VITAMIN D LEVEL IN IMPAIRED FASTING GLUCOSE AND IMPAIRED GLUCOSE TOLERANCE (PREDIABETIC) PATIENTS

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Introduction

Impaired fasting glucose (IFG) is defined as being present in those whose fasting blood glucose level is consistently elevated above normal, but is not high enough to be considered as having diabetes mellitus. Impaired glucose tolerance (IGT) is defined as being present in those whose second hour plasma glucose level is higher than normal, but is not high enough to be considered as having diabetes mellitus (1). Low serum 25-hydroxyvitamin D (25OHD) levels are associated with glucose intolerance, diabetes mellitus, and metabolic syndrome (2,3). To date, the literature is conflicting regarding the relationship between vitamin D levels and prediabetes. Our aims in this study were to evaluate serum 25-hydroxyvitamin D levels and their association with prediabetic metabolic patterns.

Material And Methods

Participants were 220 patients from our endocrine clinic: 85 with isolated IFG, 50 with isolated IGT, 85 with both IFG and IGT, and 80 normoglycemic healthy subjects with similar age, gender, and body mass index (BMI) (Table 1). A detailed history and physical examination of the patients were performed. 25-hydroxyvitamin D, calcium (Ca), phosphorus (P), albumin and parathyroid hormone (PTH) levels were measured. Vitamin D status was assessed as deficient if 25(OH) vitamin D levels were < 20 ng/mL, insufficient if ≥ 20 - < 30 ng/mL, and sufficient if ≥ 30 ng/mL

Table 1. The demographic and anthropometric characteristics of the IFG, IGT, IFG+IGT and control groups

Parameters	IFG Group 1 n=85 (a) Mean ±SD	IGT Group 2 n=50 (b) Mean ±SD	IFG+IGT Group 3 n=85 (c) Mean ±SD	Control Group 4 n=80 (d) Mean ±SD	p*	Statistical arrangement:**
Age (year)	49.69±10.03	50.92±15.31	49.37±9.99	46.33±10.51	0.096	a=b=c=d
Height (cm)	166.54±5.91	166.88±6.23	165.60±5.84	167.05±6.57	0.448	a=b=c=d
Body Weight (kg)	73.67±7.22	72.50±6.80	71.81±6.78	71.31±7.59	0.167	a=b=c=d
BMI (kg/m²)	26.54±2.09	26.04±2.17	26.18±2.056	25.55±2.36	**0.035**	d<a=b=c
WC (cm)	85.10±6.25	84.32±8.02	82.69±5.79	80.92±7.76	**0.001**	d<a=b=c

*Anova test
**Post Hoc Tukey test
WC- waist circumference

Table 3. Odds Ratios and 95% Confidence Intervals of having the IFG, IGT, IFG+IGT by different categories of serum vitamin D concentrations

25OH vitamin D (ng/ml)	OR (%95 CI)		
	IFG risk	IGT risk	IFG+IGT risk
≥20	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
<20 (Vitamin D Deficiency)	1.68 (0.82-3.45) p=0.149	2.57 (1.01-6.53) p=0.043	1.97 (0.94-6.53) p=0.068

Table 2. The values of the laboratory parameters of the IFG, IGT, IFG + IGT and control groups

Parameters	IFG Group 1 (a) Mean±SD	IGT Group 2 (b) Mean±SD	IFG+IGT Group 3 (c) Mean±SD	Control Group 4 (d) Mean±SD	p*	Statistical** arrangement
25(OH)D (ng/ml)	13.90±8.89	11.69±6.48	13.22±7.24	16.63±9.78	**0.007**	d>a=b=c
Ca (NV: 8.3-10.6 mg/dl)	8.53±0.56	8.25±0.91	8.46±0.54	8.15±0.52	**0.000**	d<a=b=c
P (NV: 2.4-5.1 mg/dl)	3.50±0.59	3.35±0.83	3.43±0.54	3.45±0.63	0.587	a=b=c=d
Albumin (NV: 3.2-5 g/dl)	4.17±0.35	3.92±0.49	4.20±0.32	4.01±0.25	**0.000**	b<a=c=d
PTH (NV: 14-72 pg/dl)	59.57±34.08	62.56±41.93	48.28±21.49	52.35±76.88	0.281	a=b=c=d

* Anova test
**Post Hoc Tukey test
NV: Normal value

Results

The demographic/anthropometric characteristics and laboratory data of the IFG, IGT, IFG+IGT and control groups were shown in Table 1 and 2 respectively. We found significantly lower 25-hydroxyvitamin D levels in the IGT (11.7±6.5 ng/ml) (p<0.007) and IFG+IGT patients (13.2±7.2 ng/ml) compared to controls (16.6±9.8 ng/ml) (p<0.047). 25-hydroxyvitamin D levels were similar in the control group and IFG group. Significant differences in 25-hydroxyvitamin D levels between the IFG group, IGT group and IFG+IGT group were not found. Lower 25-hydroxy vitamin D levels were associated with a higher risk of IGT (OR 2.57, 95% CI 1.01-6.53, p=0.043) (Table 3).

Conclusions

Vitamin D insufficiency and deficiency are associated with IFG, IGT, and combined IFG and IGT. However, the only statistically significant association was that between 25-hydroxyvitamin D levels and IGT.

References

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