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VITAMIN D DEFICIENCY AND CARDIOVASCULAR RISKS IN DIABETES PATIENTS

Laboratory Medicine

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ABSTRACT

Low vitamin D levels in diabetic patients are associated with an increased risk of cardiovascular disease. Diabetic patients in Kerala are at increased risk for cardiovascular disease due to low vitamin D levels. The prevalence of cardiovascular diseases (CVD) is rising worldwide. Recent research reveals that Vitamin-D (Vit-D) insufficiency may contribute to advancing cardiovascular illnesses, even if the impact of conventional risk factors is already well-established. Diabetes mellitus (DM) is an established risk factor for cardiovascular disease (CVD). It has been observed that the frequency of diabetes mellitus and vitamin D insufficiency is relatively high in the population of Kerala. To determine if the status of vitamin D influences the evolution of cardiovascular risk in patients with diabetes in the given population, this research was conducted. A cross-sectional study was undertaken at a teaching hospital for tertiary care. The test population consisted of persons with diabetes, whereas the control group consisted of age- and sex-matched healthy adults. Each patient's demographic information, blood pressure, and blood samples were obtained. The lipid profile, blood glucose level, Apo-A1, and Apo-B were analyzed using the collected samples. The acquired results were evaluated using a suitable statistical instrument. A higher value for lipid profile in the test population suggests a greater risk for CVD in the test population, according to the results. Apo-A1 levels were substantially lower, and Apo-B levels were significantly more significant in the test population compared to the control group, indicating that the test population is at an elevated cardiovascular risk. The research revealed a negative connection between vitamin D and cardiac indicators, suggesting a role for vitamin D deficiency in cardiovascular disease. The analysis of biomarkers in the various test groups revealed a statistically significant difference based on Vit-D status. The correlation between Vit-D status and CVD is established, and the results are comparable to previous research abroad. The present investigation indicated a strong correlation between Vit-D concentration and CVD risk in the population of Kerala. The study showed that the test group had increased levels of both traditional and novel biomarkers for predicting cardiovascular risk. To determine the prevalence of this association, future prospective follow-up research must be done.

KEYWORDS

Diabetes, Vitamin D, Cardiovascular disease, Cardiac markers, Oxidative stress, Nutritional deficiency

INTRODUCTION

Cardiovascular disease is the main reason for death and disease [1]. Although the importance of classical risk factors is well-established, it is evident that they cannot fully explain the development of cardiovascular disease. This circumstance has prompted an ongoing quest for other CVD risk factors. Recent research suggests that vitamin D insufficiency is connected with an increased risk of cardiovascular disease [2]. Vitamin D is a steroid hormone whose primary function is calcium and phosphorus balance management. Even though food sources may maintain the level, the primary source of vitamin D is its production inside the body. Deficiency in vitamin D is associated with an increased risk of cardiovascular disease, including coronary heart disease (CHD) and heart failure, and is believed to impact millions of individuals worldwide [3]. It is believed that suboptimal vitamin D level influences CVD risk via altering other risk factors, such as hypertension, diabetes, and inflammation [4]. Unanswered is whether substantial Vit-D supplementation among the Vit-D deficient population may affect CVD, and clinical studies are now examining this subject.

Numerous surveys and research indicate that the prevalence of cardiovascular disease among people of all socioeconomic levels has risen considerably over the last decade [5]. Recent research and surveys reveal that the prevalence of CVD-related morbidity and death in low-income countries has grown substantially [6]. According to current statistics, India will host more than fifty percent of the world's cardiac patients in the next fifteen years. India is accountable for 25% of cardiovascular-related deaths [7].

Vitamin D insufficiency is one of the critical concerns for chronic disease prevention [8]. Despite India's location between 8.4° and 37.6° North latitude and the fact that most of its people are exposed to sufficient sunshine throughout the year, the disease's frequency has risen drastically. Numerous investigations have highlighted vitamin D's preventive function in diabetes and CVD [9]. Despite the prevalence of vitamin D insufficiency in the Indian population, the precise mechanisms underpinning vitamin D deficiency in the development of DM and its associated consequences have yet to be investigated. In addition, earlier research has given inconsistent outcomes. Moreover, inflammation and oxidative stress are researched in various illnesses, including CVD, although they are not commonly employed in clinical practice or disease diagnosis. These indicators are not widely assessed and employed in diabetes and cardiovascular disease prevention efforts at present.

An elevated risk for cardiovascular diseases accompanies diabetes, hypertension, and dyslipidemia. It has been reported that the incidence of diabetes mellitus is relatively high among the population of Kerala. Some studies have also shown a significant prevalence of vitamin D insufficiency among the general population in this area. This research was conducted to determine if the status of vitamin D influences the evolution of cardiovascular risk in individuals with diabetes in the given group.

MATERIALS AND METHODS

Patients having a previous diagnosis of type 2 diabetes mellitus who were receiving treatment at the diabetic clinic situated at the Sevana clinic in Kozhikode, Kerala, participated in a comparative cross-sectional study. The scope of the examination spans from December 2020 to May 2022. Patients were eligible for this research if they were between 35 and 65 years old, willing to participate, and had no life-threatening conditions (such as liver disease, renal disease, endocrine disease, or cancer). Each participant was paired with a person of the same age and gender. As a basis for choosing control participants, the first research targeted persons between the ages of 35 and 65 with no clinically severe symptoms. On the Datasheet, demographic information, baseline lipid profile values, and biochemical markers were gathered and recorded. After collecting 5 ml of blood by venepuncture, the serum was separated according to the usual technique. Biochemical parameters such as fasting blood sugar, lipid profiles (Total cholesterol, triglycerides, HDL, LDL), Apolipoprotein-A1 (Apo-A1), and Apolipoprotein-B were analyzed using a fully automated analyzer (Apo-B). Chemiluminescence Immunoassays were used to calculate Vit-D levels.

The authors used a variety of appropriate statistical methods to assess the parameters. Descriptive statistics were used to evaluate demographic information such as age, sex, height, and body mass. The Pearson correlation test evaluated the relationship between vitamin D and cardiovascular risk indicators. The statistical analysis was conducted using the SPSS program.

RESULTS AND DISCUSSION

The research aimed to determine the effect of vitamin D levels on the increased cardiovascular risk of diabetic individuals. The research revealed that the average age of the control group is 45, and that of the experimental group is 50. The average body weight of the control group is 62.01 kilograms, whereas that of the test group is 64.33 kilograms. The test group had a higher average BMI (24.72) than the

control group. The test group's blood pressure, fasting glucose, total cholesterol, LDL, and triglycerides were substantially more significant than the control group's (p0.001). Vit-D levels were considerably lower in the experimental group (18.99ng/mL) compared to the control group (32.18ng/mL) (table 2). The HDL level was substantially lower in the experimental group (36.48 mg/dl) than in the control group (47.08 mg/dl) (table 2). This demonstrated the existence of risk variables in the population examined. In the test group, a drop in Apo-A1 and an increase in Apo-B showed an elevated risk of CVD. These data suggest that those with vitamin D insufficiency may have an increased risk of cardiovascular disease. No association was discovered between vitamin D and TGs. The considerable variation in cardiac markers suggests that vitamin D has a role in the development of cardiovascular disease.

Table 1: Comparison of demographic and BP parameters between the Control and Test Subjects

Parameters	Category		t-test	p-value
	Control(n=120)	Test (n=120)		
Age (Yrs)	45.74 ± 9.02	50.98 ± 10.19	-4.22	<0.01**
Height (cm)	161.91 ± 6.42	161.97 ± 7.41	-0.07	0.948
Weight (kg)	62.01 ± 7.95	64.33 ± 8.01	-2.25	<0.05*
BMI (kg/m2)	23.57 ± 2.63	24.72 ± 1.99	-3.81	<0.01**
Syst BP	123.62 ± 8.3	135.13 ± 15.03	-7.34	<0.01**
Diast BP	80.08 ± 0.91	83.1 ± 4.24	-7.63	<0.01**

All values are mean ± standard deviation, n: Number of subjects. The statistical test used is the t-test. *Significant at p<0.05, **significant at p<0.01.

Table 2: Comparison of biochemical parameters between the Control and Test Subjects

Parameters	Category		t-test	p-value
	Control(n=120)	Test (n=120)		
FBS (mg/dL)	85.06 ± 8.91	165.78 ± 49.36	-17.63	<0.01**
PPBS (mg/dL)	114.65 ± 12.06	220.69 ± 72.25	-15.86	<0.01**
Cholesterol (mg/dL)	178.68 ± 13.59	231.41 ± 27.91	-18.60	<0.01**
HDL (mg/dL)	47.08 ± 4.48	36.48 ± 3.02	21.49	<0.01**
LDL (mg/dL)	112.41 ± 10.26	157.21 ± 28.49	-16.21	<0.01**
VLDL (mg/dL)	20.73 ± 4.78	33.86 ± 11.15	-11.86	<0.01**
TG (mg/dL)	123.2 ± 19.51	177.65 ± 31.25	-16.19	<0.01**
APO B (g/L)	1.47 ± 0.17	1.55 ± 0.2	-3.10	<0.01**
APO A1 (g/L)	1.23 ± 0.13	1.28 ± 0.34	-1.66	0.099
Vitamin D (ng/mL)	32.18 ± 2.24	18.99 ± 6.01	22.53	<0.01**

All values are mean ± standard deviation, n: Number of subjects. The statistical test used is the t-test. *Significant at p<0.05, **significant at p<0.01.

Declaration Of Interest

The authors state that they have no conflict of interest that may be seen as impairing the research's objectivity.

CONCLUSION

According to the present research findings, there is a substantial correlation between Vit-D levels and diabetes risk in the population of Kerala. The research confirmed the higher levels of both traditional and novel cardiovascular risk biomarkers. To determine the prevalence of this association, future follow-up research must be done in the future. The primary area for improvement of our study was its cross-sectional design, which prevented us from establishing the causal nature of the link. A randomized controlled study must be conducted to determine if vitamin D may have a role in preventing cardiovascular diseases.

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