



Correlation of Vitamin D level with severity of Coronary Artery Disease(CAD) in patients of Acute Coronary Syndrome(ACS) in a Single Tertiary Care Academic Centre in Eastern India

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Abstract

Introduction: Now-a-days it is quite clear that there remains an association between cardiovascular disease and Vitamin D deficiency.¹ However its prevalence in ACS is unknown. Vitamin-D deficiency seems to predispose to Hypertention, Diabetes Mellitus, Left Ventricular Hypertrophy, Congestive Heart Failure and chronic vascular inflammation.² Recent evidence has suggested that lower level of Vitamin D is associated with increased all cause and cardiovascular mortality.³

Aims and Objectives: Because Vitamin D deficiency is readily traceable and its supplementation, potentially will be able to improve the outcome of deficient patient, this single tertiary academic centre study is conducted to find out the relation of Vitamin D deficiency with severity of coronary artery disease in patients admitted with acute coronary syndrome.

Materials & Methods: 102 cases of ACS, having estimation of their 25(OH) Vitamin D level following CAG, were included in this study at SCBMC and Hospital Cuttack.

Results: Severe 25(OH) Vitamin D deficiency was found in 6 (5.9%) patients and was associated with almost 2.2 times more triple vessel disease(TVD) and one third times less single vessel disease(SVD) compared to normal or mild to moderate 25(OH) Vitamin D deficient patients. Female patients have significantly lower 25(OH) Vitamin D level compared to the male patients (P<0.001)

Conclusion: Prevalence of 25(OH) Vitamin D level deficiency was high (69.6%) in post ACS setting. Female patients were having statistically significant lower 25(OH) Vitamin D level. (P<0.001) All those with severe deficiency are 2.2 times more likely to develop TVD compared to normal and mild to moderate deficient patients.

Keywords: Coronary Artery Disease, Acute coronary syndrome, 25(OH) Vit.D.

Introduction

Recent evidence has suggested that lower level of Vitamin D is associated with increased all cause and cardiovascular mortality. It is also one of the risk factors in coronary atherosclerosis. An excess of parathormone (PTH) level is known to promote atherosclerosis, which is associated with Vitamin D deficiency serving as one of the contributing factor.⁴ Vitamin D is also known to down regulate proinflammatory cytokines e.g. TNF, IL-6 and upregulate anti inflammatory cytokine IL-10.

Aim & Objective

To study the relation of 25 (OH) Vitamin D deficiency in patients of ACS and its correlation with the no. of coronary arteries involved.

Material and Method

125 cases of ACS were included in the present study, conducted at S.C.B. Medical College, Cuttack, Odisha, India in the Department of Cardiology during 6 months from June 2017 to December 2017. Clinical and biochemical risk factors were assessed in all 125 patients following ACS. Serum 25 (OH) Vitamin D level was assessed in 102 patients only using radio immuno assay.

The serum sample of all enrolled patients were sent to a single central lab for analysis using fully automated chemiluminescent immunoassay on seimens ADVIA centaur. Normal level was >30 ngm/ml. Patients with 10-30 ng/ml of 25(OH) Vitamin D were stamped as mild-moderate deficiency and those having below 10 ng/ml as severely deficient. Coronary angiography was performed through standard femoral or radial artery approach. CAD was defined when a segment of the epicardial coronary artery of size more than 1.5 mm had a diameterstenosis of >50%, either diagnosed visually or by using quantitative coronary angiography (QCA) software when needed. According to the no. of vessels involved (LAD, LCX, RCA), they were

grouped as SVD. DVD or TVD. LM was included as DVD.

Inclusion Criteria

All patients of age greater than 18 yrs and less than 75 years with classical symptoms of ACS along with EKG and/or biomarkers evidence of ACS underwent coronary angiogram. Patient's demographic data included age, gender and associated coronary risk factors.

Exclusion Criteria

Patients age less than 18 or more than 75, Patients with cardiogenic shock, CKD, pregnancy, patients on calcium or Vitamin D supplementary drugs were excluded.

Statistical Analysis

25(OH) Vitamin D level in both genders was compared using unpaired 't' test and the relation of 25(OH) Vitamin D level to the CAD severity was compared using the chisqu are test. P value of <0.05 was considered significant.

Results

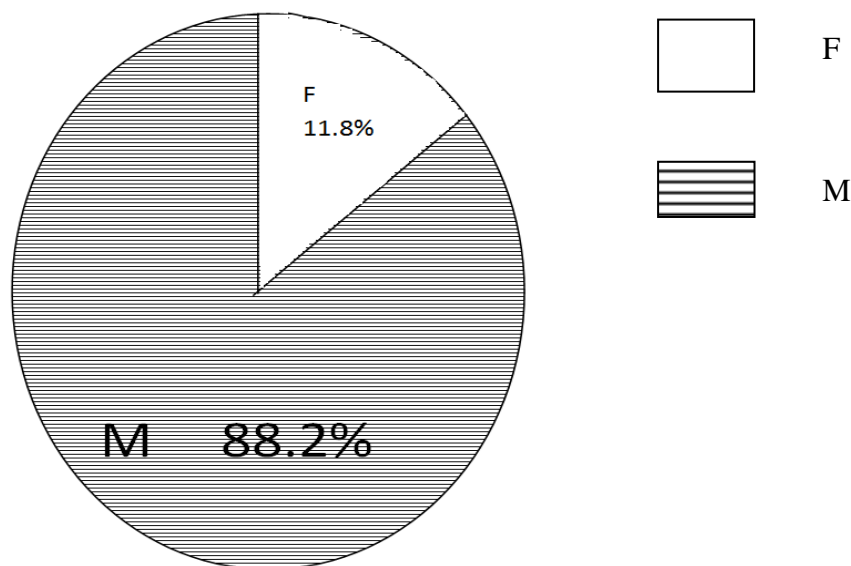
Out of 102 cases having 25(OH) Vitamin D estimation, 3 (2.9%) had normal coronaries to recanalized coronaries, 49 (48%) had SVD, 26 (25.5%) had DVD and 24 (23.5%) had TVD. Amongst the 31 patients with normal or sufficient 25(OH) Vit. D, the level was found to be from 30.20 to 40.10 ng/ml with a mean value of 33.57 ± 2.99 ng/ml. Amongst the 65 patients with mild to moderate 25(OH) Vitamin D deficiency the level varies from 10.58 to 29.97 ng/ml with a mean value of 20.85 ± 5.33 ng/ml. 6 patients with severe 25 (OH) Vit.D deficiency, the level ranged from 6.38 to 9.74 ng/ml with a mean value of 8.83 ± 1.32 ng/ml.(Table-1)

Table – 1

Distribution of Patients as per 25(OH) Vitamin D level		
	η (102)	Mean ± SD 25(OH) Vit.D Con.(ng/ml)
Normal Vitamin D	31	33.57 ± 2.99
Mild to Mod Deficiency	65	20.85 ± 5.33
Severe Vitamin D Deficiency	6	8.83 ± 1.32

Out of 102 patients of ACS, 90 were male (88.2%) and 12 were female (11.8%).(Fig.1)

Male Vs Female patients with CAG undergoing Vitamin D estimation



The 25(OH) Vitamin D level in the male patients was ranging from 8.24 ng/ml to 40.10 ng/ml with a mean value of 25.01 ± 7.85 ng/ml. Similarly in the female patients the level of

25(OH) Vitamin D level was found to be varying from 6.38 ng/ml to 27.31 ng/ml with a mean value of 16.11 ± 6.64 ng/ml. (Table.2)

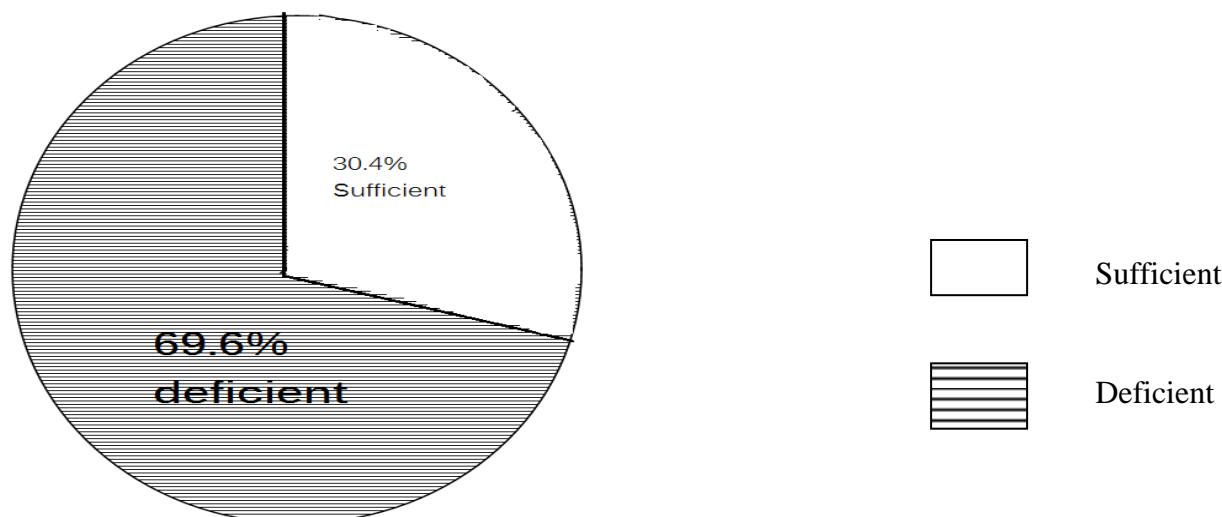
Table – 2

25(OH) Vit.D Level in Males Vs Females	
Sex (η)	Mean ± SD 25(OH) Vit.D (ng/ml)
Male (90)	25.01 ± 7.85
Female (12)	16.11 ± 6.64

When subjected to statistical analysis by unpaired ‘t’ test, the ‘t’ test value was found to be 4.23 with P value <0.001, hence statistically quite significant. Thus female patients in this part of India have significantly less of 25 (OH) Vitamin D level compared to the male patients. Out of the 102 patients of ACS with CAG, who had

undergone 25(OH) Vitamin Destimation, 71 (69.61%) had their level deficient in this part of the country. Thus deficiency of serum 25(OH) Vitamin D is highly prevalent in this eastern part of India.(Fig.2)

Fig.2 Distribution of 25(OH) Vitamin D level in eastern part of India



Out of the 31 patients with sufficient Vitamin D, SVD was found in 16(51.6%), DVD in 7(22.6%) and TVD in 8(25.8%). (Table.3)

Table – 3

CAD Distribution in patients with Normal 25(OH) Vitamin D level (>30 ng/ml)		
CAG	n (31)	%
Normal	0	0
SVD	16	51.6
DVD	7	22.6
TVD	8	25.8

Out of 65 patient with mild-moderate Vitamin D deficiency 32 (49.2%) had SVD, 17 had DVD (26.2%) and 13 (20.0%) had TVD. (Table.4)

Table – 4

CAD Distribution in Mild-Mod 25(OH) Vitamin D deficiency (10-30 ng/ml.)		
CAG	n(65)	%
Normal	3	4.6
SVD	32	49.2
DVD	17	26.2
TVD	13	20

Out of 6 patients with severe Vitamin D deficiency, 1 (16.7%) had SVD and 2 had DVD (33.3%) and 3 had TVD (50%).(Table.5)

Table – 5

CAD Distribution in Sev. 25(OH) Vitamin D deficiency (<10 ng/ml)		
CAG	n (6)	%
Normal	0	0
SVD	1	16.7
DVD	2	33.3
TVD	3	50.0

Thus patient with severe Vitamin D deficiency had severe Coronary artery disease like triple vessel disease (TVD). The relative risk is almost 2.2 times compared to normal or mild to moderate Vitamin D deficiency cases. Similarly they suffer

less from SVD compared to the other two above mentioned groups, the relative risk being 0.33 times. Distribution of DVD did not show a clear trend with the 25(OH) Vitamin D level amongst the three groups.

Table – 6

CAD Distribution Vs 25(OH) Vitamin D level			
CAG / Vitamin D	SVD	DVD	TVD
Nrmal Vit. D	51.6%	22.6%	25.8%
Mild-Mod Vitamin DDef.	49.2%	26.2%	20%
Sev Vitamin D Def.	16.7%	33.3%	50%

However, when subjected to statistical analysis the (χ^2) chi-square value was found to be 3.6441 and the intergroup P value thus calculated came to 0.456.(Table.6)

Discussion

This study shows comparably high prevalence (69.61%) of 25(OH) Vitamin D level deficiency in ACS patients in eastern part of India. This study is comparable with that of Goswami R et al from North Indian rural population.⁶ A similar study from Andra Pradesh in India reported a very high prevalence of Vitamin D deficiency.⁷ High prevalence of 25(OH) Vitamin D deficiency in this part is also supported by the observation of higher proportion of non caucasians in 25(OH) Vitamin D deficiency group by Matsuoka et al⁸ because of their skin pigmentation. In our study, patients with severe 25 (OH) Vitamin D deficiency had a relative risk of 2.2 compared to normal or mild to moderate deficient cases, to develop TVD. A similar study by Syal et al from North India found that people with deficient Vitamin D level had more severe CAD.⁹

Limitations

The study is a single tertiary centre result recruiting small number of enrollees, those who could have 25(OH) Vitamin D estimated during their in hospital stay for ACS .Three of the patients had normal to recanalized coronary arteries, as cases of thrombolysis were not excluded from the present study. Thus more number of patients if recruited could show a more significant relation of severe Vitamin D deficiency with TVD in future. Patients with

leftmain coronary disease were included as DVD, which might have impacted our result. Recruiting patients almost during the winter months, without any patient enrollment from Jan to May, could have altered the mean level of 25(OH) Vitamin D in the study towards higher prevalence of deficiency. Another important limitation was the lack of a control group for comparison with the CAD patients.

Summary and Conclusion

As per our study from a single tertiary academic centre of eastern India, 25(OH) Vitamin D deficiency is quite common in ACS patients in this part of the country. Female patients have a significantly lower 25(OH) Vitamin D level compared to male patients. Severe 25(OH) Vitamin D deficiency is associated with increased risk of TVD. Thus prospective large scale studies are needed to investigate their role in CAD extent and benefit on treating this very common deficiency disorder.

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