ejpmr, 2018,5(2), 209-212

SJIF Impact Factor 4.161

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Review Article

ISSN 2394-3211

EJPMR

STUDY OF 25-OH VITAMIN-D LEVEL AND BONE RELATED PARAMETERS IN CARDIOVASCULAR DISEASE PATIENTS

Teena Agrawal, P.Dey Sarkar, Sangita Paneri*, Rajeev Lohokare and Ravikant Sharma

Department of Biochemistry M.G.M. Medical College Indore M.P. India.

***Corresponding Author: Dr. Sangita Paneri**

Department of Biochemistry M.G.M. Medical College Indore M.P. India.

Article Received on 24/11/2017 **Article Revised on 14/12/2017** **Article Accepted on 04/01/2018**

ABSTRACT

Background: Cardiovascular diseases are prevalent in most parts of the world including India, and consists variety of heart illness. In order to study the changes associated with bone related parameters like 25-OH vit D, calcium, phosphorus in cardiovascular disease patient, present study was planned. The study comprised total 100 subjects among them 50 cardiovascular patient taken as cases and 50 age matched healthy volunteers taken as control. The fasting blood samples were analyzed for following biochemical parameters serum calcium, phosphorus, alkaline phosphatase and calcitrol. Results revealed that the significant changes observed in calcium, phosphorus and calcitriol when compared to control. This study concluded that continues follow up of calcium, phosphorus, alkaline phosphatase and calcitrol (vitamin D) will be helpful for assessment of increased risk of coronary artery disease events beyond the traditional risk factor.

KEYWORDS: Cardiovascular diseases, 25-OH vit D, traditional risk factor, prohormon.

INTRODUCTION

Cardiovascular disease (CVD) is globally considered as the leading cause of death and disability including India.[1] The prevalence of cardiovascular disease has almost doubled in Northern India as well over 30 years. Moreover it is estimated that by the year 2020, coronary artery disease (CAD) will be the leading cause of premature death in India.[2]

Vitamin D is one of the fat soluble vitamins also known as sunshine Vitamin due to its synthesis in the body following exposure to ultraviolet rays, however it is unique in a way that it acts as a prohormone and mediates its functions by binding to a member of nuclear receptor super family, the Vitamin D receptor.[3] The active form of vitamin D 1,25-dihydroxyvitamin D (1,25(OH)2D), acts as a steroid hormone by binding to the vitamin D receptor (VDR), which is present in many cells throughout the body, including cardiomyocytes, vascular smooth muscle and endothelium.[4,5,6]

Vitamin D deficiency is prevalent in most parts of the world. Vitamin D has long been known to be an essential part of bone metabolism, although recent evidence suggests that vitamin D and calcium plays a key role in the pathophysiology of other diseases, including cardiovascular disease. Emerging evidence indicates that vitamin D deficiency, cardiovascular disease and endothelial dysfunction are linked together.[7] Endothelial dysfunction is an important antecedent event in the development of CHD and atherosclerosis.[8,9] Vitamin D is known to affect vascular endothelium directly or indirectly through up regulation of the renin-angiotensin system or via induction of smooth muscle proliferation and a proinflammatory state. A variety of possible biological mechanism (Blood pressure elevation, Insulin resistance, Inflammation, Obesity, Endothelial dysfunction, Vascular remodelling due to hyperparathyroidism) have been proposed by which, vitamin D deficiency may cause cardiovascular events.[10,11,12] Our study aimed at determined the relationship between Calcitriol (vitamin D), Calcium, Phasphorus, Alkaline phasphatase level and coronary artery disease. We hypothesized that this relation might be explained by endothelial dysfunction and atherosclerosis and development of cardiovascular disease.

METHODS AND MATERIAL

The present study was carried out in the Department of Biochemistry, M.G.M. Medical College, Indore (M.P.) during the period of June 2016 to Nov 2016 after approval from the ethical committee of the institute. Total 100 subjects were included in this study which were categorized into two groups-cases and controls (50 cases and 50 controls). Patients with 20-60 years of age, irrespective of gender were included in the study. Patients who were haemodynamically unstable in shock or heart failure were excluded. Patients who were already taking vitamin D, had known chronic kidney disease, Chronic liver disease, diabetes mellitus, Endocrine dysfunction, Malabsorption syndrome, Renal Rickets were excluded from the study.

5 ml overnight fasting blood sample was collected from each subject and subjected to biochemical estimation of 25(OH) vitamin D by enzyme immunoassay method calcium, phosphorus and Alkaline phasphatase by enzymatic end point method in fully automated analyzer.

All data were analyzed using SPSS statistical software. Results are expressed as mean ± standard deviation. P value <0.05 was considered statistically significant. Student t-test was used to compare means between the groups and the chi-square test was used to compare proportions between the groups.

OBSERVATION AND RESULT

Table 1:- Baseline characteristics in cases and control.

Parameter	Cases (mean±SD)	Control (mean±SD)	p-value
Age	50.34±6.34	45.68±10.6	0.06
Sex (male)	40(80%)	25(50%)	0.103
BMI (≥30) BMI (<30)	15 35	4 46	<0.05*
Hypertension	39	10	<0.05*
Smoking	38	15	<0.005**

Table 2:- Comparision of biochemical parameter between cases and control.

Parameter	Control (mean±SD)	Cases (mean±SD)	p-value
25(OH)Vitamin D (ng/ml)	33.89±15.3	20.11±9.8	<0.001***
Calcium (mg/dl)	10.66±1.37	9±1.3	<0.05*
Phasphorus (mg/dl)	3.8±0.94	2.8±0.74	<0.05*
Alkaline phasphatase(U/l)	52.16±16.45	99±25.67	<0.005**

* Significant
** Highly Significant
*** Very Highly Significant

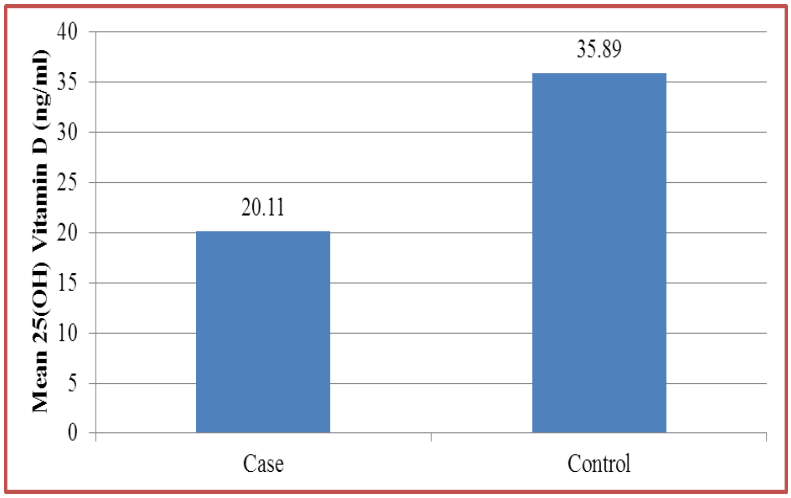

Figure 1: Comparision of 25 (OH)vitamin D level between cases and control.

In cases and controls mean value of 25(OH) vitamin D (20.11±10.39 and33.89±15.3) were obtained.

Statistically significant differences were seen for serum 25(OH) vitamin D, Calcium, phosphorus, Alkaline phasphatase levels in cases as compared to controls.

DISCUSSION

In the present study, we have compared the values of 25(OH) vitamin D activity and lipid profile in healthy subjects and patients with myocardial infarction. We found decreased level of 25(OH) vitamin D, calcium and phosphorus and increased levels of alkaline phasphatase in myocardial infarction patients. Several studies showed vitamin D as a novel risk factor for cardiovascular events and mortality. 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.[13] Recently, Zittermann *et al*[14] reviewed various studies reported association between cardiovascular disease (CVD) and Vitamin D deficiency (VDD) in context of increased prevalence of coronary artery disease (CAD), vascular calcification and essential hypertension. Study by Watson *et al*[15] reported inverse correlation of serum

1, 25(OH) 2D3 and presence ofcoronary artery calcification in subjects with hypercholesterolemia who are at high risk for CAD (Framingham cohort). Mahdavi K *et al*[16] reported 72% of Patients with acute coronary syndrome had serum 25-hydroxyvitamin D level of 20ng/ml or less. The observational study by Lindquist, et al[17] has reported a reverse relationship between vitamin D levels and thrombosis. Another prospective study by Giovannucci[18], funded by the National Cancer Institute and the National Heart, Lung and Blood Institute, vitamin D deficiency was found to be an independent risk factor for development of AMI after adjusting for all known CAD risk factors. Data from prospective observational studies indicate that vitamin D deficiency is also an independent risk factor for stroke.[19,20] *A.K.Pancholia et al(2012).*[21] This study shown that vitamin D as a novel risk factor for cardiovascular events and mortality. Skaaby et al[22] concluded that significant association of hypovitaminosis major risk factor for CVDs.[23] All the components are associated with increased incidence of coronary artery disease. A large number of studies conducted in the past have provided the basic scientific framework and this study attempts to explore the role of Vitamin D deficiency in the pathogenesis of CAD. Additionally, the prevalence of vitamin D is quite high among CAD patients.

CONCLUSION

In present study patients of coronary artery disease had significantly low level of vitamin D and calcium as compared to individuals without coronary artery disease. Vitamin D and calcium deficiency was found to be an independent predictor of CAD after adjusting other risk factors emphasizing that vitamin D can be a potential risk factor for CAD. Hence, our study suggests that vitamin D and calcium might be considered as risk factor for cardiovascular events. Our study suggests that vitamin D deficiency and hypocalcimia potentially increase the risk of cardiovascular disease. Several studies have shown strong independent association between hypovitaminosis D and cardiovascular risk. Hence, vitamin D and hypocalcimia might be considered as one of the risk factor for cardiovascular events. We suggest early screening programme for patients with vitamin D deficiency and low calcium that could be sign of illness and therefore should be treated promptly.

REFERENCE

1. (2010) Global Status Report on Noncommunicable Disease World Health Organization, Geneva.
2. A.K. Pancholia et al Vitamin D deficiency: An emerging risk factor for cardiovascular J. Preventive Cardiology, May 2012; 1(4): 153.
3. Ramesh Aggarwal, 1 Tauseef Akhthar and Sachin Kumar Jain Coronary artery disease and its association with Vitamin D deficiency J Midlife Health, 2016 Apr-Jun; 7(2): 56–60.
4. Nibbelink KA, Tishkoff DX, Hershey SD, Rahman A, Simpson RU. 1,25(OH)2-vitamin D3 actions on cell proliferation, size, gene expression and receptor localization, in the HL-1 cardiac myocyte. J Steroid Biochem Mol Biol., Mar. 2007; 103: 533–7.
5. Wu-Wong JR, Nakane M, Ma J, Ruan X, Kroeger PE. Effects of Vitamin D analogs on gene expression profiling in human coronary artery smooth muscle cells. Atherosclerosis, 2006; 186: 20–8. [PubMed]
6. Merke J, Milde P, Lewicka S, Hügel U, Klaus G, Mangelsdorf DJ, et al. Identification and regulation of 1,25-dihydroxyvitamin D3 receptor activity and biosynthesis of 1,25-dihydroxyvitamin D3. Studies in cultured bovine aortic endothelial cells and human dermalcapillaries. J Clin Invest.
7. Zahra Dana Siadat, Keyvan Kiani, 1 Masoumeh Sadeghi, 2 Amir Sina Shariat, 1 Ziba Farajzadegan, and Maryam Kheirmand Association of vitamin D deficiency and coronary artery disease with cardiovascular risk factors J Res Med Sci., 2012 Nov; 17(11): 1052–1055.
8. Cora McGreevy and David Williams New Insights About Vitamin D and Cardiovascular Disease *Ann Intern Med.*, 2011; 155: 820-826.
9. Sanjeev Kumar Syal et al Vitamin D Deficiency, Coronary Artery Disease and Endothelial Dysfunction: Observations From a Coronary Angiographic Study in Indian Patients, August 2012; 24(8): (/issue/3452).
10. Pittas AG, Harris SS, Stark PC, et al. The effects of calcium and vitamin D supplementation on blood glucose and markers of inflammation in nondiabetic adults. Diabetes care, 2007; 30(4): 980-986.
11. Saneei P, Salehi-Abargouei A, Esmaillzadeh A. Serum 25-hydroxy vitamin D levels in relation to body mass index: a systematic review and meta-analysis. Obes Rev., 2013; 14(5): 393–404.
12. Chitalia N, Recio-Mayoral A, Kaski JC, et al. Vitamin D deficiency and endothelial dysfunction in non-dialysis chronic kidney disease patients. Atherosclerosis, 2012; 220(1): 265-268.
13. Judd S, Tangpricha V. Vitamin D deficiency and risk for cardiovascular disase. Circulation, 2008; 117: 503–11.
14. Zittermann A, Schleithoff SS, Koefer R. Putting cardiovascular disease and vitamin D insufficiency into perspective. *Br J Nutr*., 2005; *94*: 483-92.
15. Watson KE, Abroiat ML, Malone LL, Hoed JM, Doheerty T, Detrano R, *et al*. Active vitamin D levels are inversely correlated with coronary calcification. *Circulation*, 1997; *96*: 1755-60.
16. Mahdavi K, Amirajam Z, Yazdankhah S, *et al*. The prevalence and prognostic role of vitamin D deficiency in patients with acute coronary syndrome: a single centre study in South-West of Iran. *Heart Lung Circ*, 2013; 22(5): 346-51.
17. Lindqvist PG, Epstein E, Olsson H. Does an activesun exposure habit lower the risk of venous thrombotic events? A D-lightful hypothesis. *J Thromb Haemost*. 2009; 7: 605 – 610.

18. Giovannucci E. 25-Hydroxyvitamin D and Risk of Myocardial Infarction in Men A Prospective Study. *Arch Intern Med.*, 2008; 168(11): 1174-80.
19. Sun Q, Pan A, Hu FB, Manson JE, Rexrode KM. 69. 25-hydroxyvitamin D levels and the risk of stroke: a prospective study and meta-analysis. *Stroke*, 2012; *43*: 1470-7.
20. Chowdhury R, Stevens S, Ward H, Chowdhury S, Sajjad 70. A, Franco OH. Circulating vitamin D, calcium and risk of cerebrovascular disease: a systematic review and meta-analysis. *Eur J Epidemiol*, 2012; *27*: 581-91.
21. A.K.Pancholia MD, Vidyut Jain MD, Vijay Garg MD, Vitamin D deficiency: An emerging risk factor for cardiovascular disease Journal of preventive cardiology, 2012; 1(4): 153-163.
22. Skaaby T, Husemoen LLN, Pisinger C, Jørgensen T, Thuesen BH, Fenger M, *et al.*, Vitamin D status and changes in cardiovascular risk factors: A prospective study of a general population, Cardiology, 2012; 123: 62–70.
23. Vivek Jain, Shaikh MKS*, Siddhant Jain and Mukesh Meena et al Comparative study of serum vitamin D levels and other biomarker in patients attending tertiary cardiac care center *Int. J. Bioassays*, 2015; 4(04): 3812-3814.