Original Research Article

Correlation of vitamin D levels with left ventricular ejection fraction in patients with dilated cardiomyopathy

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ABSTRACT

Vitamin D deficiency is highly prevalent and has been shown to be associated with cardiovascular diseases, including coronary artery disease, left ventricular (LV) hypertrophy and systolic heart failure. Vitamin D is an important hormone whose receptors are found in many tissues including cardiac myocytes, and plays a significant role in the autocrine and paracrine regulation of cellular function, growth and differentiation in various organs. Although there is a substantial published literature on Vitamin D deficiency and cardiovascular diseases, there is a little data on Vitamin D deficiency and diastolic dysfunction or diastolic heart failure. Since diastolic dysfunction is an early manifestation of LV hypertrophy and ventricular dysfunction, it may reflect the effects of Vitamin D deficiency on the cardiovascular system. As a result, the present study examines if there is any association between Vitamin D levels and diastolic dysfunction as measured by comprehensive two-dimensional (2D) Doppler echocardiography.

Keywords: Vitamin D deficiency, left ventricular, systolic dysfunction, cardiomyopathy

INTRODUCTION

Dilated Cardiomyopathy is an important cause of sudden cardiac death (SCD) and heart failure (HF), is the leading indication for cardiac transplantation in children and adults worldwide. It is defined by ventricular chamber size increase and systolic dysfunction with normal left ventricular wall.[1,2]
Different aetiologies can lead to DCMP, such as inherited, infectious and inflammatory diseases. The majority of cases are undiagnosed after a search for secondary cause.[3,4]

Vitamin D plays a vital role in maintaining serum calcium and phosphate levels for bone mineralization and metabolism.
Recent literature has indicated a much broader role of Vitamin D than simply the regulation of calcium metabolism as Vitamin D receptors (VDRs) are found in a variety of cells and tissues. These include cells from various vital organs as kidney, heart, and glands.[5,6,7]
The heart is particularly noteworthy in that plasma 25hydroxyvitamin D3 [25(OH) D3] levels have been shown to correlate inversely with the incidence of a variety of cardiac disorders including ischemic heart disease and heart failure.[8]

MATERIAL AND METHODS

The study was conducted in the department of general medicine in Gujarat Adani Institute of Medical Sciences, a tertiary care centre in Bhuj. Information was collected from patients through pre-tested preforms meeting the objectives of the study purpose of the study has been carefully explained to patients and consent was taken. Data collection was done by clinical history, examination and investigation.

Study was designed as a Cross Sectional based study.
- Duration - Mar 2020-Oct 2020

• DCMP patients were diagnosed strictly according to AHA Scientific Statement on the Classification of Cardiomyopathy.

The normal LVEF was taken as 50 - 70%,
Mild dysfunction - 40-49%
Moderate dysfunction - 30-39%
Severe dysfunction was taken as LVEF < 30%

Vitamin D levels, 25(OH) was taken by the method of ultra-enzyme linked fluorescence assay.

LVEF was measured strictly on the basis 2D echocardiography.

Vitamin D levels defined as per the endocrine society clinical practice guidelines for evaluation and treatment and prevention of vitamin D deficiency.

RESULTS

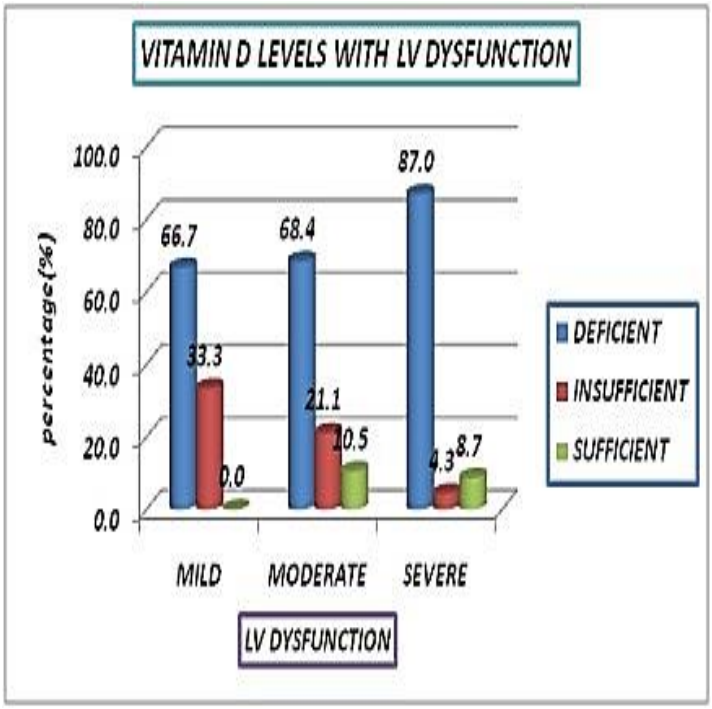
Vitamin D levels	
DEFICIENT	<20 ng/ml
INSUFFICIENT	20-29 ng/ml
SUFFICIENT	30-100 ng/ml

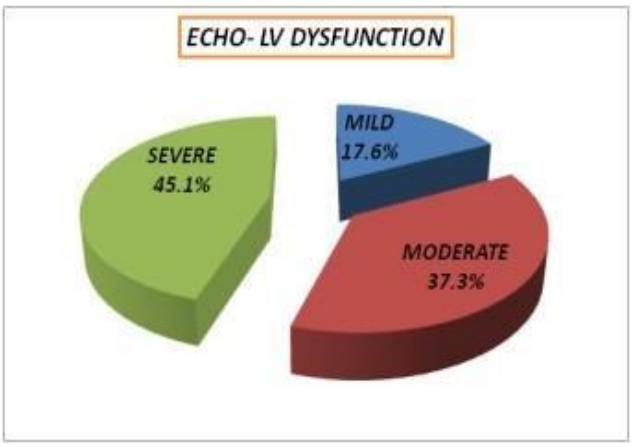
ECHO left ventricular dysfunction	Number	Percentage %
MILD	9	17.6
MODERATE	19	37.3
SEVERE	23	45.1
TOTAL	51	100

There were.9 patients were with mild LVSD that's >40% EF.19 patients had moderate LV dysfunction that's between 30-39% EF and 23 patients had severe LV systolic dysfunction that's <30% EF

DISCUSSION

The association between vitamin D and cardiovascular-disease events is widely debated and analysed in the literature. Myocardium is an important target tissue for vitamin D-mediated effects on a genomic and non-genomic level. Cardiomyocytes express the vitamin D receptor studies indicate that 1.25-(OH) Vitamin D could directly suppress rennin gene expression. Second, is the presence in the cardiac muscle cells of vitamin D receptors, a calcitriol-dependent Ca2+ binding protein and a calcitriol-mediated rapid activation of voltage-dependent Ca2+ channels. Third, vitamin D deficiency triggers secondary hyperparathyroidism, which then directly promotes cardiac hypertrophy (the direct PTH toxicity hypothesis).3, in this study also we concluded that there is a significant corelation between vitamin d levels and ejection fraction of left ventricle.





LEFT VENTRICULAR DYSFUNCTION

VITAMIN D LEVELS	LV DYSFUNCTION: MILD	MODERATE	SEVERE	TOTAL
DEFICIENT	6	13	20	39
INSUFFICIENT	3	4	8	1
SUFFICIENT	0	2	2	4
TOTAL	9	19	23	51

PROBABILITY OF FISHER'S EXACT TEST | P VALUE 0.0023

CONCLUSION

We have found in our study that there was correlation between LV dysfunction and Vitamin D levels.

In patients with severe systolic dysfunction,20 patients had vitamin D deficiency, with moderate LV dysfunction-13 patients were vitamin D deficient, and with mild LV dysfunction we had 6 patients with deficient vitamin D levels. With insufficient vitamin D levels there was 1 severe LV dysfunction patient. Total of 6 patients had moderate LV dysfunction and with mild LV dysfunction we had 1 patient. While patients with sufficient vitamin D levels -2 had severe LV dysfunction and 2 had moderate LV dysfunction.

Hence, we can conclude from our study that there is a significant correlation between the vitamin D levels and severity of Left ventricular ejection fraction levels.

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