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ORIGINAL ARTICLE

Association of Circulating Vitamin D, VDBP, and Vitamin D Receptor Expression with Severity of Diabetic Nephropathy in a Group of Saudi Type 2 Diabetes Mellitus Patients

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SUMMARY

Background: **As the seventh leading cause of death by 2030, type 2 diabetes mellitus (T2DM) is considered the most common chronic metabolic disease worldwide. Vitamin D metabolic axis players were identified as good candidates for T2DM. We aimed to analyze the circulating levels of total 25-hydroxy vitamin D (25-OHD), vitamin D receptor (*VDR*) transcript and VD-binding protein (VDBP) in a sample of Saudi T2DM and to correlate these profiles with diabetic nephropathy and insulin resistance.**

Methods: **Ninety T2DM patients, classified into normo-, micro- and macro-albuminuria groups (n = 30/each) and 50 healthy controls were studied. Serum (25-OHD) and VDBP levels were assayed by ELISA. The peripheral blood mononuclear cell (PBMN) *VDR* expression level was quantified by real-time RT-PCR. Insulin resistance was evaluated by the homeostasis model assessment index (HOMAI).**

Results: **The normo-albuminuria group showed the highest levels of PBMN *VDR* expression, whereas the macro-albuminuria group had the lowest levels among T2DM patients. However, serum VDBP levels were significantly elevated in all patient groups. There was a significant positive correlation between PBMN *VDR* expression levels and serum (25-OHD) in the total patient group ($r = 0.579$, $p < 0.001$). Spearman's correlation showed significant correlations of the circulatory markers with many clinico-laboratory variables. Stepwise regression analysis indicated that serum VDBP levels, HBA1c, and BMI were independent predictors for albuminuria.**

Conclusions: **The study findings suggest a potential role of vitamin D metabolic players in DN, with a special concern regarding serum VDPB as a putative predictor of DN severity in type 2 DM Saudi patients. Large-scale validation studies are warranted.**

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Supplementary Text.

CLINICAL ORIGINAL ARTICLE

Changes in serum and urine vitamin D binding protein concentrations in type 2 diabetes
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Abstract

Objective
To determine the changes in serum and urine vitamin D binding protein(VDBP)concentrations in type 2 diabetes, and to explore the clinical significance.
Methods
The serum and urine VDBP concentrations in 102 healthy individuals and 106 type 2 diabetic patients were determined by ELISA. For analysis and comparison, 106 type 2 diabetic patients were divided into imperfect glycemic control subgroup and perfect glycemic control subgroup, microalbuminuria subgroup and normal albuminuria subgroup.
Results
The cut-off point of serum VDBP concentrations was 60.6 μg/mL and the cut-off point of the urine ratio of VDBP and creatinine was 7.76 mg/g, and both were determined according to the upper limit of 97.5% credit intervals in 110 healthy individuals. Serum VDBP concentration and the urine ratio of VDBP to creatinine in type 2 diabetic patients were significantly higher than those in the healthy individuals ($p < 0.01$), the imperfect glycemic control subgroup had higher serum VDBP concentrations and the urine ratio of VDBP to creatinine than those in the perfect glycemic control subgroup ($p < 0.05$). The microalbuminuria subgroup had higher urine ratio of VDBP to creatinine than that in the normal albuminuria subgroup ($p < 0.01$). Urine ratio of VDBP to creatinine in diagnosing early diabetic nephropathy had sensitivity of 96.4%, specificity of 68%, and concordance of 83%.
Conclusion
Detection of serum VDBP levels has some reference value in understanding the state of diabetes. Combined determinations of urine ratio of VDBP to creatinine and ratio of albumin to creatinine have significant clinical value in the early diagnosis of diabetic nephropathy.

Key words:
Vitamin D binding protein; Diabetes mellitus, type 2; Diabetic nephropathy

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