

THE ASSOCIATION OF VITAMIN D LEVEL WITH DIABETIC NEPHROPATHY IN CHILDREN



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Introduction

Diabetic nephropathy (DN) is the most common renal complication of diabetes mellitus and a leading cause of end-stage chronic kidney disease. The renin-angiotensin system (RAS) is a major mediator of progressive renal injury in DN. One of the main problem limiting the efficacy of the RAS inhibitors is the compensatory renin increase caused by disruption of renin feedback inhibition. Vitamin D (VD) negatively regulates the RAS by suppressing renin expression and thus plays a renoprotective role in DN. The association between DN and VD in the clinical setting of childhood has been examined insufficiently.

Objective

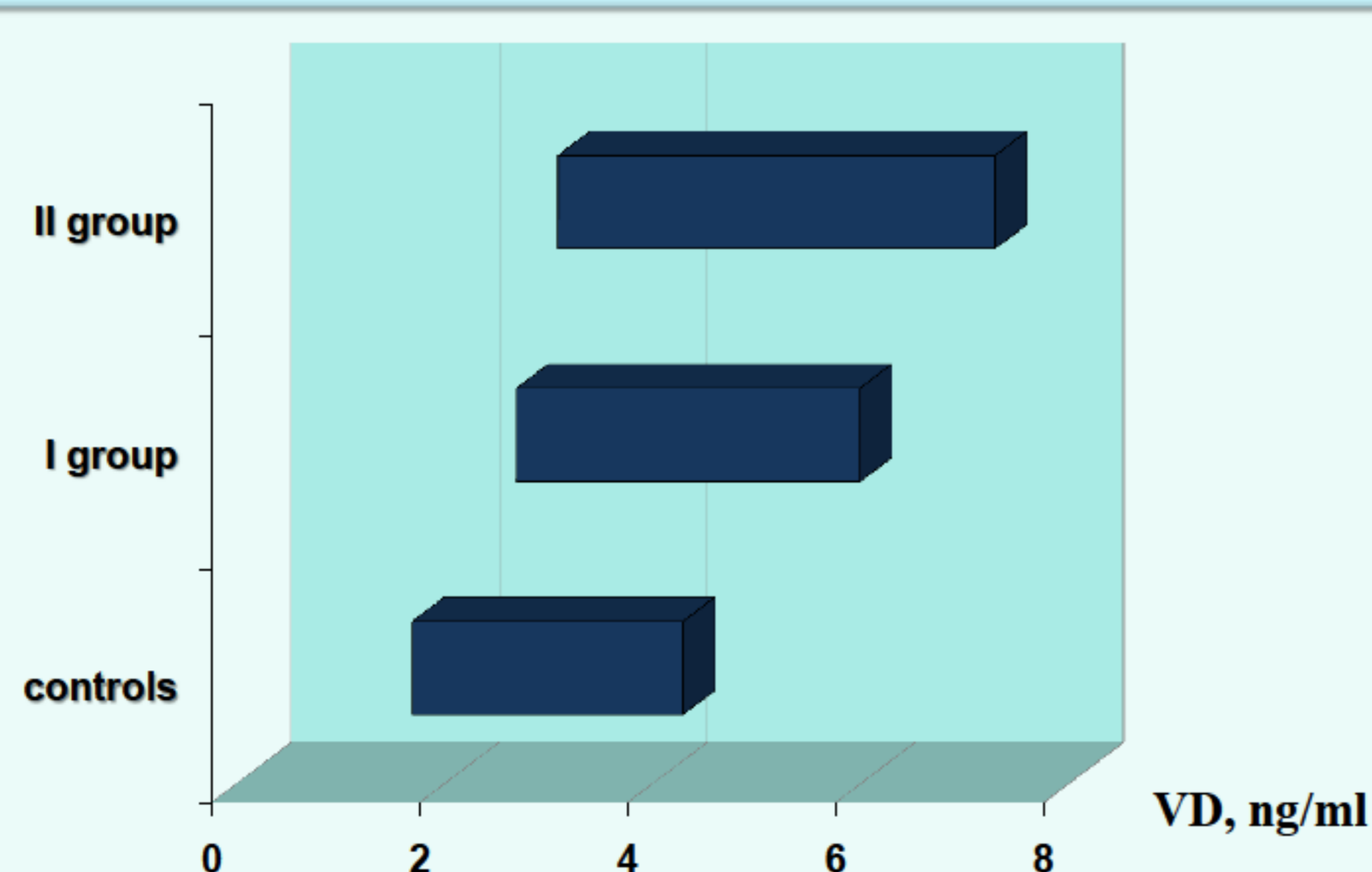
To evaluate the association between VD deficiency and insufficiency with DN and parameters of the diabetic course in children.

Material and Methods

42 children aged 6 to 17 years with type 1 diabetes (T1D) were examined, among them 24 normoalbuminuric patients (1st group) and 18 with DN (2nd group). 15 healthy children were included in control group. DN was defined as urinary albumin-to-creatinine ratio ≥ 30 mg/g in a random spot urine sample. Serum 25 (OH) D levels were measured by 25(OH) vitamin D ELISA assay kit (Eagle Biosciences, Inc, catalog #VID31-K01, USA) according to the manufacturer's instructions. sVD levels were characterized as < 20 ng/ml - VD deficiency, 20 to 29 ng/ml -VD insufficiency, and ≥ 30 ng/ml - normal VD. Statistical analyses were performed with StatSoft STATISTICA Version 8 (Tulsa, OK). Non-parametric variables are given as median (interquartile range). Differences between groups were tested using Mann-Whitney test. Logistic regressions were performed to address the independent relationship between VD status and DN. The other predictor variables evaluated were gender, age, duration of diabetes, glycemic control, hypertension, high cholesterol, smoking status, and use of angiotensin-converting enzyme inhibitors (ACEI). We used logistic regression analysis to estimate the odds ratio (OR) (95% CI) of the outcome of serum VD levels in patients with DN in comparison with the patients without DN.

The clinical study were approved by the Local Ethics Committee of the Kharkiv National Medical University and conducted in accordance with the guidelines of the Declaration of Helsinki. All participants and their parents gave written informed consent.

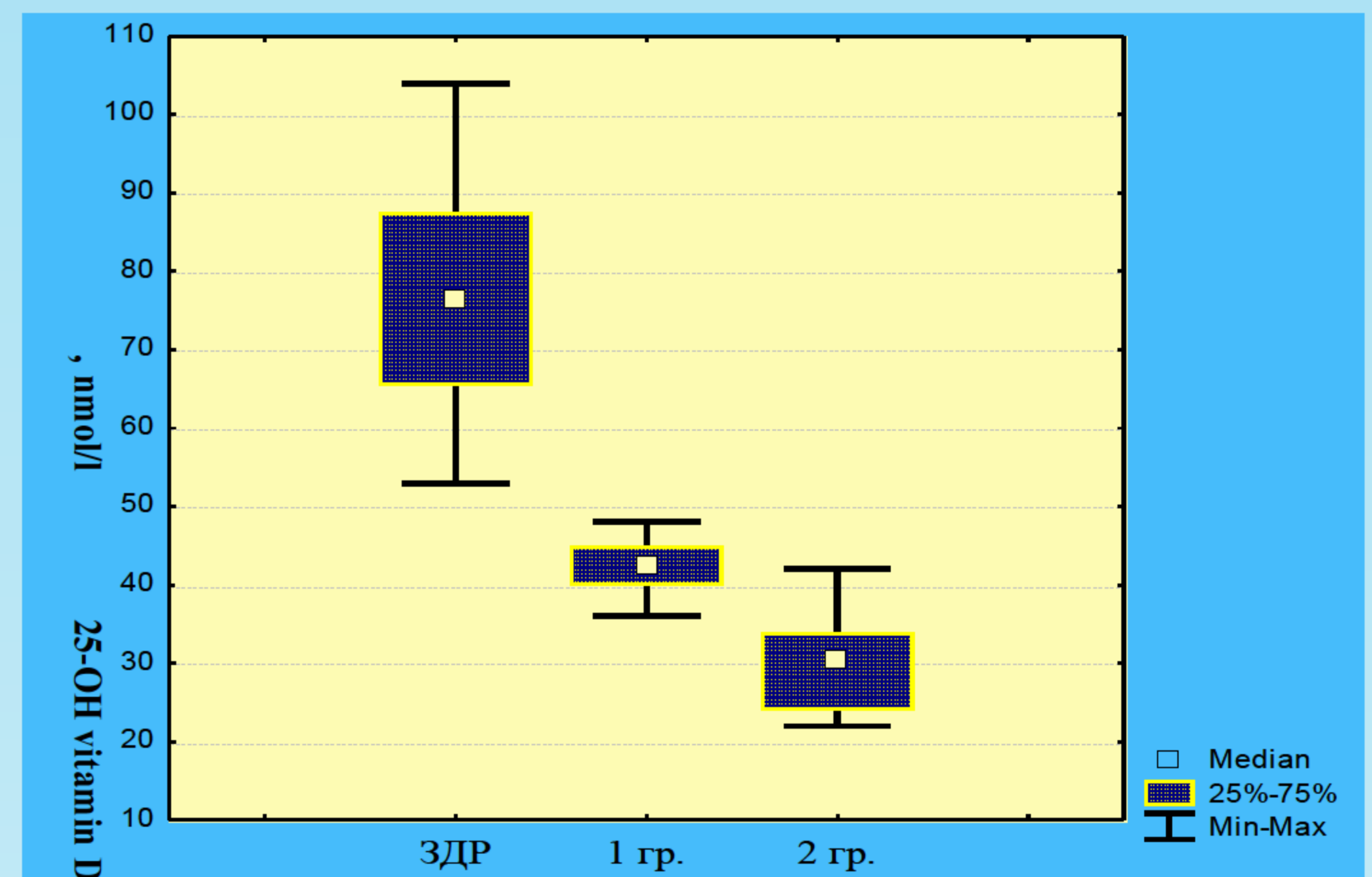
Levels of vitamin D in serum at investigated children



Results

Vitamin D levels were significantly decreased in the patients of the 1st and 2nd groups, compared with control group ((22.03 (17.23; 24.44) and 14.42 (12.02; 19.63), compared with 30.65 (28.45; 35.05) ng/ml, respectively) ($P < 0.001$)). A marked decreased in the sVD level was apparent in subjects with DN, compared with patients without DN ($P = 0.0056$). Higher proportions of patients with DN have VD deficiency than individuals without DN (77.8% vs 41.7%; $P = 0.0244$). Logistic regressions demonstrate VD deficiency and insufficiency are associated with the presence of DN, age, gender, duration of diabetes, the glycemic control, hypertension, and use of ACEI (OR, 2.94; 95% CI, 2.12-4.11 for VD deficiency; and OR, 1.84; 95% CI, 1.14-2.79 for VD insufficiency).

Levels of 25-OH vitamin D in serum at investigated children



Conclusions

Using logistic regression modeling, the study demonstrates an association between VD deficiency and VD insufficiency with DN in children. The association saves stable despite adjusting for gender, ACEI and other variables.

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