Vitamin D status in Egyptian children with T1D and the role of Vitamin D replacement in glycemic control.

Mona Hafez[1], Mona Hassan[1], Noha Musa[1], Sahar Sharaf[2], Sally Abdel Azim[1]

[1] Diabetes, Endocrine and Metabolism Pediatric Unit, Cairo University

[2]Department of Chemical Pathology, Cairo University

Disclosure: Authors have nothing to disclose

BACKGROUND

Many epidemiological studies have found high prevalence of vitamin D deficiency in children with T1D **[1,2].** 1,25 $(OH)_2$ D is a potent immune-modulator that also enhances the production and secretion of several hormones, including insulin **[3].** The association of low serum 1, 25$(OH)_2$ D levels with high glucose level and diminished insulin sensitivity suggests that vitamin D may modulate insulin metabolism **[4].**

OBJECTIVES

To screen for vitamin D deficiency in pediatric patients with T1D and to study the effect of vitamin D supplementation on glycemic control and insulin requirements in those patients.

METHODS

This study was a prospective cohort study that included 50 patients with T1D above 5 years of age with onset of T1D > 1 year, with no hepatic or renal problems or any drug therapy that may affect vitamin D metabolism. 25-hydroxyvitamin D (25(OH)D) level was assessed initially and after 3 months of vitamin D3 supplementation (in those with vitamin D deficiency) in a dose of 4000 IU/d. Glycemic control (HbA1c) and insulin requirements were studied at 0, 3 and 6 months of vitamin D therapy. The study protocol was approved by the Research Ethics Committee of Cairo University and patients were included after obtaining informed consents from their legal guardians.

RESULTS

- This study was a prospective cohort study, where 50 patients (23 females and 27 males) with T1D were recruited from Diabetes, Endocrinology and Metabolism Paediatric Unit (DEMPU), Cairo University. Mean age of included patients was (10.24 ± 3.46) years with a range of 5.2 - 16.9 years. Their age at onset of diabetes ranged from 1 to 14 years with mean of (6.16 ± 3.4), whereas their diabetes duration range was 1.3 to 11.5 years of mean (4.11± 2.34). Vitamin D levels in the study group measured in the form of 25(OH)D ranged from 0.2 to 33 (ng/ml) with a mean of (11.246 ± 5.716).
- When we correlated the basal vitamin D status of the 50 patients with other parameters (before vitamin D supplementation; there was a significant correlation with insulin dose, magnesium levels ($p<0.05$) and HbA1c % levels ($p=0.00$). However, there was no correlation between Vitamin D and calcium, phosphorus or alkaline phosphatase levels ($p> 0.05$).
- The thirty five (n=35) vitamin D-deficient patients were allocated to vitamin D supplementation for 3 months. Among the 33 patients allocated to vitamin D supplementation (2 patients were excluded due non-compliance), 12 (36.4%) were males while 21 (63.6%) were females. Their age ranged from 5.2 to 16.9 yrs with a mean of (10.389 ± 3.53 yrs). The supplemented group had significant improvement in their vitamin D levels after 3 mo of therapy with a mean of (31.44 ± 11.57 ng/ml) ($p=0.000$). Also, patients with low calcium and phosphorus levels showed normalisation of these levels after 3 mo of Vitamin D supplementation [table 2]. As for insulin requirements, no significant difference was noted at 0, 3 and 6 mo of Vitamin D supplementation ($p= 0.354$). However, there was significant improvement in HbA1c in the supplemented group ($p=0.000$) [table 3].

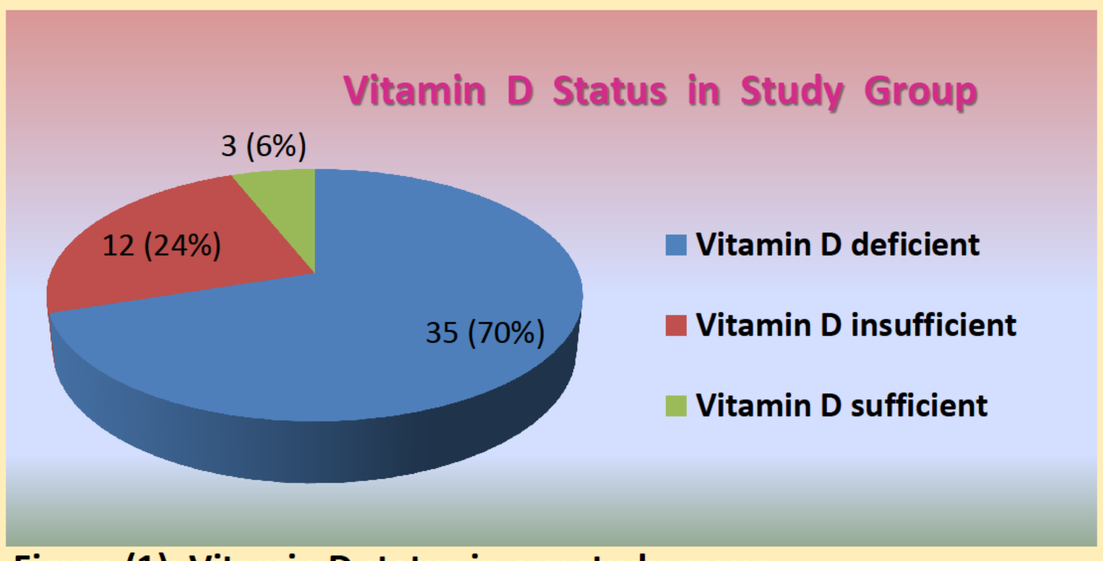

Figure (1): Vitamin D status in our study group.

Table (1): Calcium homeostasis, insulin requirements and HbA1c in relation to vitamin D status within the study group.

		Vitamin D deficient (n=35)	Vitamin D insufficient (n=12)	Vitamin D sufficient (n=3)
Calcium (mg/dl)	Low	6	0	1
	Normal	29	12	2
Phosphorus (mg/dl)	Low	1	0	0
	Normal	34	12	3
ALP (U/L)	High	0	0	0
	Normal	35	12	3
PTH (pg/ml)	High	1	0	0
	Normal	34	12	3
HbA1c (%)	< 7 (good)	3	3	0
	7-9 (fair)	13	5	3
	>9 (poor)	**19**	4	0
Insulin requirements (IU/kg/d)	< 0.5	1	1	0
	0.5 - 1	13	7	1
	>1	**21**	4	2

Table (2): The biochemical features of vitamin D deficient patients before and after vitamin D supplementation.

		Pre ttt		Post ttt (3 mo)		Pvalue
		mean	range	mean	range	
Calcium	(mg/dl)	9.13±0.77	7.8-10.4	9.27±0.47	8.2-10.5	0.400
Phosphorus	(mg/dl)	4.47±0.645	2.4-6.1	4.83±0.745	3-6.2	**0.047**
ALP	(U/L)	196.39±78.5	5-405	190.45±59.7	54-354	0.626
25(OH)D	(ng/ml)	8.71±3.17	0.2-33	31.44±11.57	13-58	**0.000**

Table (3): HbA1c and insulin requirements in vitamin D deficient patients before and after vitamin D supplementation.

	Before ttt		After 3 mo of ttt		After 6 mo of ttt		P value
	mean	range	mean	range	mean	range	
Insulin (U/Kg/d)	1.218±0.38	0.3-2	1.18±0.41	0.37-2.16	1.22±0.42	0.33-2.2	0.354
HbA1c %	9.413±1.97	5.7-14	8.78±1.58	6.2-13.4	9.53±1.7	6.9-13.0	**0.000**

CONCLUSION

Checking the serum 25(OH) D levels in children and adolescents with T1D and providing replacement for children with low levels improved glycemic control at 3 and 6 months after therapy in those with low levels with no reduction in insulin requirements.

REFERENCES

1- Janner M et al (2010) High prevalence of vitamin D deficiency in children and adolescents with type 1 diabetes. Swiss Med Wkly Sep 3;140:w13091

2- Greer RM et al (2013) Serum vitamin D levels are lower in Australian children and adolescents with type 1 diabetes than in children without diabetes. Pediatr Diabetes Feb;14(1):31-41

3- Bock G et al (2011) The effect of vitamin D supplementation on peripheral regulatory T cells and β cell function in healthy humans: a randomized controlled trial.Diabetes Metab Res Rev. Nov;27(8):942-5

4- Giulietti A et al (2004) Vitamin D deficiency in early life accelerates T1D in non-obese diabetic mice. Diabetologia 47, 451–462

ESPE 2015 745--P3

Diabetes 2

Noha Musa

DOI: 10.3252/pso.eu.54espe.2015

Poster presented at: 54th Annual Meeting 1-3 October ESPE 2015 BARCELONA European Society for Paediatric Endocrinology

PosterSessionOnline.com