

Assessment of Vitamin D Levels in Patients with Acute Coronary Syndrome and Its Risk Factors

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Abstract

Original Research Article

Background: Conventional risk factors for acute coronary syndrome (ACS) have failed to explain highly variable prevalence of ACS among different races. Growing body of evidence has identified vitamin D (25OHD) deficiency as a potential risk factor for ACS. **Objectives:** 1) To determine the relationship between vitamin D level and ACS 2) To analyze vitamin D level with other risk factors of ACS. **Material and methods:** 100 patients diagnosed as ACS. Serum 25OHD concentrations were analyzed, and risk factors for ACS were evaluated. **Results:** Out of 100 patients diagnosed as ACS. 25OHD was deficient in 40 patients and insufficient in 54 patients and was normal in only 6 patients. Out of the total 63 Diabetic patients, 32 were 25OHD deficient and 31 were insufficient. Out of 76 Hypertensive patients, 33 were 25OHD deficient and 40 were insufficient and four patients had normal levels. Of the 13 patients who didn't had either of risk factor 25OHD deficiency was seen in 5 patients and insufficiency in 5 patients and normal level in 2 patients. **Conclusion:** In the current study we observed a significant deficiency of vitamin D in patients with acute coronary syndrome and its risk factors. Since Vitamin D deficiency is a potentially modifiable risk factor, patients getting admitted with acute coronary syndrome should be screened and treated accordingly.

Keywords: ACS, vitamin D, risk factors.

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INTRODUCTION

Coronary artery disease (CAD) is a major cause of cardiovascular death worldwide. Asian Indians have been noted to have the highest CAD rates and the conventional risk factors fail to explain this difference completely. Several studies examined the CAD risk factors. A majority of this data is collected from white adult males and is extrapolated to ethnic populations such as Asians and African-Americans. Extrapolation of this data to native Asian Indians could be erroneous [1].

Conventional risk factors for CAD have been extensively studied. Obesity, diabetes, hypertension, dyslipidemia, metabolic syndrome and smoking are all highly associated with CAD development. However, these risk factors do not account for the increased prevalence of CAD and mortality associated with CAD seen in Asian Indians. Heart disease is occurring in Asian Indians 5–10 years before other ethnicities because the CAD shows accelerated atherogenesis which results in higher premature morbidity and

mortality. Since Asian Indians have a lower prevalence of conventional risk factors such as hypertension, hypercholesterolemia, obesity and smoking, it is important to explore the underlying causes of increased CAD prevalence [1].

Apart from this, a significant proportion of first cardiovascular events occur among individuals without traditional risk factors. To evaluate the risk factor of acute coronary syndrome (ACS), in addition to classical risk factors several biochemical indicators may be used. Recently attention has been focused on various novel inflammatory markers; especially vitamin D. Particularly a growing body of evidence has identified vitamin D deficiency as a potential risk factor for acute coronary syndrome. Vitamin D has antiatherosclerotic, anti-inflammatory and direct cardio-protective actions. Studies report an inverse relationship between levels of vitamin D and atherosclerotic calcification [2]. In the recent years, pleiotropic effects of vitamin D has been increasingly recognized and low 25(OH) vitamin D levels have been tied to other CAD risk factors like hypertension, heart failure, diabetes mellitus, coronary

artery disease, stroke and mortality in numerous epidemiologic, observational and experimental studies[3].

MATERIAL AND METHODS

This is a Descriptive cross sectional study. Conducted at Mandya Institute of Medical Sciences, (MIMS) Mandya, over a period of three months, from November 2019 to January 2020. Patients coming to emergency with chest pain and diagnosed as acute coronary syndrome were admitted in ICCU.

Information collected during diagnosis of acute coronary syndromes made by history, physical examination, electrocardiogram and CK-MB and troponin levels (more than three times the normal limits) was entered into a structured proforma. Conventional risk factors were evaluated. Serum vitamin D level was sent in all the patients.

INCLUSION CRITERIA

All ACS patients

EXCLUSION CRITERIA

Patients with renal or hepatic disease, malignancy, rickets, osteomalacia, severe protein energy malnutrition on vitamin D therapy, and intake of drugs like PTH analogues those on phenytoin or other medications that can affect vitamin D level, and patients who refused or unable to give consent.

All the data collected was entered into an excel sheet and analysed.

Ethical considerations

The protocol for this study was approved by the Medical Research Coordinating Committee. MIMS, Mandya.

RESULTS

Total of 100 patients diagnosed as having ACS were included in study. 60 patients were female and 40 were male. Mean age group was 63(+/-10) Table 1.

Table-1: General characteristics of study patients and other variables.

VARIABLES	
Age (years)	63(+/-10).
Sex: Male	40
: Female	60
Diabetics	63
Hypertensive	76
Patients without DM and hypertension	13
Average HbA1c (%) among DM	8.72
Smokers	11
Alcoholics	20

Vitamin D was deficient (< 25 nmol/L) in 40 patients and insufficient (26-75 nmol/L) in 54 patients and was normal (76-250 nmol/L) in only 6 patients. (Figure 1) and Table 2.

52 patients had both Diabetes Mellitus (DM) and hypertension as a risk factor, 11 and 24 patients had DM and Hypertension as a sole risk factor respectively. And 13 patients did not have either of the risk factors.

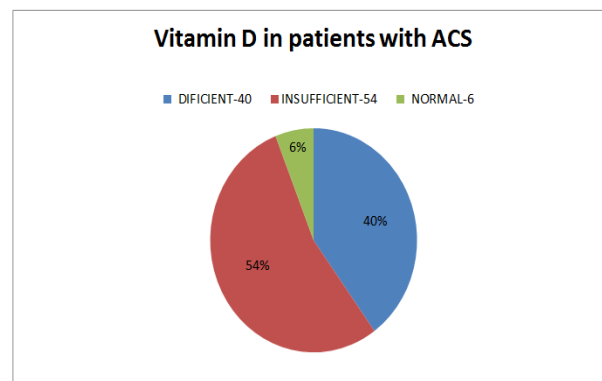


Fig-1: Vitamin D levels in patient with ACS

Table-2: Serum Vitamin D level among ACS patients

Vitamin d levels	Average value in acs patients	Number of patients
Deficient (< 25 nmol/L)	20.12	40
Insufficient (26-75 nmol/L)	47.3	54
Normal (76-250nmol/L)	110.3	6

Out of the total 63 diabetic patients, 32 were vitamin D deficient and 31 were insufficient (figure-2).

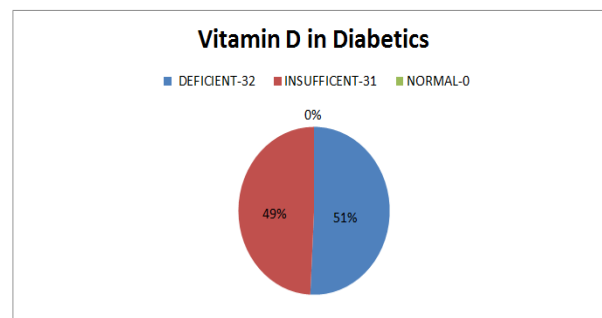


Fig-2: Vitamin D level in ACS patients who were Diabetic

Out of 76 hypertensive patients, 33 were vitamin D deficient and 40 were vitamin D insufficient and 4 patients had normal vitamin D level (figure 3).

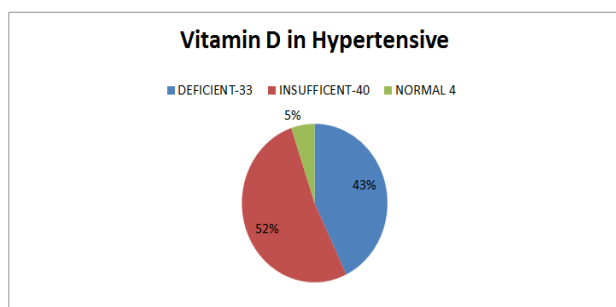


Fig-3: Vitamin D level in ACS patients who were Hypertensive

Of the 13 patients who didn't had either of risk factor Vitamin D deficiency was seen in 5 patients and insufficiency in 5 patients and normal level in 2 patients.

DISCUSSION

Vitamin D deficiency has been shown to be associated with autoimmune diseases, including rheumatoid arthritis, systemic lupus erythematosus, inflammatory bowel disease, multiple sclerosis, and type 1 diabetes, and that vitamin D supplementation prevents the onset and/or development of these autoimmune diseases [4, 5].

Relationship between the cardiovascular system and vitamin D status was first demonstrated in a study on a rat model deficient in vitamin D more than 20 years ago. Vitamin D has antiatherosclerotic, anti-inflammatory and direct cardio-protective actions. Studie report an inverse relationship between levels of vitamin D and atherosclerotic calcification. Also, vitamin D levels are correlated with other coronary heart disease risk factors, such as hypertension, hyperlipidemia, and diabetes. So, the association between vitamin D deficiency and ischaemic heart disease may occur directly or indirectly by influencing the risk factors for ACS [2].

Hence a cross sectional study was conducted to determine the relationship between vitamin D level and ACS and to analyze vitamin D level with other risk factors of ACS. In our study, vitamin D was significantly low in ACS patients. Out of the hundred patients recruited ninety-four patients had vitamin D levels below normal range (deficient in 40 patients and insufficient in 54 patients) and in only six patients vitamin D was in the normal range.

Many studies conducted had similar results. A study conducted by Bijaya M *et al.* at the Department of Medicine, Tata Main Hospital, Jamshedpur. 100 cases of acute coronary syndromes and randomly selected 100 ages and sex-matched controls were analyzed. The average serum vitamin D level in ACS patients was lower (28.30 ng /ml) than the healthy participants (32.97 ng/ml) which was statistically significant. They observed an inverse association between acute coronary syndrome and vitamin D deficiency [2].

A similar study conducted by Ismail Doğu *et al.* in One hundred people, who included 50 patients with ACS and 50 subjects with normal coronary arteries, vitamin D and corrected calcium levels were significantly lower in patients group with ACS when compared with patients with normal coronary arteries independent of seasonal fluctuation [3].

Among the 63 diabetic, 32 were vitamin D deficient and 31 were insufficient. In another study conducted by Gondim *et al.* at the University of Pernambuco Medical School, Assessing vitamin D in diabetics with the acute coronary syndrome. The diabetic patients had a lower mean vitamin D (20.34 ng/mL vs 23.64 ng/mL) when compared with non-diabetic patients. Also, Diabetics with vitamin D deficiency had more multivessel lesions in the coronary angiography than non-diabetics [6].

Vitamin D level has also been implicated in the pathogenesis of hypertension. A study conducted by Forman *et al.*, reported that the individuals with suboptimal vitamin D levels had higher circulating angiotensin II levels and blunted renal plasma flow responses to infused angiotensin II suggesting activation of the RAAS in the setting of lower plasma vitamin D level. In our study out of 76 hypertensive patients, 33 were vitamin D deficient and 40 were vitamin D insufficient and 4 patients had normal vitamin D level [7].

CONCLUSION

Vitamin D deficiency is rampant in India despite plenty of sunshine. In the current study, we observed a significant deficiency of vitamin D in patients with acute coronary syndrome and its risk factors. Since Vitamin D deficiency is a potentially modifiable risk factor, patients getting admitted with the acute coronary syndrome and all the patients with diabetes mellitus and hypertension should be screened for serum vitamin D and treated accordingly. However, there needs to be more studies focusing to confirm the real effect of vitamin D on acute coronary syndrome and its risk factors.

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