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Depressive Symptoms, Cognitive Function and Vitamin D Levels in the Oldest-Old Patients with Type 2 Diabetes

Introduction

The oldest-old population (aged 85 or older) is growing fast and there is a need to improve geriatric care. Many individuals in later life experience diabetes mellitus (DM) and depression; and both could be risk factors for dementia and mild cognitive impairment (MCI) [1]. Depression and diabetes have recently become a focus of research [1, 2]. The present study explores the association between the level of vitamin D, which regulates the nervous system and brain [3], and the prevalence of depressive symptoms, MCI and their comorbidity in patients aged ≥ 85 years with type 2 diabetes (T2D).

Methods

A cross-sectional study was conducted among T2D patients aged 85 or older, recruited from an outpatient diabetology clinic. The participants were assessed with the Montreal Cognitive Assessment (MoCA) for MCI and the Geriatric Depression Scale (GDS-30). The serum levels of 25-hydroxyvitamin D were assessed using ELISA. Detailed data was collected including sociodemographic, clinical, and biochemical parameters. Comparison between groups was done using ANOVA, followed by post-hoc test. Statistica 13.1 (StatSoft, Poland) was used for analysis.

Results

Clinical data were collected from 81 T2D patients, (73.6% female; mean age 87.3 ± 2.6 years). MCI was diagnosed in 21 (25.9%) subjects, depressive symptoms in 12 (14.8%); comorbid cognitive impairment and depression in 16 (19.8%). Thirty-two (39.5%) subjects had no psychiatric problems. The patients with comorbid cognitive impairment and depression were significantly more likely to be female ($p < 0.001$), single ($p = 0.003$), smokers ($p = 0.04$), older ($p = 0.03$), with a higher number of co-morbidities ($p < 0.001$), retinopathy ($p = 0.006$), hyperlipidemia ($p < 0.001$), cardiovascular diseases ($p < 0.001$), and with higher HbA1c level (67 ± 18.5 mmol/L, $p < 0.001$), compared to controls.

ANOVA followed by a *post hoc* test found serum 25-hydroxyvitamin D level was significantly decreased in patients with depressive symptoms (16.48 ± 5.12 ng/mL, $p = 0.025$) and MCI subjects (16.54 ± 3.98 ng/mL, $p = 0.002$) compared to controls (22.28 ± 5.92 ng/mL). The lowest concentration was noted in patients with diabetes who had comorbid MCI and depressive symptoms (14.12 ± 3.29 ng/mL, $p < 0.001$) (Fig. 1).

Correlation analysis showed a significant negative relationship between vitamin D and HbA1c levels in the comorbid cognitive impairment and depression

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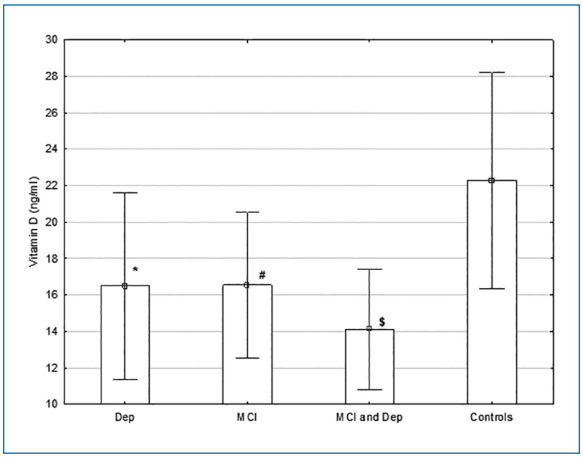

Figure 1. Serum 25-Hydroxyvitamin D Levels (ng/mL) in the Oldest-Old Patients with Type 2 Diabetes
Dep — patients with depressive symptoms; MCI — patients with mild cognitive impairment; MCI and Dep — patients with comorbid depressive symptoms and MCI; Controls — patients without depressive symptoms and MCI
Values are expressed by mean ± standard deviation; * # $ indicate difference between groups and controls, respectively. The ANOVA test followed by *post-hoc* test was used to test for significant differences. A p-value of less than 0.05 was considered statistically significant.

group ($r = -0.83$, $p < 0.001$), the depressive group ($r = -0.74$, $p = 0.006$), and in controls ($r = -0.63$, $p < 0.001$). In patients with comorbid cognitive impairment and depression, 25-hydroxyvitamin D level negatively correlated with GDS-30 score ($r = -0.87$, $p < 0.001$) and positively correlated with MoCA score ($r = 0.81$, $p < 0.001$).

Discussion

Our data indicates comorbidity of MCI, depression and diabetes in the diabetic population over 85 years. Our study showed that lower vitamin D levels were associated with a higher prevalence of MCI and depressive symptoms, as well as higher HbA1c levels, lower MoCA scores and a higher GDS-30 score. In line with other studies [4, 5] we propose that vitamin D may be a potential protective factor for cognitive impairment and comorbid depression in patients with type 2 diabetes. Further prospective studies are needed to evaluate the influence of vitamin D supplementation on the development of dementia or depression in the oldest-old population.

Article information

Ethical approval

The study was conducted in accordance with the Declaration of Helsinki, and approved by the independent local Ethics Committee of Medical University of Lodz

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Conflict of interest

The authors declare no conflict of interest.

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