Assessment of Correlation of Vitamin D Level with Coronary Artery Disease

Reddi Basha Saheb Shaik [1], **Rondla Madhumitha** [2]

[1]Assistant Professor, Department of Cardiology, Narayana Medical College & Hospital, Chintareddy Palem, Nellore, Andhra Pradesh, India, [2]Post Graduate, Department of General Medicine, Narayana Medical College & Hospital, Chintareddy Palem, Nellore, Andhra Pradesh, India.

Abstract

Background: Cardiovascular disease (CVD) is the leading cause of death in the developed world. The present study was conducted to assess correlation of plasma 25-Hydroxy-Vitamin D level with angiographic severity in coronary artery disease. **Subjects and Methods:** The present study was conducted on 120 patients of CAD. Group I were cases and group II were control. Hypertension, type II diabetes mellitus status, smoking etc. was recorded. 2 ml of blood sample was taken from all patients and measurement of 25(OH) vit D levels was performed. **Results:** The mean BMI in group I was 24.6 kg/m^2 and 24.8 kg/m^2 in group II, smoking habit was seen in 78 in group I and 34 in group II, hypertension was seen in 65 in group I and 26 in group II, diabetes was seen in 52 in group I and 30 in group II, alcoholism in 36 in group I and 10 in group II, dyslipidemia was seen in 48 in group I and 15 in group II. The mean 25 (OH) vitamin D in group I was 15.1 ng/ml and 19.6 ng/ml in group II. The difference was significant (P< 0.05). Maximum dyslipidemia (80.5%) patients had low vitamin D level followed by DM, smoking, BMI, alcoholism and alcoholism. There was no correlation between risk factors and vitamin D deficiency (P> 0.05). **Conclusion:** Authors found that in cases, vitamin D level was lowered as compared to control, however, there was no correlation between risk factors and CAD.

Keywords: Coronary Artery Disease, Dyslipidemia, Vitamin D

Corresponding Author: Rondla Madhumitha, Post Graduate, Department of General Medicine, Narayana Medical College & Hospital, Chintareddy Palem, Nellore, Andhra Pradesh, India.
E-mail: rondlamadhumita@gmail.com

Introduction

Cardiovascular disease (CVD) is the leading cause of death in the developed world. Atherosclerosis is the principal cause of myocardial infarction and accounts for majority of these deaths.[1] The lifetime risk of developing CAD at the age of 40 is 50% for men and 33% for women.[2]

Evidence is increasingly showing that a deficiency of 25-hydroxyvitamin D [25(OH)D] causes a higher risk of several cardiovascular conditions including hypertension heart failure, coronary calcification, myocardial infarction, subclinical atherosclerosis, diabetes mellitus (DM), obesity, and peripheral vascular disease.[3] Emerging clinical data suggest a pleiotropic role of vitamin D in a variety of functions in humans.[4] The discovery that most tissues in the body have a vitamin D receptor and that several possess the enzymatic machinery to convert the primary form of vitamin D, 25-hydroxyvitamin D [25(OH)Vit D)] to the active form 1,25-dihydroxyvitamin D [1,25(OH)2 D] has provided new insights into the function of this vitamin.[5] Most tissues and cells in humans express vitamin D receptors (VDR), and vitamin D influences genes regulating many key cellular functions including cellular proliferation, differentiation, apoptosis, and angiogenesis. Of great interest is the role it can play in decreasing the risk of many chronic illnesses including common cancers, autoimmune diseases, infectious diseases, and cardio vascular disease.[6] The present study was conducted to assess correlation of plasma 25-Hydroxy-Vitamin D level with angiographic severity in coronary artery disease.

Subjects and Methods

The present study was conducted in the department of Cardiology. It comprised of 120 patients of CAD according to the American College of Cardiology and the American Heart Association (ACC/AHA) joint guidelines of both genders. 120 controls were also taken. Approval for the study was obtained from institutional ethical committee. All patients were informed regarding the study and written consent was obtained.

Data such as name, age, gender etc. was recorded. Group I were cases and group II were control. Hypertension, type II diabetes mellitus status, smoking, BMI, dyslipidemia and alcoholism etc. was recorded. A thorough clinical examination was performed. 2 ml of blood sample was taken from all patients and measurement of 25 (OH) vit D levels was performed.

Results

Table 1 shows that group I (Cases) had 70 males and 50 females and group II (Control) had 55 males and 65 females.

Table 2, Figure 1 shows that mean BMI in group I was 24.6 kg/m2 and 24.8 kg/m2 in group II, smoking habit was seen in 78 in group I and 34 in group II, hypertension was seen in 65 in group I and 26 in group II, diabetes was seen in 52 in group I and 30 in group II, alcoholism in 36 in group I and 10 in group II, dyslipidemia was seen in 48 in group I and 15 in group II. The difference was significant (P<0.05).
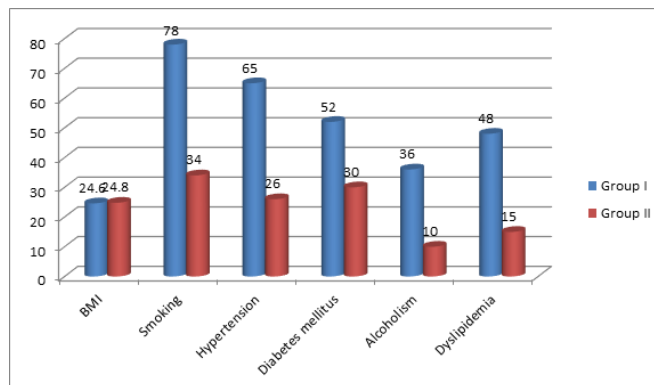

Figure 1: Demographic characteristics

Table 1: Distribution of patients

Groups	Group I (Cases)	Group II (Control)
Male	70	55
Female	50	65

Table 2: Demographic characteristics

Parameters	Group I	Group II	P value
BMI	24.6	24.8	0.91
Smoking	78	34	0.01
Hypertension	65	26	0.02
Diabetes mellitus	52	30	0.05
Alcoholism	36	10	0.01
Dyslipidemia	48	15	0.01

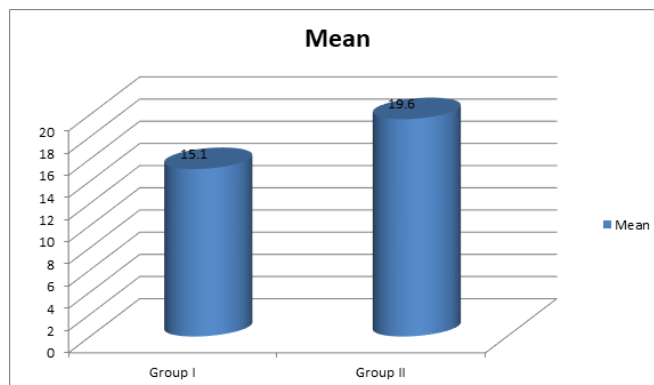**Figure 2: 25 (OH) vitamin D level in both groups**

Table 3: 25 (OH) vitamin D level in both groups

Parameters	Group I	Group II	P value
25 (OH) vitamin D (Mean)	15.1	19.6	0.02

Table 3 & Figure 2 shows that the mean 25 (OH) vitamin D in group I was 15.1 ng/ml and 19.6 ng/ml in group II. The difference was significant (P< 0.05).

[Table 4] shows that maximum dyslipidemia (80.5%) patients had low vitamin D level followed by DM, smoking, BMI, alcoholism and alcoholism.

Table 4: Prevalence of vitamin D deficiency and mean vitamin D levels in patients with different risk factors

Risk factors	% with vitamin D deficiency	Vitamin D ng/mL (mean±SD)
BMI	71.2	16.1
Smoking	76.3	15.8
Hypertension	72.8	16.4
Diabetes mellitus	79.4	16.7
Alcoholism	76.1	15.6
Dyslipidemia	80.5	15.2

Table 5: Correlation between CAD and vitamin D deficiency in both groups

Risk factors	r	P value
BMI	0.014	0.81
Smoking	0.021	0.13
Hypertension	0.12	0.92
Diabetes mellitus	0.36	0.83
Alcoholism	0.02	0.72
Dyslipidemia	0.017	0.92

Table 5 shows that there was no correlation between risk factors and vitamin D deficiency (P> 0.05).

Discussion

Cardiovascular disease (CVD) is the leading cause of death universally.[7] Research has reported that low level of vitamin D is a risk factor for various cardiovascular disease including coronary artery disease and cardiovascular death.[8] More recently low levels of 25(OH) Vit D have been linked to the presence of cardiovascular disease, hypertension, hypertension heart failure, coronary calcification, myocardial infarction, subclinical atherosclerosis, diabetes mellitus (DM), obesity, and peripheral vascular disease. Although there is no consensus on optimal levels of 25(OH) Vit D as measured in serum, vitamin D deficiency is defined by most experts as a 25(OH) Vit D level of less than 20 ng per milliliter, vitamin D insufficiency as 25 (OH) Vit D level of 20-30 ng per milliliter and normal vitamin D levels as 30- 150 ng per milliliter.[9] The present study was conducted to assess correlation of plasma 25-Hydroxy-Vitamin D level with angiographic severity in coronary artery disease.

In present study, group I (Cases) had 70 males and 50 females and group II (Control) had 55 males and 65 females. The mean BMI in group I was 24.6 kg/m^2 and 24.8 kg/m^2 in group II, smoking habit was seen in 78 in group I and 34 in group II, hypertension was seen in 65 in group I and 26 in group II, diabetes was seen in 52 in group I and 30 in group II, alcoholism in 36 in group I and 10 in group II, dyslipidemia was seen in 48 in group I and 15 in group II. Tarcin et al conducted a study in which 25(OH) Vit D level was compared in 230 people with confirmed coronary heart disease (cases) and 70 people with normal angiogram (controls).[10] It was found that the mean 25 (OH) Vit D levels of cases and controls were calculated and they were 15.2±8.2 and 19.9±8.7 ng/mL respectively. The mean 25(OH) Vit D level was higher in controls and was statistically significant (p= 0.02). The calculated odds ratio between cases and controls was 1.67 (C.I 0.39-4.84). There was no correlation between increasing severity of coronary artery disease with 25(OH) Vit D levels.

We found that the mean 25 (OH) vitamin D in group I was 15.1 ng/ml and 19.6 ng/ml in group II. We found that maximum dyslipidemia (80.5%) patients had low vitamin D level followed by DM, smoking, BMI, alcoholism and alcoholism. Akin et al measured 25-hydroxyvitamin D (25[OH]D) and inflammatory markers in 239 patients who underwent coronary angiography.[11] Results showed that 83% of the study population had levels less than 30 ng/mL. The Gensini score was negatively associated with serum vitamin D levels, and positively correlated with age, blood pressure, diabetes, hyperlipidemia and C-reactive protein levels. After adjustments for traditional and nontraditional cardiovascular risk factors, vitamin D remained a significant predictor for the severity of CAD.

We found no correlation between risk factors and vitamin D deficiency (P> 0.05). Baktur et al included a total of 113 patients undergoing coronary angiography.[12] In total, 44.2% of the patients had NSTEMI and the remaining had STEMI. 25(OH) D levels were significantly lower in the group with a high SX score than in the group with a low SX score. Correlation analysis showed a significant correlation between 25(OH) D levels and the SX score. Multiple linear regression (MLR) analysis was used to determine the significance of the relationship between the SX score and 25 (OH) D, parathyroid hormone, and C-reactive protein levels and eGFR. MLR analysis revealed that only 25(OH) D levels was significantly associated with the severity of CAD.

Conclusion

Authors found that in cases, vitamin D level was lowered as compared to control, however, there was no correlation between risk factors and CAD.

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