

PREVALENCE OF VITAMIN D3 DEFICIENCY IN ACUTE MI PATIENTS WITHOUT DIABETES OR HYPERTENSION IN RIMS, RANCHI, A TERTIARY CARE HOSPITAL JHARKHAND

Cardiology

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ABSTRACT

Introduction – Acute Myocardial Infarction is a leading cause of premature mortality in India. Many studies have identified Vitamin D3 deficiency as a risk factor for coronary artery disease.

Aims and Objectives: To identify association of vitamin D3 deficiency with acute myocardial infarction (AMI) in young patients without conventional risk factors.

Material And Methods – This Cohort Study was carried on young (<45Yrs) patients presenting with acute myocardial infarction at Department of Cardiology, RIMS, during the period Oct 2017 to Mar 2018. Diabetes or hypertension were excluded in this study. A total of 44 such patients were taken as study group. Their serum vitamin D levels were estimated on first day of admission. Fourtyfour years of age and sex matched persons with no significant medical illness were taken for comparison as control group.

Result – A strong correlation between Vitamin D3 deficiency and acute myocardial infarction was found ($p < 0.0001$) in young patients without conventional risk factors like Diabetes and hypertension in resident of Jharkhand.

Conclusion – Vitamin D3 deficiency is strongly associated with incidence of acute myocardial infarction in young patients. There is further need to study this correlation and to see whether Vitamin D3 supplementation can reduce morbidity and mortality in ischemic heart disease patients.

KEYWORDS

s Acute MI, Vitamin D3

INTRODUCTION

Coronary artery disease is the leading¹ cause of premature mortality in India. Its prevalence is increasing and importantly,² acute myocardial infarction is being diagnosed in younger patients with minimal or no conventional risk factors like smoking, hypertension, diabetes mellitus, obesity etc. Young patients of 30-44 yrs. without diabetes and hypertension risk factors presenting with myocardial infarction is no longer a rare event.³ We at RIMS, Ranchi are regularly getting such patients. This is a disturbing trend and there is a need to identify new risk factors.

Recently there has been a lot of interest in Vitamin D. Vitamin D is a pro-hormone with many functions. Its role in diseases like rickets, osteomalacia and secondary parathyroidism is well established. Recent studies have given interesting insights about⁴ Vitamin D deficiency and its association with cardiovascular diseases.⁵ Vitamin D deficiency has been found to affect 50% population worldwide this can mainly be attributed to lifestyle and environmental factors that reduce exposure to sunlight which is required for UV-B radiation induced Vitamin D production in the skin.⁶ Dark skin has been found to be a factor in Vitamin D deficiency as pigmentation has been found to impair Vitamin D synthesis in skin. Further lower sunlight exposure due to lifestyle changes is also a factor. Vitamin D receptors have been found on the endothelial linings of coronary arteries and their low activation in cases of Vitamin D deficiency has been considered to be the cause of increased calcification of the coronary arteries. Vitamin D has also been found to have important role in maintaining the endothelial linings of vessels.⁷ Further its role has been seen in regulation of vascular pressure. Experiments in mice have shown direct correlation of vitamin D3 insensitivity and atherosclerosis.⁸ So, it is important to study association of Vitamin D deficiency in patients of Coronary Artery Disease, especially those presenting with acute myocardial infarction. However, the association of Vitamin D Deficiency with coronary artery disease is a matter of controversy as it is based primarily on observational and ecological studies and needs further research.⁹

MATERIAL AND METHODS

Patients admitted in Cardiology Department of Rajendra Institute of Medical Sciences, Ranchi with diagnosis of Acute MI (patients presenting with chest pain who have supportive ECG changes/Troponin T levels), during the period from October 2017 to March 2018 were inclusion criteria for this study.

EXCLUSION CRITERIA

1. Hypertension (Systolic >130, Diastolic >90)
2. Diabetes mellitus (Fasting blood glucose >126, HbA1c <6.5)
3. Chronic Kidney disease (Serum creatinine >1.5)

4. Known history of cardiovascular disease

6. Age more than 45 yrs.

7. Those who had taken Vitamin D supplements in last 6 months

Patients were admitted and their serum collected on the first day was sent for estimation of Vitamin D3 levels after taking their written informed consent. The testing was done by Serum/Chemiluminescent Micro Particle Immunoassay (CMIA).

Healthy individuals of 30 -45 years of age with no known significant medical illnesses were chosen as controls for comparison. These were selected from persons coming for health check-ups. Informed consent was taken from both groups of patients.

125 patients presented with acute MI during the observation period, but on applying the exclusion criteria only 44 patients were considered for the study. To match them 44 healthy patients in the age group of 30-45 were considered as control group.

STATISTICAL ANALYSIS

Observational value was represented in numbers (%) and mean + standard deviation; data were entered into Microsoft Excel Worksheet and analyzed using appropriate test.

RESULTS

In the study group, 29 patients (65.9%) were in the age group of 40-45 and 15 (34%) in the age group of 30-40. Similarly in the control group, 24 (54.5%) were in the age group of 40-45 and 20 (45%) in the age group of 30-40. In terms of sex, 35 (79%) were male and 9 (20%) females in the study group whereas 34 (77%) were male and 10 (22.7%) females in the control group. The case and control groups were similar in age and gender distribution and there was no statistically significant difference between the case and control group in relation to age and gender distribution ($p > 0.1$). Vitamin D3 levels are classified as low, insufficient and normal.

The most striking observation of the study was the level of vitamin D deficiency in both the groups. In fact of all the 88 individuals whose vitamin D estimation was done only nine had normal levels of vitamin D.

Further when the Vitamin D levels were analyzed it was found that none of the patients of acute myocardial infarction had normal Vitamin D levels. All the nine individuals with the normal vitamin D levels belonged to the control group.

The mean Vitamin D levels in the case group were 19.16ng/ml,

whereas the control group had a mean Vitamin D level of 25ng/ml (Table 6, Chart 3). On statistical analysis this difference was found to be significant ($p < 0.001$).

DISCUSSION

Various studies have shown association of Coronary Artery Disease (CAD) and Vitamin D3 deficiency.¹⁰ Most of these studies have been done in western countries^{11, 12, 13}. Some studies have been done in India also, which show high prevalence of Vitamin D deficiency in CAD¹⁴ but angiographic correlations were found not to be strong. We felt the need to study this hypothesis in patients of Jharkhand. Jharkhand is a state in India having a unique demography and climatic conditions. Studies have shown Vitamin D deficiency in 70-100% of individuals in India.¹⁵ Usually there is plenty of sunshine in Jharkhand and we expected to find Vitamin D levels above average in these patients but we were surprised to see the very high levels of Vitamin D3 deficiency. Out of the 88 individuals tested only 9 had normal levels of Vitamin D3 i.e. almost 90% of those tested had either insufficient or low Vitamin D3 levels. 45 individuals had insufficient levels and 35 had low levels of Vitamin D3 levels. Darker skin and lifestyle changes leading to lesser exposure to sunlight could be the reason.

On further analysis it was seen that of the nine individuals who had normal Vitamin D3 levels, all were within the control group. Not a single patient of acute MI had normal Vitamin D3 level. Mean Vitamin D3 levels in the case group were 19.16ng/ml whereas in the control group was 25ng/ml. Statistical analysis with paired t test was done. P-value was found to be less than 0.01. Similar results have been found in other studies.^{16, 17, 18} This is a significant finding and further studies with bigger sample sizes are needed to be done to either confirm or refute these findings.

CONCLUSION

The correlation of acute myocardial infarction in young patients with Vitamin D deficiency is strong. The findings were significant statistically (p -value less than 0.01). These findings are supported by many similar studies conducted in India and outside. There are various hypotheses for this correlation but exact causation is not known. Further the studies have not been able to correlate angiographic findings with Vitamin D levels. As this is an evolving subject further studies need to be done in this field. Studies with larger sample size need to be done. Further one another important fact which is emerging is the high incidence of Vitamin D deficiency in the general population. With a prevalence rates of 90% or above, it may be suggested that mass Vitamin D supplementation drive may be undertaken. Further Vitamin D supplementation and its effects may be studied in patients of coronary artery disease.

TABLE 1: BLOOD PRESSURE MM/HG (HYPERTENSIVES WERE EXCLUDED FROM THE STUDY)

	Mean Systolic	Mean Diastolic
Cases	111.8	74.8
Controls	112.6	74.7
p value	0.7	0.9

TABLE 2: FASTING BLOOD GLUCOSE AND HBA1C (DIABETICS WERE EXCLUDED)

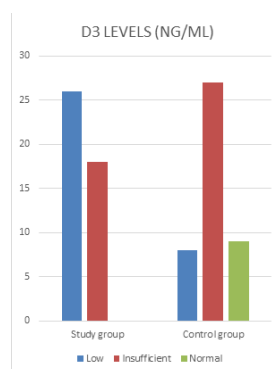
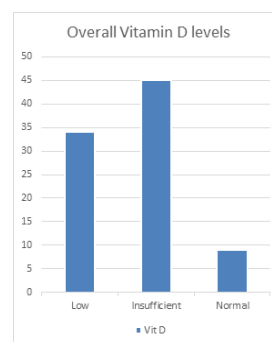
	Mean FBG	Mean HbA1c
Cases	99.74	5.21
Controls	97.86	5.53
p value	0.5	0.4

TABLE 3.: VITAMIN D3 LEVELS CLASSIFICATION

Vitamin D3	ng/ml
Low	<20
Insufficient	20-30
Normal	>30

TABLE 4: LEVELS OF VITAMIN D3 IN CASES AND CONTROLS

Levels(ng/ml)	Study group	Control group
Low (<20)	26	8
Insufficient (20-29)	18	27
Normal (>30)	0	9



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