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Assess the relationship between the level of vitamin D, metabolic parameters, and the complications of type 2 diabetes

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Introduction

Recent research has shown that vitamin D may play a role in a wide variety of body systems, including the cardiovascular, immune, and reproductive systems, in addition to the role it has traditionally played in controlling the metabolism of bone and calcium. These findings are closely related to the widespread expression of vitamin D receptors in the human body, which suggests that vitamin D plays an important role in the regulation of the expression of multiple genes beyond those involved in calcium metabolism.

Lower levels of vitamin D have been linked to an increased risk of developing type 2 diabetes mellitus (T2DM), the findings of which were found in a number of large epidemiologic studies that investigated the effects of vitamin D on metabolic and cardiovascular diseases. According to some studies, a lack of vitamin D leads to lower calcium levels inside of cells as well as less insulin being secreted by beta cells in the pancreas. A lack of vitamin D also causes a reduction in the expression of insulin receptors, which results in peripheral insulin resistance. Inadequate levels of vitamin D have been linked to an increased risk of atherosclerosis, which is associated with myocardial hypertrophy and renin activation.

In India, a significant number of people are deficient in vitamin D. National Health and Nutrition Examination Survey , which was conducted between 2011 and included participants aged 19 years or older, found that 47.3% of men and 64.5% of women had vitamin D deficiencies., vitamin D deficiency may be even more prevalent in patients with type 2 diabetes in India, and it may be connected to inadequate glycemic control and/or a variety of complications associated with type 2 diabetes.

However, studies on the association between vitamin D deficiency and micro- and macrovascular complications in T2DM showed conflicting results, and the conclusions that can be drawn from these studies at this time are inconclusive. According to the findings of a number of studies, an insufficient amount of vitamin D was associated with an increased risk of diabetic polyneuropathy, nephropathy, and retinopathy. On the other hand, some studies came to the conclusion that there is no connection between a lack of vitamin D and diabetic polyneuropathy or retinopathy. It was reported that vitamin D deficiency was associated with a lower level of low-density lipoprotein cholesterol (LDL-C) and a higher level of triglyceride level and diastolic blood pressure than those in type 2 diabetes patients with sufficient levels of vitamin D; however, other studies reported that there was no relationship between the two.

The current study investigated the prevalence of vitamin D deficiency in Indian patients diagnosed with type 2 diabetes and identified the relationship between vitamin D status and diabetes-related parameters such as glycemic control, macro- and microvascular complications, and cardiovascular risk factors. The findings of this investigation are presented here.

Methodology

In this cross-sectional study, participants included one thousand people with type 2 diabetes who had been to specific hospitals in Indore at some point between January 2016 and August 2019. According to the criteria established by the American Diabetes Association, T2DM was identified. Patients who took calcium or vitamin D supplements, patients diagnosed with osteoporosis, patients with chronic kidney stage 5 (estimated glomerular filtration rate [eGFR] 15 mL/min/1.73 m2), patients with liver cirrhosis, and patients with refractory malignancy were not included in the study. In the end, there were 1000 patients considered for inclusion in the study. The research project was given the go-ahead by the hospitals' Institutional Review Boards, and participants were not required to provide informed consent because it was a retrospective study. From the medical records of the patients, we gleaned information regarding their age, gender, whether or not they smoked, how much alcohol they consumed, how long they had diabetes, and the types of diabetic medications they took. After taking into account the subject's height and weight, the body mass index (BMI) was computed by dividing the subject's weight, expressed in kilogrammes, by the height, expressed in metres squared. With the patient seated, two readings were taken with a manual sphygmomanometer, and the average of those readings was used to calculate the patient's blood pressure.After fasting for at least 8 hours straight through the previous night, a venous blood sample was taken. The chemiluminescent immunoassay was utilised in order to determine the 25OHD levels. Through the review of medical records, it was determined whether or not the patient had diabetic retinopathy, as well as nephropathy, neuropathy, and cardiovascular and cerebrovascular diseases (CVDs). A non-proliferative or proliferative form of diabetic retinopathy, as well as a history of treatment with laser photocoagulation, were the criteria used to define diabetic retinopathy. Microalbuminuria, which was measured as UACR between 30 and 299 mg/g, and macroalbuminuria, which was measured as UACR over 300 mg/g, were used to define diabetic nephropathy. Patients who either underwent the current perception threshold test (CPT) with a Neurometer or reported experiencing pain, burning, tingling, or numbness in their feet or hands were found to have diabetic neuropathy. Myocardial infarction, unstable angina, and stroke were all forms of cardiovascular disease.

Results

The average participant was 52.6 years old (standard deviation: 8.9 years), 66.1% of them were male, and their body mass index (BMI) was 25.2 (standard deviation: 4.8 kg/m2). Patients had a HbA1c of 7.6% 1.5% on average, their diabetes had been going on for 14.0 9.0 years on average, and 17.6% of them used insulin. 32.5% of patients had retinopathy, 34.5% of patients had nephropathy, 18.7% of patients had neuropathy, and 14.9% of patients had cardiovascular disease.

The concentration of 25OHD ranged from 17.1 to 7.8 ng/mL on average. Only 100 patients, or 10.0% of the total, had adequate levels of 25OHD; 300 patients, or 30%, had severe deficiency (10 ng/mL); 460 patients, or 46.%, had 25OHD levels between 10 and 20 ng/mL; and 200 patients, or 12.0%, had values between 20 and 30 ng/mL.

The clinical and metabolic characteristics of the participants were stratified according to whether or not they had vitamin D deficiency. The results showed that among patients with type 2 diabetes, those with vitamin D deficiency were younger (59.6 years vs.64.5 years, P0.01) and had higher HbA1c (7.4% vs. 7.3%, P0.01), lower HDL-C (46.1 mg/dL vs. 49.6 mg/dL, P0.01) Although a significantly higher percentage of participants with vitamin D deficiency used insulin (19.4% vs. 13.7%, P0.01), there was

no significant difference in the duration of diabetes between the two groups. In addition, patients who had a vitamin D deficiency had a higher prevalence of nephropathy than patients who did not have a vitamin D deficiency (34.0% vs. 24.3%, P 0.01) The two groups did not differ from one another in terms of any other complications.

Conclusion

In conclusion, there was a significant lack of vitamin D among Korean patients who had type 2 diabetes, and this deficiency was independently linked to an increase in the severity of diabetic nephropathy. In patients with type 2 diabetes, having low levels of vitamin D was associated with having higher triglyceride and lower HDL-C levels. It is necessary to conduct additional prospective studies in order to assess the impact of vitamin D on lipid metabolism and the complications of diabetes.

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