-score in epileptic patents and controls group.

Characteristics	Patients (n=39)	Controls(n=38)	P value
Z-score Range	-5 – 4.8	-4.5 - 5	0.69*
Mean ± SD	-0.1 ± 2.6	-0.3 ± 2.1	NS
BMD Range	0.416 - 0.864	0.311-0.958	0.86*
Mean ± SD	0.59 ± 0.1	0.6 ± 0.12	NS
Bone Status LBMD (-2 Z-score & below) Normal	8 (20.5%) 31(79.5%)	8 (21.1%) 30 (78.9%)	0.95** NS

** The differences were statistically not significant association; Student T test; P<0.05*
*** The association was statistically not significant; Chi square test ($\chi 2$ = 0.003,df=1*

In patients with low mineral bone density, Z-score was positively correlated with the patients age, BMI, weight and height but no correlation with the disease duration as shown in table 5.

Table 5: Correlations between Z score and various demographic, clinical and lab results found in patients have LMBD.

	Z score	
	r	P value
BMD	1	0.0001*
Age	0.881	0.004*
Weight	0.929	0.001*
Height	0.837	0.01*
BMI	0.85	0.008*
ALP	-0.249	0.552
P^{+++}	0.366	0.373
Ca^{++}	-0.069	0.884
Vitamin D3	-0.087	0.837
Disease duration	0.399	0.327

**Pearson correlation; Significant at P<0.05*

In the regard of DXA scan, the patients with Low bone mineral state had a significant decrease in Z score (P< 0.05), compared to those with normal bone state. There are no significant differences between epileptic patients with low BMD and those with normal BMD regarding serum Calcium, phosphorus, BMD and ALP levels (P <0.05). It was found that disease's duration and therapy status (monotherapy versus polytherapy) had no significant effect on BMD (P<0.05) respectively as shown in table 6.

Table 6: Comparison between epileptic patients with low and normal BMD regarding DXA scan parameters, lab results and epilepsy demographics.

Parameters		Bone status		P Value
		LBMD (n=8)	Normal (n=31)	
Z-score	Range Mean ± SD	-5 - -2 -4.3 ± 0.97	-1.4 – 4.8 1.01 ± 1.6	0.0000*
BMD	Range Mean ± SD	0.503- 0.864 0.59 ± 0.1	0.416 – 0.856 0.6 ± 0.1	0.97
ALP	Range Mean ± SD	176 - 410 251.25 ± 82.3	55 – 539 240 ± 105.7	0.8
P	Range Mean ± SD	5.1 – 5.7 5.4 ± 0.2	2.75 – 6.2 5.1 ± 0.6	0.3
Ca	Range Mean ± SD	8.9- 9.8 9.5 ± 0.3	8.6 – 10.3 9.6 ± 0.4	0.4
Vitamin D	Range Mean ± SD	5-13.8 10.5 ± 2.6	2.68 – 26 11.5 ± 4.6	0.55
Duration of disease (years)	Range Mean ± SD	1-7 3.5 ± 2.2	1-14 4.4 ± 2.96	0.4
Therapy	Monotherapy Poly-therapy	3 (37.5%) 5 (62.5%)	12 (38.7%) 19 (61.3%)	> 0.05**

**The differences were statistically significant; Student T test; P value >0.05*
*** The association was statistically not significant; (Fisher's exact test)*

Significant differences (lower vitamin D, higher ALP and P^{+++} according to Student T test; (P value >0.05)) similar to table 5 were found when comparing patients and control children from both groups with LBMD as shown in table 7.

Table 7: Comparison between patients and controls with low BMD regarding DXA scan and regarding laboratory finding.

Parameters		LBMD		P value
		Patients (n=8)	Controls (n=8)	
Z-score Mean ± SD	Range	-5 - -2 -4.3 ± 0.97	-4.5 – -2.3 -3.638 ± 0.73	0.28
BMD Mean ± SD	Range	0.503- 0.864 0.59 ± 0.1	0.311 – 0.678 0.56 ± 0.1	0.7
ALP Mean ± SD	Range	176 - 410 251.3 ± 82.3	132 – 203 167.5 ± 26.9	0.02*
P Mean ± SD	Range	5.1 – 5.7 5.4 ± 0.2	3.6 – 60 4.7 ± 0.79	0.03*
Ca Mean ± SD	Range	8.9- 9.8 9.5 ± 0.3	8.6 – 10.3 9.6 ± 0.4	0.1
Vitamin D Mean ± SD	Range	5-13.8 10.5 ± 2.6	2.68 – 26 11.5 ± 4.6	0.0001*

**The differences were statistically significant; Student T test; P value <0.05*

Table 8 shows that with almost all variables, the more common status of the level of Vitamin D is the insufficient one. The deficient status (level less than 10ng/dl) was found in 14 (35%) epileptic patients, with higher frequency being reported in patients with partial seizure (64.2%), those receiving monotherapy (57.1%); with duration of antiepileptic drugs >24 months (64.2%), in male gender (71.4%) and in the mid childhood age group. On the other hand, 25 (62.5%) epileptic patients had insufficient level (10-20ng/dl), mainly those with partial seizure (72%), those receiving polytherapy (72%) and patients with duration of antiepileptic

drugs >24 months (72%). Lastly, there was one patient with sufficient level (more than20ng/dl) who had partial seizures and disease duration more than 24 months. All groups tend to be within normal average (3% and 85%) of body mass index.

Table 8: Vitamin D serum level in relation to selected variables of patients with epilepsy.

		Deficient (<10ng/dl)		Insufficient (10-20ng/dl)		Sufficient (>20ng/dl)	
		N.	%	N.	%	N.	%
Age (years)	3-6	1	7	5	20	1	100
	>6-12	9	64.2	20	80	-	-
	>12-18	4	28.5	-	-	-	-
Sex	Male	10	71.4	17	68	1	100
	Female	4	28.5	8	32	-	-
BMI	Below 3%	1	7.1	3	12	-	-
	3%-85%	7	50	11	40	1	100
	85%-97%	6	42.8	6	24	-	-
	Above 97%	-	-	5	20	-	-
Type of therapy	Monotherapy	8	57.1	7	28	1	100
	Polytherapy	6	42.8	18	72	-	-
Type of epilepsy	Focal	9	64.2	20	80	1	100
	Generalized	-	-	-	-	-	-
	Syndromic	5	35.7	5	20	-	-
Duration of AEDs (years)	<24 months	5	35.7	7	28	1	100
	>24 months	9	64.2	18	72	-	-
The total number		14	35%	25	62.5%	1	2.5%

DISCUSSION:

The present study showed that there was matching between patients with epilepsy and controls according sex and age. Also found no significant differences in the growth profile represented by weight, height and body mass index. These results agreed with the results of studies conducted in Egypt (Osman et al; 2017)[9] and Thailand (Paticheep et al; 2015)[10],While disagreed with study conducted in Egypt(Abdel Maksoud et al; 2016)[11]. This can be explained by the fact that the patents on polytherapy accounted for 60% of cases, meaning different kinds of AEDs used especially shifting from old to new generation, in additional the duration of disease ranged from 1 to 14 years, both of which can have various effect on growth indexes.

The demographic features of epileptic patients group revealed that polytherapy status (60%) was greater than the monotherapy one(40%), a result that differed from the studies conducted in Liverpool (Nevitt et al; 2017)[12], Korea (Baek et al; 2014)[13], Egypt (Osman et al; 2017)[9] and Basra (Kadhum et al; 2017)[14] which revealed that monotherapy status is the most common one. This can explained by the fact that CWTH is a tertiary center and deal predominantly with more complicated epileptic cases, namely the refractory types.

The focal type of epilepsy was found to be accounted for three fourths of the cohort population that is matched to Taiwan (Shih et al; 2017)[15]and Egypt (Abdel Maksoud et al; 2016)[11] as (88.5%)and(68%) for focal epilepsy respectively. Although no case of generalized epilepsy was reported in the study; yet, there were zero percent case of generalized seizures that were included and calculated in the epileptic syndrome.

The study showed biochemical parameters suggestive of osteomalagic state (manifested by increasing ALP, increase parathyroid hormone, normal or reduced calcium and radiological manifestations) more in the epileptic patients. So, that ALP was found to be significantly higher in patients group than in controls that agree with Egyptian studies conducted in Egypt (Osman et al; 2017)[9], Basra (Kadhum et al; 2017)[14], Taiwanan study (Razazizan et al; 2013)[16] and Turkish study (Babayigit et al; 2006)[17].

Vitamin D level shows significant low level of vitamin than with control group, which agrees with a study in Basra (Kadhum et al; 2017)[14], New York (Alison et al; 2003)[18] and Brazil (Silvana et al; 2000)[19], that the AEDs work as enzyme inducer increasing metabolism of vit D enzyme. Also, serum calcium shows no significance between two groups, that fit with Basra (Kadhum et al; 2017)[14], Egypt (Osman et al; 2017)[9], and Taiwan (Razazizan et al; 2013)[16] that may refer to secondary hyperparathyroidism to maintain normal calcium level. While that result disagrees with study done in Turkey (Babayigit et al; 2006)[17] which

shows decrease level of serum calcium.

On the other hand, our study reveals that a significant difference in phosphorus level which is higher in patient group which disagrees with study conducted in Egypt (Hasaneen et al; 2017)[20] that reveals low phosphorous level, and also disagrees with Egypt (Osman et al; 2017)[9] with no significance difference, as we know hypovitaminosis D cause hyerparathyroidisim that lead to lowering the level of phosphorus, with this dilemma we need to measure parathyroid level to measure parathyroid gland activity.

It was supposed that having epilepsy and using antiseizure drugs can affect the bone BMD. However, the current study found no significant differences between the two groups in the regard of BMD and Z-score (P=0.86 & 0.69 respectively). This result agreed with a study conducted in Lebanon (El-Hajj Fuleihan et al; 2008)[21] and disagreed with studies like that done in Egypt (Osman et al; 2017)[9] and China (Paticheep et al; 2015)[22] which found who made meta-analysis that indicates that AED treatment is accompanied with declined BMD in children with epilepsy. And also study in Serbian (Dimic´ et al; 2013)[23] which found that a total of 11 studies including, 645 subjects and 579 controls, measured the lumbar spine BMD affected by anti epileptic drugs suggest that AED treatment had decreased BMD.

This difference might be due to the variability in the methodological procedures used in all these studies. The non-significant difference in these parameters found in our study might be due factors that are shared in both groups like dietary habit, poverty and avoidance of sun light exposure, another causes like laboratory errors and variable duration of exposure to antiepileptic drug may influence to this results.

Also, it was found that about 20% (20.5%, 21.1%) of each group have LBMD. The present study showed that high frequency of low z- score happened more with younger age with no correlation to the disease duration, this result disagrees with study conducted in Thailand (Paticheep et al; 2015)[10], Egypt (Osman et al; 2017)[14] and Italy (Coppola et al; 2009)[24] they reported that the duration of disease and age were negatively correlated with lower Z-score, this can explained by few number of patent with LBMD or the effect of AEDs more in the growing bone with younger age.

Our study shows positive correlation of Z-score with weight, height and BMI. As increasing in growth parameters need fuel that not properly provided in condition under use of AEDs. When correlate between patient with low and normal BMD groups according to DXA scan parameters, laboratory findings and epilepsy demographics, our study reveals that no significant difference except for Z-score (of course it should be different according to the base that we classified the two groups), the result did not match with studies conducted in Egypt (Osman et al; 2017)[14], Denmark (Vestergaard et al; 2015)[25]. Also, Thailand (Paticheep et al; 2015)[10] reported that polytherapy of AED and duration of treatment associated with low BMD. There was significant correlation between patent and control with LBMD that show significant low vit D level in patent and significant high level of ALP and P^{+++} that can be explained by the fact that low vitamin D level in epileptic patent on AEDs but high P^{+++} cannot explained without PTH level.

Also, this study showed that about one third of patients with epilepsy had sub optimal vitamin D level, one patient who have optimal vitamin D level and the other had deficient vit D level, this result is in agreement with Indian study (Menon et al; 2010)[26]. There is more frequently seen of vitamin D deficiency between young children with epilepsy than older children, this is in agreement with Korean study (Baek et al; 2014)[13] which could be referred to age related biological processes like less physical activities with increasing in age that may be lead by? less exposure to sunlight.

In our study, BMI of patients tends to be within acceptable range of normal population (3% to 85%), This is in agreement with India (Misra et al; in 2010)[27], but it disagrees with Korean study (Baek et al; 2014)[13] and (Dong et al; 2022)[28] that show the vitamin D serum level decline with increasing BMI which can be explained by the fact that persons with high BMI usually have a high fat body content, act as a store for lipid-soluble vitamin D.

Epileptic patent on polytherapy shows lower vit D serum levels than whose on single AED therapy; this result is matched with a study conducted by Germany (Kim et al; 2007)[29] and India (Misra et al; in 2010)[27].

It can be explained by the effect of AED on vitamin D which more increase by using more than one AED (polytherapy). In contrast to a study done by Korea (Baek et al; 2014)[13] who reveals no significant difference in level of vit D level between patient in monotherapy and polytherapy.

Duration of AED therapy is significantly correlated with vit D serum level, lower level of vitamin D level for epileptic children who are on

AED for more than twenty four months than those who received AED for less than twenty four months. The same result was found in India by (Misra et al; in 2010) [27] and Korea (Baek et al; 2014)[13]. Who concluded that, there is a significant effect of AED on level of vitamin D. In contrast with (Min et al; 2020) [30] and Taiwan (Razazizan et al; 2013)[16] whom not found relation between vitamin D level and AED time of duration usage, that can be explained by using a single anti epileptic drug by the children have adequate nutritious status on that study.

Our study reveals that low vitamin D level is more prevalent with focal epilepsy than other types, this explained by the fact that the focal seizure consists of seventy-five percent of the epilepsy types.

CONCLUSION:

Children with epilepsy and on treatment with AEDs are at higher risk of hypovitaminosis D. There is greater risk of bone metabolic disturbance manifested by hyperphosphatemia and increase Alkaline phosphatase level. No significant radiological changes (measured by DXA scan) in the epileptic children placed on AEDs for at least one year, in comparison to the healthy children and the degree of bone mineral density was not related with therapeutic duration or multiplicity of AEDs in addition to no significant changes in growth parameters were found in the epileptic children in comparison to the healthy ones. It is recommended to those epileptic children on chronic AEDs to be monitored for bone health markers including vitamin D level, and place them on vitamin D supplementation, even in absence of significant bone loss.

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