



Study of Vitamin D Level in Patient Presenting with Coronary Artery Disease

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Introduction: *Coronary heart disease is common cause of morbidity and mortality worldwide. Vitamin D deficiency is common in general population, and is more prevalent among hospitalized patients.*

Vitamin D regulate cardiac contraction through its receptors in cardiac myocyte, and many studies support its role in acute myocardial infarction and heart failure. In this study, we seek to investigate the existence of an association between vitamin D and coronary heart disease in hospitalized patients.

Material and Method: *A case control study with 120 cases of coronary artery disease and 40 healthy controls was conducted. The standard clinical and biochemical risk factor for myocardial infarction were assessed in both cases and controls. Serum vitamin D assay was performed in cases and controls using radioimmunoassay technique.*

Observation: *Vitamin D deficiency < 20 ng/ml was higher in cases (67%) than control (50%), with respect to this mean level was lower in case (18.96 ng/ml) and control (21.84 ng/ml) respectively. P value is < 0.0394.*

Conclusion: *This study reveals high prevalence of vitamin D Deficiency in case and controls with level of 25 (OH) D being significantly lower among cases.*

Introduction

Vitamin D deficiency is highly prevalent worldwide.¹ 25-hydroxy-vitamin D (25-OH D) is the principal circulating storage form of vitamin D, low levels are present in as many as one third to one half of otherwise healthy middle-aged to elderly adults.¹⁻⁴ Limited cutaneous synthesis due to inadequate sun exposure or pigmented skin and inadequate dietary intake are the principal causes of low 25-OH D levels.

Vitamin D deficiency is prevalent in most parts of the world. Vitamin D exists in two forms: Ergocalciferol (D2) and cholecalciferol (D3).

Ergocalciferol is made in herbal resources and cholecalciferol through UVB (Ultraviolet B) radiation to the body skin. Generally, humans receive vitamin D by being exposed to the sun light or dietary intake, such as fish oil and nutritional supplements.^[5]

A serum level of less than 20 ng/ml 25 (OH) D is considered as vitamin D deficiency, between 20-30 ng/ml is taken as insufficient level and higher than 30 ng/ml is taken as desirable level.^[6]

Most body cells, including cardiomyocytes, vascular smooth muscles and the endothelium of the vessels have vitamin D receptors.^[7,8,9]

Recent studies indicates relationship between vitamin D deficiency and cardiovascular disease, increased blood pressure, increased insulin resistance, heart failure and fatal strokes.^[10]

The mechanism which causes the protective effect of vitamin D against cardiovascular diseases is not fully understood, but several mechanisms have been proposed such as the effect of the vitamin D on the renin-angiotensin system, vessel compliance, blood pressure, parathyroid hormone level and also glycemic control. In addition, vitamin D has anti-inflammatory effects and prevents cholesterol removal by macrophage and foam cell formation on vessels walls. Also an inverse relation has been seen between vitamin D serum level and coronary artery calcification.^[11]

Aims and Objectives

- To assess the level of vitamin D (25_hydroxy vitamin D) in patients with coronary artery disease.
- To elucidate a possible correlation between the level of vitamin D (25_hydroxy vitamin D) in patients with coronary artery disease.

Materials and Methods

Materials: The study was conducted in the Department of Medicine, Netaji subhash Chandra Bose Medical College and Hospital Jabalpur from march 2015 to august 2016

Study Design

- Observational case control study

Duration of Study

- 1STMarch 2015 to 31 August 2016

Sample Size

- 120 Cases
- 40 Controls

Inclusion Criteria: cases

1. All patients admitted in our hospital diagnosed clinically, ECG wise and biochemically as Acute Coronary Syndrome / coronary artery disease.
2. Patient having history of Ischemic heart disease (IHD).

Inclusion Criteria: controls

Controls were healthy person or patients relative those who had no history of IHD or those had normal ECG, no regional wall abnormality in 2D Echo and normal TMT.

Exclusion Criteria

- 1) Patients on Vitamin D supplements.
- 2) Known case of chronic kidney disease.
- 3) Pregnant women.
- 4) Patients with underlying malignancies.
- 5) Patients who are not willing to be a part of the study.

Planning and Procedure

This is a observational cross sectional study.

The cases were selected by convenient sampling method from the patients admitted to the hospital with the diagnosis of angina pectoris and whom the existence of coronary artery disease had been proved by ECG, 2D-Echo, CPKMB and TMT.

Criteria for CAD

- Symptoms of ischemia plus detection of a rise in CPKMB.
- New or presumed new significant ST-segment–T wave (ST–T) changes or new left bundle branch block (LBBB).
- Development of pathological Q waves in the ECG.
- Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality.
- History of angina, chest pain and positive treadmill.
- ECG (exercise-induced horizontal or down- sloping ST depression of ≥ 1 mm at 80 ms from J point)
- Documented evidence of prior acute coronary syndrome (ACS) or treatment for CAD.
- Documented history of undergoing coronary angioplasty or CABG.

Risk factor including age, sex, education, smoking status, usage of antihyperlipidemic, antidiabetic and antihypertensive drugs were gathered through checklist. Weight, height and also the blood

pressure of the participants were measured by the standard protocol.

The levels of 25 (OH) D, Cholesterol and Fasting blood sugar were measured in the laboratory. Vitamin D measured by Radioimmunoassay method.

BMI (Body Mass Index) was calculated as weight/height²(kg/m²). And as per AACE guideline over weight consider if BMI >25.

As per Endocrine Society Clinical Guideline 2011, Vitamin D deficiency was considered as 25 (OH) D levels <20ng/ml .

As per American Diabetes Association (ADA) guideline 2015 diabetes was considered as FBS

levels ≥126 or PPBS >200 mg/dl or the consumption of antidiabetic drugs.

As per American Heart Association (AHA) Hypertension was considered as blood pressure ≥140/90 or the consumption of antihypertensive drugs.

As per NCEP ATP-3 CHOLESTEROL guideline Dyslipidemia was considered as blood cholesterol ≥200 mg/dl or the consumption of antihyperlipidemic drugs or HDL <40 mg/dl or LDL more than 100 mg/dl or TRIGLYCERIDE more than 150 mg/dl.

Observation& Result

Table – 1 Comparison of Mean Vitamin D Level, Age, SBP, DBP, BMI, FBS, PPBS, Total Cholesterol, HDL, LDL, TG in Cases and Controls.

Variable	Case		Control		P
	Mean	Std. Deviation	Mean	Std. Deviation	
S.Vitamin D	18.96	7.87	21.837	5.005	0.0319
Age	53.95	12.78	50.57	9.55	0.045
SBP	135.97	24.16	127.65	17.78	0.045
DBP	80.45	12.38	77.5	7.54	0.15
BMI	25.84	3.284	23.55	2.152	0.0001
FBS	104.02	38.52	98.55	24.09	0.399
PPBS	155.634	144.77	155.77	45.46	0.216
T.Cholesterol	184.20	49.212	161.17	33.55	0.0066
HDL	34.49	7.032	39.42	9.39	0.006
LDL	113.643	34.537	94.163	25.45	0.0013
VLDL	29.27	10.628	26.59	19.17	0.344
TG	124.937	45.02	120.248	45.19	0.7485
CPKMB	96.017	61.87	13.5	2.38	1

Table – 2 Distribution of Serum Vitamin D in Cases & Controls

	Deficiency <20ng/ml	Insufficiency 20-30 ng/ml	Sufficient >30ng/ml	Mean Vitamin D	Std. Deviation
Case	77 (64%)	26 (21.6%)	17 (14.3%)	18.96	7.878
Control	20 (50%)	12 (30%)	8 (20%)	21.84	5.000

Discussion

Table 1: Comparison of Mean serum 25 (OH) Vitamin D with AGE, SBP, DBP, FBS, BMI, T.CHOLESTEROL, HDL, LDL, TRIGLYCERIDE in cases and controls.

Present study has 120 cases and 40 controls Mean Serum vitamin D was less in cases (18.96 ng/ml) then in controls (21.67),and mean AGE, SBP,DBP, BMI, FBS, T.CHO, HDL, LDL,

TRIGLYCERIDE, VLDL in case was 53.95, 135.97, 80.45, 25.844, 104.029 mg/dl, T.CHO. 184.20 mg/dl, HDL 34.49mg/dl, LDL 113.643 mg/dl, TG 124.937mg/dl respectively. while mean in control was 50.574, 127.65, 77.5, 23.55, 98.522 mg/dl, 161.175 mg/dl, 39.922mg/dl, 94.163mg/dl, 120.248 mg/dl respectively.

Mean SBP, BMI, T. Cholesterol, LDL are significantly higher in case group (P value 0.045, 0.001, 0.0066, 0.0013).

Mean HDL is significantly lower in cases (P< 0.0006) as compared to controls.

Table 2 Distribution of serum vitamin D in cases and controls.

Serum vitamin D deficiency <20ng/ml was found in 77 case (67%), Insufficiency (21-29%) was found in 26 (21.6%) cases and sufficient vitamin D >30ng/ml was found in 17 (14.3%) in cases.

Compared to control group vitamin D deficiency was found in 20(50%) of control, insufficiency was found in 12 (30%) of control, sufficient level of vitamin D was found in 8 (20%) of control.

Mean Vitamin D level was 18.96ng/ml in cases (CAD), compared to controls which have 21.84ng/ml, P< 0.0319 which was statistically significant. John H.lee et al (2011) reported prevalence of vitamin D deficiency 75% in CAD patients. ⁽¹²⁾

Karman mahadevi, mohammadhassan, et al (2012) reported prevalence of vitamin D deficiency of about 72% in CAD patients. ⁽¹³⁾

Zahra dana siadat, Amir Sina Shariat et al reported prevalence of vitamin D deficiency 63.2 % in CAD patients. ⁽¹⁴⁾

Hyder O MirghaniMohammad Abdulla (april 2015) et al reported prevalence of vitamin D deficiency 62% in CAD patients. ⁽¹⁵⁾

Hegazy mohammed, Hisam M el, Alkomy Mostafa et al (2015) reported prevalence of vitamin D deficiency prevalence 70% in STEMI patient. ⁽¹⁶⁾

Our finding is consistent with all the above studies.

Conclusions

- 1) Occurrence of vitamin D deficiency was found to be higher in coronary artery disease patients (67%) as compared to controls (50%).
- 2) Mean vitamin D level was lower in disease group.

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