PREVALENCE OF VITAMIN D DEFICIENCY IN ACUTE CORONARY SYNDROME IN A TERTIARY CARE HOSPITAL, MAHARASHTRA, INDIA

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ABSTRACT

BACKGROUND

Deficiency in 25-hydroxyvitamin D (25 [OH] D), the main circulating form of vitamin D in blood could be involved in the pathogenesis of Acute Coronary Syndromes (ACS). To date, however, the possible prognostic relevance of 25 (OH) D deficiency in ACS patients remain poorly defined.

The purpose of this prospective study was to assess the association between 25 (OH) D levels in ACS.

MATERIALS AND METHODS

Total 100 cases were studied in Krishna Institutes of Medical Sciences, Karad. All adult age > 18 years admitted for acute coronary syndrome were eligible for this study. We measured 25 (OH) D in 100 ACS patients at hospital presentation; 74% of them were above the age of 50 years at the time of presentation. The ACS group was studied as STEMI, NSTEMI and unstable angina; 62% of whom were admitted with STEMI, 20% NSTEMI and the remaining 18% with unstable angina. Vitamin D serum levels > 30 ng/mL were considered as normal; levels between 30 and 21 ng/mL were classified as insufficiency and levels < 20 ng/mL as deficiency.

RESULTS

In the current study, the percentage of Vitamin D deficiency individuals among the study population amounted to 46% and Vitamin D insufficiency 33%. No correlation was evident between vitamin D level, age and sex.

CONCLUSION

Vitamin D deficiency and insufficiency were common in patients with acute coronary syndrome patients.

KEYWORDS

Vitamin D Level, Acute Coronary Syndrome, Tertiary Care Hospital, Maharashtra.

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BACKGROUND

With the turn of the century, Cardiovascular Diseases (CVDs) have become the leading cause of mortality in India.[1] In comparison with the people of European ancestry, CVD affects Indians at least a decade earlier and in their most productive mid-life years.[2,3] For example, in Western populations only 23% of CVD deaths occur before the age of 70 years; in India this number is 52%.[4] In addition, case fatality is attributable to CVD in low-income countries including India, appears to be much higher than in middle- and high-income countries.[5,6] The World Health Organisation (WHO) has estimated that with the current burden of CVD, India would lose $237 billion from the loss of productivity and spending on healthcare over a 10-year period (2005 - 2015).[7] Reasons for the high propensity to develop CVD, the high case fatality and the high premature mortality include biological mechanisms, social determinants and their interactions.

Vitamin D deficiency was recently reported to be common in patients with Acute Coronary Syndromes (ACS).[8] Reports from across the world indicate that hypovitaminosis D is widespread and is re-emerging as a major health problem globally.[9] The prevalence of Vitamin D deficiency in urban population is reported from 62% - 90% in various ages in India.[10]

Beyond its fundamental role in bone metabolism and calcium homeostasis, vitamin D may influence several other medical conditions including cardiovascular disease. Indeed, vitamin D receptors have been found in the myocardium as well as in vascular cells and hypovitaminosis D, a common finding in many industrialised countries, has been independently associated with increased risk of developing acute myocardial infarction and heart failure.[11,12]

Moreover, vitamin D deficiency has been linked to conditions such as hypertension, diabetes mellitus, metabolic

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syndrome, cardiac hypertrophy and chronic kidney disease that predispose to cardiovascular disease.[13–17]

More importantly, in heart failure patients vitamin D supplementation has been shown to be associated with improved survival.[18]

Several studies have also demonstrated a survival benefit in end-stage renal disease patients treated with vitamin D, primarily related to a reduction in cardiovascular death.[19] Thus, vitamin D seems to play an important role in cardiac function and in the development and progression of coronary artery disease.

Deficiency of vitamin D or of 25-hydroxyvitamin D (25 [OH] D), its main circulating form in the blood has been recently reported to be common in patients with Acute Coronary Syndromes (ACS) and preliminary studies indicate a possible association with prognosis.

Very few studies, however, have investigated the association between vitamin D levels and clinical outcomes in ACS patients thus far; moreover, they were either underpowered to evaluate in-hospital outcomes or mainly focused on long-term results.[20-23]

Therefore, convincing data demonstrating the possible impact of vitamin D insufficiency or deficiency, on morbidity and mortality of ACS patients are still lacking. Notably, vitamin D has been demonstrated to suppress the renin-angiotensin system and to affect endothelial function, inflammatory processes, platelet function, insulin resistance and blood pressure.[13, 24-27]

All these effects are relevant during ACS and related to patient's clinical course. Moreover, low levels of vitamin D have been associated with ventricular dysfunction and cardiac remodeling after ACS and with heart failure mortality and sudden cardiac death.[20,28,29]

MATERIALS AND METHODS

Total 100 cases were studied in Krishna Institutes of Medical Sciences, Karad. All adult age > 18 years admitted for acute coronary syndrome were eligible for this study. Patients were grouped according to their 25 (OH) D levels within the total number of ACS cases. The ACS group was studied as STEMI, NSTEMI and Unstable Angina. The groups studied were those with vitamin D levels < 20 ng/mL, 20 - 30 ng/mL, > 30 ng/mL linked to presence of myocardial infarction and ischaemia. ACS was identified on the basis of typical history of angina, ECG changes with or without elevated cardiac enzymes. Patients with history or presence of any of the following were excluded from this study. a) Chronic kidney disease (Creatinine ≥ 2 mg/dL), b) Valvular Heart Diseases, c) Congenital Heart Diseases, d) Liver Cirrhosis, Alcoholic Liver Disease, e) Calcium and Vit D supplementation, f) Use of corticosteroids and rifampicin, g) Abnormal calcium levels (Normal reference range - 9 to 11 mg/dL), h) Pregnancy/Lactation, i) Diabetes mellitus.

All patients underwent thorough history including time of onset of typical chest pain, nature of pain, increasing with exertion and associated symptoms like excessive sweating and breathlessness. A thorough clinical examination was carried out in each case with special reference to pulse, blood pressure, cardiovascular and respiratory examination for the presence of murmur, crepitations and S3 gallop.

During hospitalisation, complete blood count, urine, fasting and post-prandial blood glucose, blood urea, serum creatinine, liver function tests, chest x-ray, ECG, CPK MB, Troponin-I and 2D echo were done. Venous blood sample sent for vitamin D2 estimation by radioimmunoassay.

According to published data and to the US Endocrine Society guideline recommendations,[30] we used the following cut-off values for classifying vitamin D status: > 30 ng/mL were considered normal vitamin D levels; between 30 and 21 ng/mL were classified as vitamin D insufficiency and < 20 ng/mL as vitamin D deficiency.

RESULTS

One hundred patients were included in the study (Mean age 58.58, 68% male and 32% female), 62% of whom were admitted with STEMI, 20% NSTEMI and the remaining 18% with Unstable Angina; 36% of the patients were between 61 - 70 years of age and 32% were between 51 - 60 years of age. Thus, over 74% of them were above the age of 50 yrs. at the time of presentation.

No. of Cases	100
Male	68
Female	32
Mean Age of Year	58.58
Age range from	28 - 85

Table I. Demographic Data of ACS

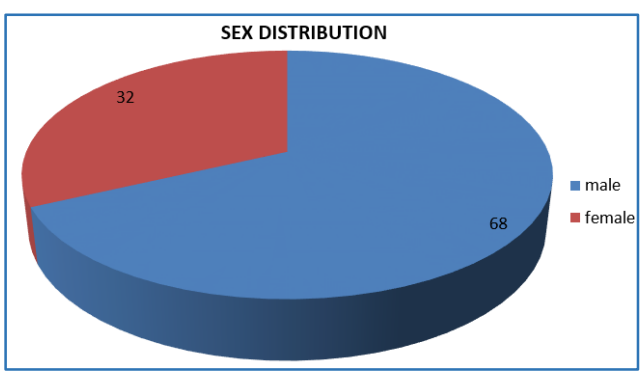

Figure I. Sex Distribution among Study Population

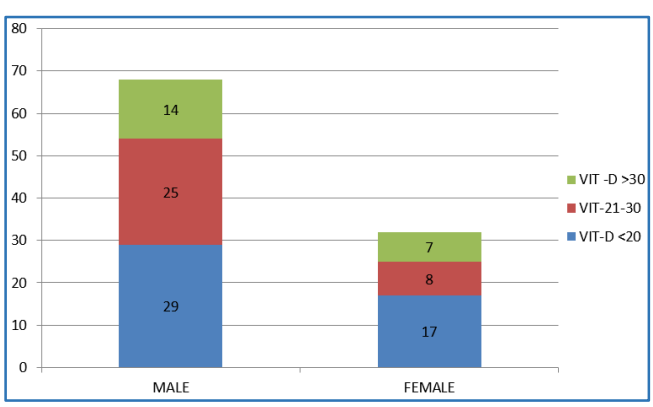

Figure II. Frequency of Vitamin D Level in Male and Female

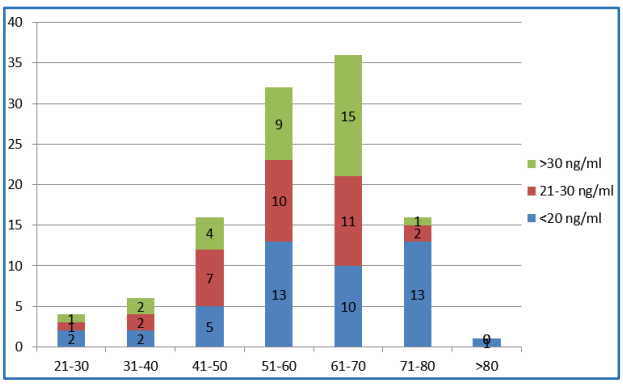

Figure III. Age Distribution among the Study Population with Vitamin D Level

Type of ACS	VIT-D < 20 ng/mL	VIT-D 21-30 ng/mL	VIT-D > 30 ng/mL	Total
STEMI	29	21	12	62
NSTEMI	10	6	4	20
Unstable Angina	7	6	5	18
Total	**46**	**33**	**21**	**100**

Table II. Frequency of Vitamin D Level in ACS Patients

DISCUSSION

Coronary heart disease is a leading cause of mortality and morbidity worldwide and elderly people are at special risk (Lopez AD, et al 2006).[31] Vitamin D deficiency is not uncommon and it is associated with cardiovascular risk. A total of 100 patients were included in this study. The mean age of patients with acute coronary syndrome was 58.58 SD ± 12.38 years, a study conducted in patients enrolled in the Saudi Project for Assessment of Acute Coronary Syndrome (SPACE), in which the mean age of patients was 58 SD ± 12.9 years which supports our study,(31) Khalid AA et al (2012).[32]

Our study showed a preponderance of male among study population. Total male under study were 68%, while the female under study were 32%. Similarly, Hersi A et al (2013) found in a study conducted in coronary syndrome patients, that males were predominant (77%).[33]

In the current study, the percentage of Vitamin D deficiency individuals among the study population amounted to 46% and Vitamin D insufficiency 33%. Similarly, Luis et al (2013) confirmed high vitamin D deficiency among coronary syndrome patients (98%).

Additionally, Satish K et al (2014) in a study published in India stated that of the patients enrolled 67.5% were 25-hydroxyvitamin D deficient and 16% insufficient for a total of 83.5% of patients with abnormally low 25-vitamin D level and in accordance with the present study.[34]

There is accumulating knowledge about the wide distribution of vitamin D receptors in the cardiovascular system, gastrointestinal tract, muscles, endocrine and others; hence, vitamin D deficiency could participate in the pathogenesis of many diseases including vascular disorders (DeLuca HF, et al 2004).[35]

In the present study, no correlation was evident between vitamin D level, age and sex, similar to Satish K et al (2014), who stated that no significant heterogeneity was observed between age or gender subgroups, but 25 (OH) D deficiency was more commonly seen in those with lower socioeconomic status, lower activity levels, hypercholesterolemia and hypertriglyceridemia.[34]

Several epidemiological studies provided evidence that vitamin D deficiency is associated with atherosclerosis and cardiovascular adverse events in the general population (Brown AJ et al 2007).[36]

CONCLUSION

Vitamin-D deficiency and insufficiency were common in patients with acute coronary syndrome patients. Further, larger multicentre studies are needed to assess vitamin-D level in acute coronary syndrome patients and to investigate its relationship with long-term prognosis.

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