

Prevalence of Vitamin D Deficiency in Critically Ill Patients of Acute Coronary Syndrome

B.N. Bhogal, Vishal R Tandon*, Annil Mahajan, Vijay Kundal

Abstract

To evaluate the prevalence of vitamin D deficiency among patients of ACS and establish any correlation between two states. This prospective observational cross sectional analysis was carried out. Group-1: included 50 patients of ACS of both sex with any co morbid condition and Group 2: included age matched 50 apparently healthy subjects of both sex. Vitamin D levels were measured by radioimmunoassay & compared statically to find out any possible correlation. In the current study vitamin D deficiency was recorded in 38% and insufficiency in 52% of total patients of ACS taking total count to 90% and only 10% of the population had adequate Vitamin D levels. Significant ($p < 0.01$) correlation between the vitamin D deficiency and ACS in comparison to healthy controls was recorded. Study recorded a very high vitamin D deficiency in patients of ACS and suggests significant correlation between the two.

Key Words

Vitamin D deficiency, Cardiovascular, Acute Coronary Syndrome

Introduction

Vitamin D deficiency is a worldwide health problem. A very high prevalence (96%) of vitamin D deficiency has been reported in patients of coronary artery disease. (1) A growing body of evidence supports an association between vitamin D and cardiovascular disease. (2) Vitamin D deficiency is also reported to be associated with substantial increases in the incidence of cardiovascular risk factors like hypertension, hyperlipidaemia, myocardial infarction and stroke, as well as in diseases such as chronic kidney disease and type 1 & 2 diabetes. (3, 4) Furthermore, severe vitamin D deficiency is independently associated with in-hospital cardiovascular mortality in patients with acute coronary syndrome. (5, 6)

The data do exist from western world about correlation between ACS and Vitamin D deficiency but to best of

our knowledge no study exists from India setup evaluating such correlation. Moreover, such a data will be of immense use for the Indian health care providers. Hence, the current study was undertaken to evaluate the prevalence of vitamin D deficiency among patients of ACS and establish any correlation between two states.

Material and Methods

This prospective observational cross sectional analysis was carried in subjects of both sexes by constituting two groups. Group-1: included 50 patients of ACS with any co morbid profile presenting in medical emergency of tertiary care medical college, Jammu and Group 2: age matched 50 apparently healthy subjects without known history of diabetes, thyroid, renal or hepatic disease or malignancy. Patients with history of surgery, hospitalization, or major medical illness within the past

From PG Deptt. of G Medicine and Pharmacology*, Government Medical College, Jammu (J&K)- India

Correspondence to : Dr B.N Bhogal, Asst. Professor Department of G Medicine Govt Medical College, Jammu, J&K- India

one year were excluded from the study. Patients on hormone replacement therapy, glucocorticoids, biophosphonates, teriparatide and other drugs affecting bone metabolism were excluded as well. Surgical and other iatrogenic causes of menopause were also excluded from the current study.

Intake of conventional calcium/vitamin D supplements was not considered an exclusion criterion. All subjects were enrolled after taking a written informed/ voluntary consent. The institutional Ethics committee permission vide no. IEC/R1/2013/06b dated 25.10.2013 was taken for the said study. The 25(OH) D concentrations were measured by competitive radioimmunoassay. The minimal detectable limit of the 25(OH)D assay was 1.5 ng/mL. The subjects were classified as vitamin D-deficient, insufficient or sufficient on the basis of 25(OH) D concentrations of < 20 ng/mL, 20-30 ng/mL or > 30 ng/mL respectively, according to recent consensus. (7)

The data was analysed by one laboratory after standardization. The groups were compared statically to find out any possible correlation between vitamin D deficiency and ACS.

Statistical Analysis

The data was categorised as mean±SD and n (%) and Correlation between Vitamin D and ACS was established by using Parson Coefficient Correlation Test comparing the vitamin D deficiency between ACS and normal subjects. The P Value (2 tailed) < 0.05 was considered significant.

Results

The *table-1* shows the clinical profile of population in group-1. In the current study vitamin D deficiency was recorded in 38% and insufficiency in 52% of total patients of ACS taking total count to 90%. Whereas, only 10 % of the population had adequate Vitamin D levels. Significant (p<0.01) possible correlation between the prevalence of vitamin D deficiency and occurrence of ACS in comparison to healthy controls. (*Table-2*)

Table-1. Clinical Profile of Myocardial Infarction Patients

ACS	
Global Infarct-8(16%)	
Anterior Wall Infarct-13(26%)	
Inferior Wall Infarct-17(34%)	
Posterior Wall-4(8%)	
NSTEMI- 8(16%)	
Diagnostic profile	
Trop -T Test positive -50(100%)	
ECG-50(100%)	
TMT-6(12%)	
Angiography - 4(8%)	
Most Common Symptoms:	
Chest Pain- (96%) ,	
Diaphoresis- (80%),	
Nausea/Vomiting- (60%)	
Risk Factors	
HT	22(44%)
DM	10(20%)
Hyper-uric state	4 (8%)
Dyslipidemia	9(18%)
Smoking	16(32%)
Alcohol	18(36%)
Obesity	11(22%)
Metabolic Syndrome	3(6%)
COPD	2(4%)
Thyroid Dys function	5(10%)
Complications	
ALVF	4(8%)
LBBS	1(2%)
RBBB	1(2%)

Discussion

In the current study vitamin D deficiency was recorded in 38% and insufficiency in 52% of total patients of ACS on taking total count to 90%. Whereas, only 10 % of the population had adequate Vitamin D levels in our analysis. The results of the current study are in accordance with the study of lee JH *et al* (1) wherein they reported very high prevalence up to 75% as 25(OH)D deficient and 21% as insufficient, making a total of 96% of patients with abnormally low 25(OH)D levels who presented with coronary artery disease.

Table-2. Vitamin D Status of Patients of MI in Comparison to Healthy Control

MI Patients		Healthy Control	
Mean Age –	65.1	63.48	
M: F-	36(72%) :14(28%)	16(32%): 34(68%)	
U: R	26(52%) : 24(48%)	24(48%) :26(52%)	
Mean Vitamin D levels	21.832	26.427	
Vit D Status of the study Population			
Deficiency <20ng/ml	19(38%)	18(36%)	
Insufficiency 20-30ng/ml	26(52%)	22(44%)	
Adequacy >30 ng/ml	5(10%)	10(20%)	

**** Pearson Correlation is significant at the 0.01 level (2-tailed).**

Similarly, Mahdavi K *et al* (2) reported 72% of patients with acute coronary syndrome to had serum 25-hydroxyvitamin D level of 20 ng/ml or less.

In another study most subjects (92%) had suboptimal levels of 25(OH) D (<75 nmol/L), with 22.2% being severely deficient (<25 nmol/L) and optimal 25(OH)D levels substantially lowered all-cause and cardiovascular disease mortality in subjects with the metabolic syndrome.(8) Severe vitamin D deficiency has been shown to be independently associated with in-hospital cardiovascular mortality in patients with acute coronary syndromes. (6) However, this aspect was not studied in the current analysis.

Interestingly, in the current study, control group 80% of healthy individuals are shown to be vitamin D deficient and yet free from apparent cardiovascular events. This can be explained on the high prevalence of vitamin D deficiency existing in general population and probably the more number of female and mean age of 63.48 in the control group which was included after basic CVS screening in the current study.

The results of the current study suggested significant ($p < 0.01$) correlation between the prevalence of vitamin D deficiency and ACS in comparison to healthy controls.

In accordance to our study, Vitamin D deficiency has been shown to be associated with highly significant

($p < 0.0001$) increase in the prevalence of diabetes, hypertension, hyperlipidemia, and peripheral vascular disease. The vitamin D levels were also highly associated with coronary artery disease, myocardial infarction, heart failure, and stroke ($p < 0.0001$), as well as with incident death, heart failure, coronary artery disease/myocardial infarction ($p < 0.0001$) and stroke ($p = 0.003$). (9)

Severe vitamin D deficiency has been also suggested to be strongly associated with sudden cardiac death, cardio-vascular events and mortality and borderline associations with stroke and fatal infection. (10)

On contrary to our study results serum 25(OH)D levels did not differ significantly between the CVD and non-CVD groups in the study of Park S *et al* (11)

Similarly, the analysis of Grandi NC *et al* (12) carried in high-risk patients with stable CHD does not support a prognostic value of baseline-25-OH-D levels for secondary cardiovascular event incidence or all-cause mortality. This might be due to different nature, design of study and demographic profile of study populations.

The possible correlation between Vitamin D insufficiency and cardiac events has been postulated to be associated with metabolic, procoagulant and inflammatory events that predispose to atherothrombosis. In addition, VD insufficiency has been shown to be associated with endothelial dysfunction and subclinical

atherosclerosis. (13) Small sample size of the study is very small to generalize results of this study to Indian population. However, it addresses a major nutrition related health problem in Indian population which needs attention.

Conclusion

Current study indicates a very high vitamin D deficiency in patients of ACS with significant correlation between the prevalence of vitamin D deficiency and occurrence of ACS in comparison to healthy controls in Indian population.

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