Vitamin D Supplementation in Patients with Diabetes Mellitus Type 2 on Different Therapeutic Regimens: A One-Year Prospective Study on Cardiovascular Risk Factors

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INTRODUCTION

Little or no research has determined the effect of vitamin D3 supplementation in conjunction with non-pharmacological and pharmacological approaches in the type 2diabetes mellitus (DMT2) population. The purpose of this study was to determine the effect of vitamin D3 supplementation in a cohort of DMT2 patients on rosiglitazone, diet, insulin and/or different oral hypoglycemic agents (i.e., insulin + oral agents, metformin, and sulfonylureas) and compare them with a non-DMT2 control cohort.

Methods

: A total of 499 randomly selected subjects divided into 2 groups [non-DMT2 Controls=151; DMT2=348]. All DMT2 patients were given 2000 IU vitamin D3 daily, while the control group received none but were advised to increase sun exposure. Anthropometrics, glucose, lipid profile and 25-hydroxyvitamin D were measured at baseline, and at 6 and 12 months

Results

Circulating 25-hydroxyvitamin D concentrations improved in all patient groups and the controls. The metformin group showed the highest change in circulating vitamin D levels both at 6 months (62.6%) and 12 months (50.6%) as compared to baseline ($p < 0.001$). Significant improvements were observed in systolic blood pressure, total- and HDL-cholesterol in male patients on insulin + oral agents after vitamin D supplementation (p-values<0.05). Significant decreases in triglycerides were also observed in the rosiglitazone and insulin + oral hypoglycemic agent groups both at 6 and 12 months of supplementation (p-values<0.001).

Discussion

We previously observed that non-DMT2 adults are more vitamin D deficient than DMT2 adults, probably because of improved diet and multi-vitamin supplementation [1]. Furthermore, vitamin D supplementation up to 18 months confers improvement in the metabolic profiles in DMT2 adults [2]. The present study highlighted how the different anti-diabetes therapies influence/interfere with 25-hydroxyvitamin D status before and after 12-months of vitamin D supplementation.

Figure 1. Circulating 25-hydroxyvitamin D Levels in A. DMT2 Males and Females and B. Non-DMT2 Control Males and Females

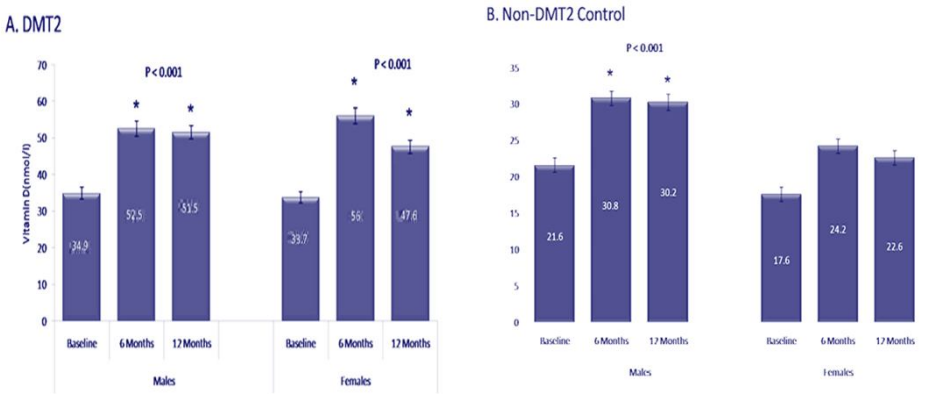

Table 1. Group Comparisons of Metabolic Parameters at Different Time Points

	Controls	Rosiglitazone	Diet	Insulin	Insulin +Oral agents	Metformin	Oral agent-combinations	Sulphonylureas
25-Hydroxyvitamin D (nmol/l)								
N	151	49	15	55	12	121	37	59
Baseline	19.4 ± 1.0	33.3 ± 1.0	24.4 ± 1.1	32.2 ± 1.0	34.1 ± 1.1	34.8 ± 1.0	34.6 ± 1.1	38.3 ± 1.0
6 months	27.4 ± 1.0*	47.8 ± 1.1*	34.3 ± 1.2	55.7 ± 1.1*	55.8 ± 1.1*	62.4 ± 1.1*	46.0 ± 1.1	51.2 ± 1.1*
12 months	25.8 ± 1.1*	49.9 ± 1.2*	26.7 ± 1.3	46.1 ± 1.1*	48.1 ± 1.2*	55.3 ± 1.1*	46.8 ± 1.1	46.8 ± 1.1*
Systolic BP (mmHg)								
Baseline	115.6 ± 1.1	129.0 ± 1.0	124.2 ± 1.0	126.5 ± 1.0	129.1 ± 1.0	126.1 ± 1.0	134.1 ± 1.1	126.5 ± 1.0
6 months	113.3 ± 1.1	130.0 ± 1.0	124.3 ± 1.0	123.5 ± 1.0	132.5 ± 1.0	124.8 ± 1.0	131.1 ± 1.0	129.7 ± 1.0
12 months	115.4 ± 1.1	130.9 ± 1.0	130.0 ± 1.1	128.1 ± 1.0	130.5 ± 1.0	127.4 ± 1.1	127.7 ± 1.0	127.9 ± 1.0
Diastolic BP (mmHg)								
Baseline	74.5 ± 1.0	71.5 ± 1.0	77.4 ± 1.2	78.2 ± 1.0	75.6 ± 1.0	80.5 ± 1.2	77.5 ±1.0	79.8 ± 1.1
6 months	72.9 ± 1.0	81.2 ± 1.0*	73.0 ± 1.1	76.7 ± 1.0	79.8 ± 1.1	78.1 ± 1.1	82.3 ± 1.1	77.8 ± 1.0
12 months	73.5 ± 1.0	84.3 ± 1.1*	73.0 ± 1.1	78.2 ± 1.0	80.4 ± 1.2	79.5 ± 1.1	79.5 ±1.1	81.3 ± 1.1
BMI (kg/m²)								
Baseline	28.5 ± 1.1	30.1 ± 1.1	30.1 ± 1.2	33.4 ± 1.2	31.5 ± 1.0	32.4 ± 1.1	32.9 ± 1.0	32.3 ± 1.0
6 months	28.5 ± 1.1	30.1 ± 1.2	31.1 ± 1.2	35.0 ± 1.2	31.4 ± 1.0	28.2 ± 1.0	30.5 ± 1.0	32.2 ± 1.1
12 months	28.5 ± 1.1	30.1 ± 1.2	-	35.1 ± 1.3	31.6 ± 1.0	30.0 ± 1.1	32.2 ± 1.1	30.6 ± 1.2
Total Cholesterol (mmol/l)								
Baseline	4.7 ± 1.0	4.8 ± 1.0	5.3 ± 1.0	5.1 ± 1.0	5.4 ± 1.0	5.3 ± 1.0	4.9 ± 1.0	5.2 ± 1.0
6 months	4.4 ± 1.0	4.4 ± 1.0	5.4 ± 1.1	4.9 ± 1.1	5.1 ± 1.1	5.2 ± 1.0	4.8 ± 1.0	5.1 ± 1.0
12 months	4.1 ± 1.0	4.1 ± 1.0	5.8 ± 1.2	4.6 ± 1.0	4.4 ± 1.2	4.9 ± 1.0	4.5 ± 1.0	5.1 ± 1.0
Triglycerides (mmol/l)								
Baseline	1.2 ± 0.02	2.4 ± 0.04	1.6 ± 0.07	1.8 ± 0.04	2.5 ± 0.08	1.9 ± 0.03	2.0 ± 0.05	2.0 ± 0.04
6 months	1.2 ± 0.04	1.6 ± 0.04*	1.4 ± 0.13	1.8 ± 0.05	1.9 ± 0.09*	2.1 ± 0.04	1.7 ± 0.06	2.0 ± 0.04
12 months	1.2 ± 0.04	1.5 ± 0.07*	1.7 ± 0.18	1.5 ± 0.06	1.9 ± 0.14	2.0 ± 0.04	1.6 ± 0.09	2.0 ± 0.05
HDL-Cholesterol (mmol/l)								
Baseline	0.66 ± 0.03	0.95 ± 0.06	1.0 ± 0.09	1.0 ± 0.05	0.91 ± 0.10	0.93 ± 0.03	1.0 ± 0.06	0.94 ± 0.04
6 months	1.0 ± 0.06*	1.0 ± 0.14	0.93 ± 0.28	1.1 ± 0.11	0.90 ± 0.23	0.89 ± 0.07	1.1 ± 0.15	1.0 ± 0.10
12 months	0.98 ± 0.08*	0.98 ± 0.10	-	0.81 ± 0.10	1.0 ± 0.35	0.93 ± 0.09	0.99 ± 0.14	1.0 ± 0.12
Glucose (mmol/l)								
Baseline	5.3 ± 1.0	10.0 ± 1.1	7.1 ± 1.3	10.8 ± 1.2	12.4 ± 1.2	10.2 ± 1.0	9.4 ± 1.2	9.1 ± 1.0
6 months	5.7 ± 1.1	9.0 ± 1.0	7.7 ± 1.3	10.3 ± 1.1	10.2 ± 1.1	10.2 ± 1.0	9.1 ± 1.1	9.7 ± 1.0
12 months	5.8 ± 1.1	8.3 ± 1.0	8.2 ± 1.2	9.9 ± 1.0	10.6 ± 1.0	11.2 ± 1.1	9.6 ± 1.2	10.1 ± 1.1

Data represented by Mean ± standard error; '*' Represents significant difference from the baseline. Level of significance is at p≤ b 0.05

conclusion

Vitamin D therapy at a dose of 2000 IU appears to alter cardiovascular disease risk factors under particular anti-diabetes regimens. Effects on well-being and other parameters need further study.

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References

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