



DECREASED SERUM VITAMIN D LEVEL IMPLIES INCREASED CARDIOVASCULAR RISK IN DIABETES

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AIM

Increase in homocysteine (HCY) level may increase cardiovascular risk (CVR), partly because of an impact on apolipoproteins and inflammation. Absorption of vitamin B12, involved in the regulation of HCY level, decreases with vitamin D deficiency. A possible association of vitamin D with visceral obesity and HCY was studied.

PATIENTS AND METHODS

HCY, 25-hydroxyvitamin D, vitamin B12, lipids, and other diabetes-related markers, including lipid accumulation product (LAP), were tested in 612 type 2 diabetic patients divided into four groups according to LAP quartiles. LAP as an index, combining waist circumference and triglycerides, is related to risk of metabolic syndrome, diabetes and CVR.

LAP was calculated using the formula: male LAP=[waist (cm)–65] × TG concentration (mmol/l) and female LAP=[waist (cm)–58] × TG concentration (mmol/l)

Groups according to LAP quartiles	
1 st group	LAP ≤ 28.5
2 nd group	28.5 < LAP ≤ 50.59
3 rd group	50.59 < LAP ≤ 80.64
4 th group	LAP ≥ 80.64

In all statistical tests: ANOVA, Tukey post hoc test, and stepwise multivariate linear regression, $\alpha=0.05$ was considered as statistically significant.

RESULTS

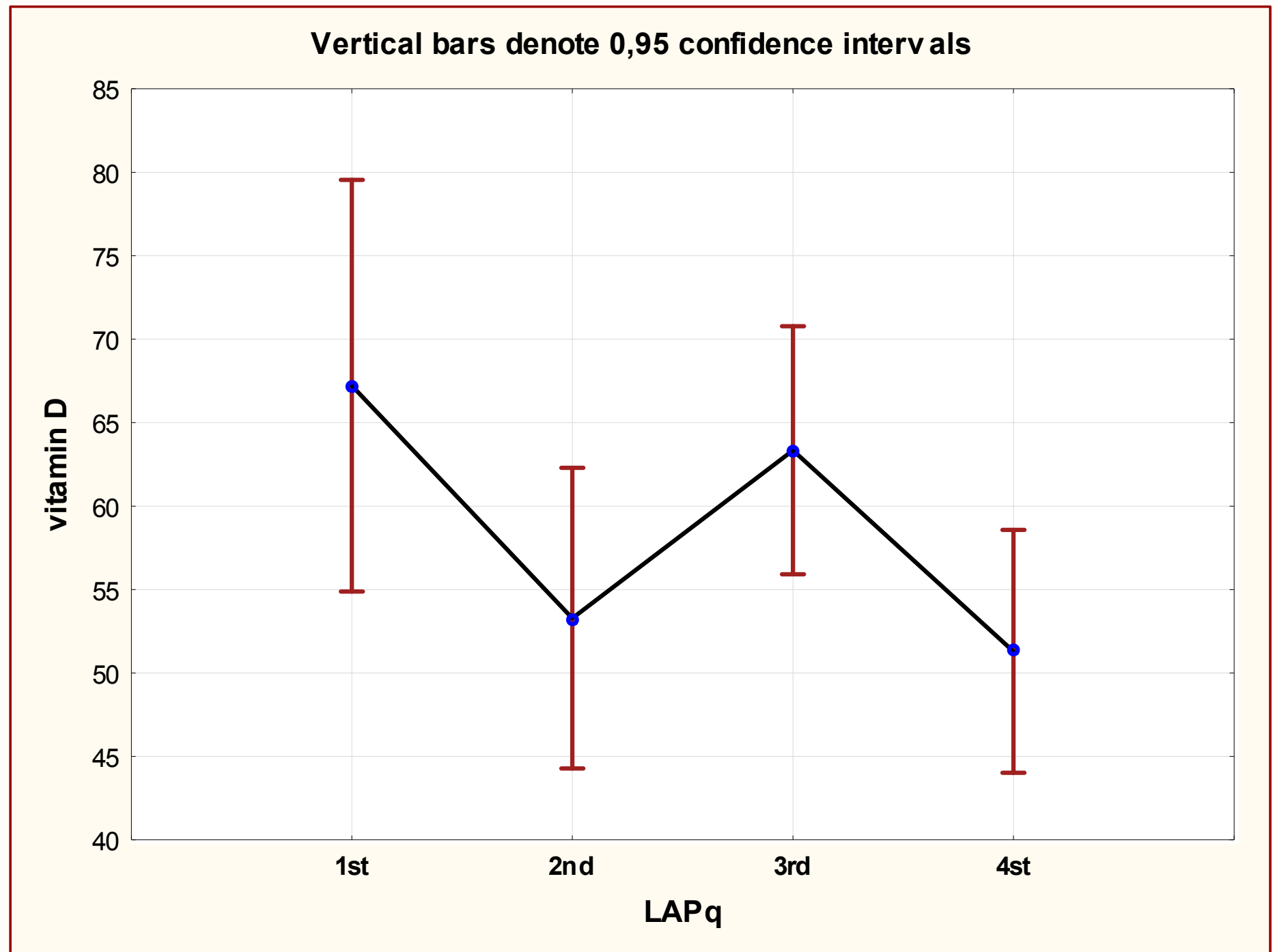
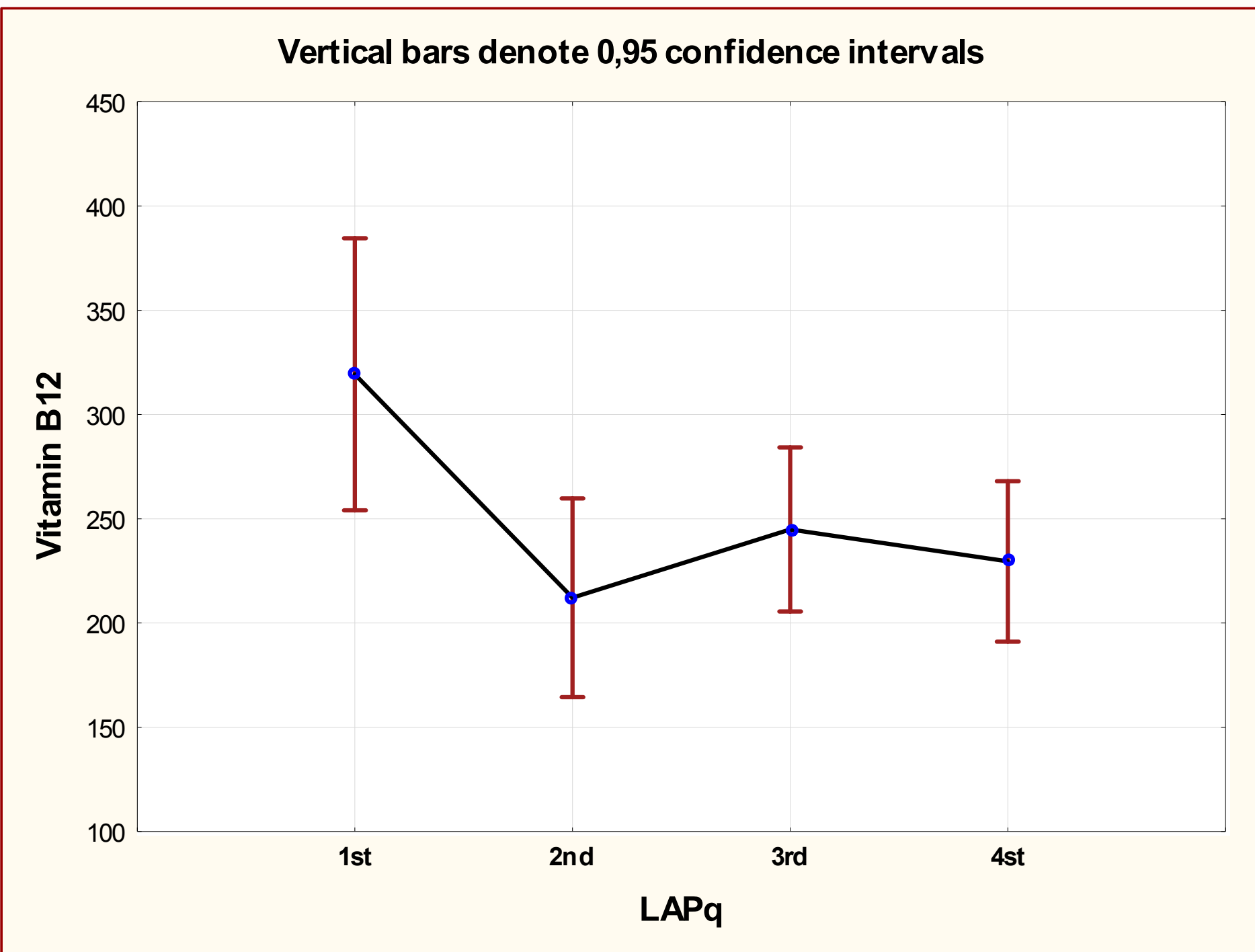
Significant difference in vitamin D ($p=0.04$) and B12 ($p=0.06$), and high-density lipoprotein (HDL) ($p<0.01$) according to LAP groups was determined, but not in HCY ($p=0.44$) and UA ($p=0.81$).

The values of tested variables according to LAP				
LAP Q	1 st	2 nd	3 rd	4 st
Variables	LAP quartile	LAP quartile	LAP quartile	LAP quartile
Vitamin D nmol/L	67.21±11.87	53.28±21.07	60.34±10.78	51.29±13.41
Vitamin B12 pmol/L	319.33±158.71	212.14±71.92	244.91±80.19	229.56±85.87
HCY μ mol/L	14.3±2.51	15.85±2.97	19.34±10.22	19.32±13.14
HDL mmol/L	1.56±0.27	1.36±0.31	1.24±0.17	1.19±0.25
UA μ mol/L	308.1±38.83	341.6±79.66	333.86±85.32	344.54±120.56

HCY – homocysteine, HDL - high-density lipoprotein, UA – uric acid, Q - quartile

Significant difference was observed in:

- HDL between the 1st and the 3rd, and between the 1st and the 4th group,
- vitamin D between the 1st and the 3rd, and between the 1st and the 4th group,
- vitamin B12 between the 1st and the 3rd group.



After stepwise regression the best predictive variables were:

- for *vitamin D* - glomerular filtration rate (GFR) ($\text{parR}^2=0.12$) and LAP ($\text{parR}^2=0.07$),
- for *vitamin B12* - HCY ($\text{parR}^2=0.07$) and age ($\text{parR}^2=0.07$),
- for *HCY* - GFR ($\text{parR}^2=0.23$) and vitamin B12 ($\text{parR}^2=0.09$).

CONCLUSIONS

Vitamins D and B12 differed according to quartiles of LAP, implying an influence of central obesity on their levels. LAP was one of the main predictors of vitamin D, and vitamin B12 was among the best predictive variables for HCY. The relationship between vitamin D, vitamin B12 and HCY implies involvement of decreased vitamins D in increased CVR.

