

ORIGINAL ARTICLE

Association of Vitamin D Deficiency with Ischemic Cardiomyopathy among the Local Population of Pakistan

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ABSTRACT

Introduction: The majority of the world's population is chronically deficient in vitamin D. ergocalciferol (D2) and cholecalciferol (D3) are the two forms of vitamin D. (D3). In terms of potency, vitamin D2 in the form of ergocalciferol (D2) is superior to vitamin D3 (D3). It is possible to get ergocalciferol from herbal sources, but cholecalciferol is produced in the body by being exposed to ultraviolet B radiation on the skin (UVB). Vitamin D is made from ergocalciferol, which is a precursor.

Objectives: Whether or if vitamin D deficiency is linked to ischemic cardiomyopathy is the major purpose of this study (heart failure).

Material and methods: From August to December 2021, researchers from Queen Mary University performed a cross-sectional study. Participants were required to undergo physical exams, blood tests, and echocardiographic evaluations as part of the research procedure. Venous blood samples were obtained the next morning after subjects had fasted the previous night (10 to 12 hours). After that, the serum was centrifuged and sent to the laboratory for biochemical examination as quickly as feasible.

Results: A total of 50 persons participated in this research, which depends on data supplied by patients. There were no changes in age, gender, BMI, or sun exposure between the two groups of subjects. In ICMP patients, calcium levels were the only significant difference from those in the control group. Other biochemical indicators did not vary substantially across subjects. As compared to the general population, persons with ICMP had notably reduced mean 25(OH) D3 levels (14.5-7.4 ng/ml as opposed to 28.2-12.2; P = 0.001), but significantly higher PTH and NT-proBNP concentrations. Conclusion: Vitamin D levels were revealed to be lower in ICMP patients than in controls, and it was proved that this shortfall had a major effect on heart function.

Keywords: Vit-D, Patients, Cardiac Functions, Cardiomyopathy

INTRODUCTION

Vitamin D insufficiency affects the vast majority of people every day. Vitamin D2 and D3 are the two forms. (D3). Ergocalciferol is the most active form of vitamin D2 (D3). Vitamin D is present in herbal ergocalciferol, but UVB radiation stimulates the body to produce cholecalciferol (UVB). Ergocalciferol is a precursor of vitamin D. Fish oil and supplements contain vitamin D. Vitamin D aids in the maintenance of blood calcium and phosphate levels, both of which are required for bone mineralization. Vitamin D receptors (VDRs) have been discovered in a variety of cells and tissues all throughout the body [1]. [2] Immune cells, cardiovascular cells, and vasculature cells are among these cells [3]. Because vitamin D possesses pleiotropic qualities including cardioprotection and immunomodulation, it has been linked to early cardiovascular disease and cancer [3, 4].

According to the WHO, vitamin D insufficiency is common in North America and Europe. Vitamin D is a steroid, much like calcium and bone metabolism [4]. Vitamin D insufficiency is being linked to cardiovascular disease in an increasing number of studies. [5]. Vascular smooth muscle, endothelium, and cardiomyocytes all have vitamin D receptors [6].

According to recent research, vitamin D insufficiency has been associated to a poor prognosis in heart failure patients. Chen and co-workers found the vitamin D-vitamin D receptor signaling route to inhibit cardiomyocyte

hypertrophy directly. Before, vitamin D has been connected to studies on the left ventricle's form [7].

In children, rickets, dental cavities, and growth retardation have been linked to vitamin D deficiency, as well as osteomalacia and osteopenia in adults [8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19]; in adults, it is linked to osteoporosis, lower muscular strength, falls, and a greater risk of fracture. Vitamin D deficiency is linked to a number of risk factors, including an inactive lifestyle, sun avoidance, being overweight or obese, and having low HDL cholesterol. The winter season, air pollution, smoking, and malabsorption are all factors that contribute to vitamin D deficiency. People who live inside and avoid the sun are more likely to suffer from vitamin D insufficiency than those who spend a lot of time outside and have fair skin. drugs to treat seizures, glucocorticoids, antirejection, and HIV medication. 25(OH) D3 in the blood is linked to several cardiac conditions, cardiac disease, Ischemic heart disease and heart failure are two examples.

An investigation of the link between vitamin D deficiency and ischemic cardiomyopathy is the major goal of this study.

MATERIAL AND METHODS

Cross-sectional survey results were released in December 2021, by the QMC from August 2021 to December 2021. The hospital's ethical review board gave its assent to this study. All participants in the study were required to undergo physical examinations, blood tests, and echocardiographic

assessments. Venous blood samples were obtained the next morning after subjects had fasted the previous night (10 to 12 hours). As soon as the serum had been separated, it was submitted to a laboratory for biochemical testing and analysis. The total cholesterol, CRP with high sensitivity, glucose, phosphate, calcium, and albumin levels in the blood were all measured using standard laboratory protocols. 25OHD3 levels in the blood were measured using the radioimmunoassay technique. An immunoassay approach was used to measure the blood levels of PTH. All statistical analyses in this research were performed using version 21.0 of the Statistical Package for Social Science for Windows (SPSS Inc., Chicago, IL). Mean standard deviation (SD) is used to convey descriptive statistics for continuous data, while proportion (%) or frequency is used to represent descriptive statistics for categorical data, such as frequency.

RESULTS

The study included 50 patients. The groups did not differ in age, gender, BMI, or sun exposure. None of the other biochemical indicators studied showed a statistically significant difference between the ICMP patients and the control group.

Table 1: Biochemical characteristics of ischemic cardiomyopathy patients and controls

Variables	Patients with ICMP	Controls	P
Fasting plasma glucose (mg/dl)	104±18.2	96±12.6	0.2
Total cholesterol (mg/dl)	186±25.6	178±22.6	0.56
LDL (mg/dl)	116±18	112±12	0.06
Hemoglobin (mg/dl)	9.2±1.8	11.2±2.2	0.03
Creatinine (mg/dl)	0.9±0.03	0.82±0.1	0.05
Albumin (mg/dl)	3.4±1.2	4.2±1.4	0.04
Calcium (mg/dl)	8.2±1.4	9.6±0.8	0.01
25(OH) D3 (ng/ml)	14.5±7.4	28.2±12	0.001
Parathyroid hormone (pg/ml)	90.5±28.5	57±20.2	0.02
NT-proBNP (pg/ml)	3482±1256	165±34	0.001

DISCUSSION

Prostaglandin and cyclooxygenase pathways are inhibited, anti-inflammatory cytokines are upregulated, adhesion molecules are decreased, the activity of the enzyme matrix metalloproteinase 9 is decreased, and the RAA is inhibited by nutritional D [10,11]. Vitamin D deficiency raises inflammation in the body and the risk of atherogenesis. When the RAA system becomes activated, as it does with high blood pressure, endothelial dysfunction occurs, which is the first stage in the formation of plaque. Nuclear factor- κ B, a proinflammatory cytokine, is linked to endothelial dysfunction and low vitamin D levels. [12].

The levels of 25(OH)D3 were considerably lower in DCMP patients than in healthy controls. The DCMP patients' 25(OH) D3 levels linked adversely with left ventricular diameter. 25(OH) D3 levels, LVESD, and LV volume were inversely associated in heart failure, according to Ameri et al This matched their findings [14].

CONCLUSION

It has been demonstrated that Vitamin D deficiency is a major risk factor for impaired cardiopulmonary function among individuals with ICMP. Because of this, people with

ICMP should be tested for Vitamin D deficiency and treated as soon as possible if they are found to be suffering from this problem.

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