DOES VITAMIN D STATUS CORRELATE WITH CARDIOMETABOLIC RISK FACTORS IN ADULTS WITH GROWTH HORMONE DEFICIENCY?

Ivayla Uzunova[1], Georgi Kirilov[1], Sabina Zacharieva[1], Naydenka Zlatareva[2], Krassimir Kalinov[3]

[1]Department of Hypothalamic, Pituitary, Adrenal and Gonadal Diseases, Clinical Centre of Endocrinology and Gerontology, Medical University – Sofia
[2]University Hospital "Tsaritsa Yoanna – ISUL", Medical University - Sofia
[3]New Bulgarian University, Sofia, Bulgaria
2 Zdrave Str., Sofia, Bulgaria; e-mail: dr_uzunova@yahoo.com

Apart from being individually associated with cardiometabolic health, Vitamin D and growth hormone/insulin-like growth factor-1 (GH/IGF-1) axis are reported to interplay, with a positive correlation between IGF-1 and 25-hydroxyvitamin D (25(OH)D). These findings raise questions about the role of vitamin D for the adverse cardiovascular (CV) risk profile in hyposomatotropism.

Aim of the research

The aim of the study was to investigate the association between 25(OH)D and metabolic syndrome (MetS), its components and other surrogate markers of CV risk.

Patients and methods

This cross-sectional study included **129 adults** (70 males, 42.1±16.6 years) **with GHD** [childhood-onset GHD (COGHD): n=54]. Each subject underwent **routine biochemical blood testing, anthropometric** (body mass index, waist circumference, waist-to-hip ratio, percent body fat, visceral fat area, skeletal muscle mass) **and blood pressure measurements**. Other CV risk markers were examined in a subsample of the initial population - **high-sensitivity C-reactive protein**, **adiponectin** and **asymmetric dimethylarginine** (n=88); **intima-media thickness** of carotid arteries (n=44). **Total serum 25(OH)D** was used to assess vitamin D status and was **measured by electro-chemiluminescence binding assay** (COBAS, Roche Diagnostics International Ltd.; analytical sensitivity - 4.01 ng/ml; within-run and intermediate precisions - ≤ 6.5% and ≤ 11.5%, respectively). Vitamin D status and **GHD** were defined according to the **Endocrine Society Clinical Practice Guideline recommendations**. **MetS** was scored by the National Cholesterol Education Program - Adult Treatment Panel III **criteria**. Statistical analysis was performed using **SPSS for Windows, version 23.0.**

Results

Approximately a quarter of the patients (n=32, 16 men, 6 COGHD) fulfilled the NCEP-ATPIII criteria for MetS. **Those diagnosed with MetS demonstrated significantly lower 25(OH)D levels compared with the subjects without MetS** (11.8 ± 4.5 ng/ml vs. 16.3 ± 8.1 ng/ml, p < 0.0001) (Figure 1).

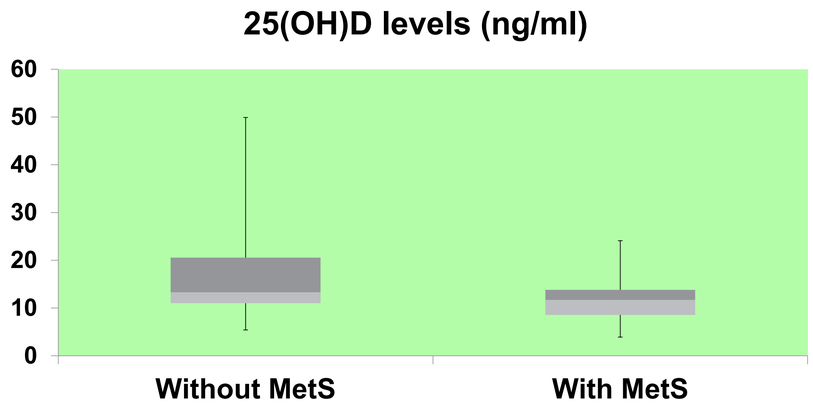

Figure 1 25(OH)D levels in GHD patients with MetS (n=32) and without MetS (n=97), p < 0.0001

Further on, we analyzed the **association between vitamin D status** (adequate vs. insufficient and deficient, i.e. 25(OH)D levels ≥ 30 ng/ml vs. < 30 ng/ml) **and** the **individual components of the MetS as well as** some **other** biochemical and anthropometric **factors** (normal vs. abnormal values), **proved to affect CV risk**. (Table 1)

Inadequate 25(OH)D concentrations **were associated** only **with** higher prevalence of **increased WC and waist-to-hip ratio**. All these parameters were also analyzed as continuous variables. **Serum 25(OH)D correlated negatively and weakly with systolic blood pressure and anthropometric indices** – BMI, WC, PBF and VFA.

Variable	Fisher's Exact Test	Correlation analysis	
	p-value	Pearson Coefficient	p-value
Total cholesterol	0.732	-0.069	0.435
HDL-cholesterol	0.152	0.076	0.392
LDL-cholesterol	0.862	-0.051	0.579
Triglycerides	0.485	-0.125	0.157
Fasting Glucose	1.000	-0.121	0.174
Uric acid	0.683	-0.101	0.258
Fasting Insulin	1.000	0.106	0.265
HOMA-IR	0.681	0.057	0.553
Systolic Blood Pressure	0.683	-0.179	0.042*
Diastolic Blood Pressure	0.869	-0.040	0.650
Body Mass Index	0.294	-0.197	0.026*
Waist Circumference	0.010*	-0.356	< 0.0001*
Waist/Hip Ratio	0.033*	-0.193	0.052
Percent Body Fat	0.173	-0.228	0.033*
Visceral Fat Area	0.060	-0.308	0.004*
Skeletal Muscle Mass	0.103	0.082	0.447

Table 1 Association between 25(OH)D levels and some biochemical and anthropometric markers known to affect cardiovascular risk
**Statistically significant p-value (p < 0.05)*

Correlation analysis of 25(OH)D levels was also performed **including** some **other markers related to atherogenesis, vascular inflammation and endothelial function**, such as hs-CRP, adiponectin, ADMA and IMT (Table 2). **No significant associations were observed**.

Variable	Pearson Coefficient	p-value
hs C-reactive protein	-0.134	0.229
Adiponectin	0.069	0.521
Asymmetric dimethylarginine	-0.044	0.689
Intima-media thickness	-0.297	0.053

Table 2 Correlation between 25(OH)D levels and makers related to atherogenesis, vascular inflammation and endothelial function

Conclusion

The severe impairment of vitamin D status in hyposomatotropism and its association with adiposity and BP warrant 25(OH)D testing in GHD patients. Although the normalization of the vitamin D status has not been proven to improve CV outcomes in general population, it might have beneficial effects in GHD subjects, especially in those with obesity or hypertension. Patients with a combination of GHD, hypovitaminosis D and MetS show an adverse CV risk profile and need more active therapeutic care.

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