

VITAMIN D AND HIGH-SENSITIVITY C-REACTIVE PROTEIN IN SUBJECTS WITH DYSLIPIDEMIA

DR. NAMITA JAIN¹, DR.P.D.SARKAR ²,DR. BHAVANA TIWARI³,DR. MOHIT
JAIN⁴, DR.RAJEEV LOHOKARE⁵, DR.ROHIT MANYAL⁶

AFFILIATION -

DR.NAMITA JAIN - SENIOR RESIDENT DEPARTMENT OF BIOCHEMISTRY, M.
G. M. MEDICAL COLLEGE,INDORE, (M.P.)

DR.P.D.SARKAR -PROFESSOR AND HEAD, DEPARTMENT OF
BIOCHEMISTRY, M. G. M. MEDICAL COLLEGE,INDORE, (M.P.)

DR. BHAVANA TIWARI- ASSISTANT PROFESSOR, DEPARTMENT OF
BIOCHEMISTRY, M. G. M. MEDICAL COLLEGE,INDORE, (M.P.)

DR. MOHIT JAIN- CONSULTANT GASTROENTEROLOGIST ,DNS
HOSPITAL,INDORE (M.P.)

DR.RAJEEV LOHOKARE- ASSOCIATE PROFESSOR, DEPARTMENT OF
BIOCHEMISTRY, M. G. M. MEDICAL COLLEGE,INDORE, (M.P.)

DR.ROHIT MANYAL- ASSISTANT PROFESSOR, DEPARTMENT OF
BIOCHEMISTRY, M. G. M. MEDICAL COLLEGE,INDORE, (M.P.)

*CORRESPONDING AUTHOR: DR. MOHIT JAIN

EMAIL ADDRESS- mjrocking2013@gmail.com

TELEPHONE NO.-9993253748

ABSTRACT-

Background: Vitamin D is a fat-soluble prohormone steroid that has paracrine, endocrine and autocrine functions.⁽¹⁾ Recent researches on Vitamin D revealed that it is not only involved in the homeostasis of bone but also take part in various physiological functions in the body. Studies have concluded that vitamin D receptors are present on a large variety of cell types, including immunologic cells ,osteoblasts, , nerve cells, pancreatic beta cells, vascular endothelial cells, myocytes and cardiac muscle cells.⁽²⁾ The recent reports reveal that deficiency of vitamin D can cause autoimmune diseases, infections, hypertension, diabetes mellitus, coronary artery disease, stroke, cancer etc.⁽³⁾ It is now clear that in addition to its classic effects on calcium and bone homeostasis, vitamin D has other important roles too. The receptor of vitamin D is expressed on immune cells and these immunologic cells are able to synthesize the active vitamin D metabolite. Further vitamin D has the ability to act in an autocrine manner in a local immunologic milieu.⁽⁴⁾ So ,the aim of our study was to compare the levels of vitamin D and inflammatory marker levels in individuals with and without dyslipidemia and to correlate the inflammatory changes with vitamin D levels in the patients..

Methods -The study was conducted at M.Y Hospital,Indore (M.P.).

- We included 33 subjects with dyslipidemia as test and 33 age and sex matched healthy subjects without dyslipidemia as control group.
- 5 ml of blood samples were collected used for the analysis of vitamin D, hsCRP.

Result: hsCRP levels were significantly high ($p < 0.01$) whereas vitamin D levels were significantly low ($p < 0.01$) in subjects with dyslipidemia as compared to the healthy subjects. The Pearson Correlation between hsCRP and Vitamin D suggested a statistically significant negative correlation

Conclusion: A negative correlation between vitamin D levels and hsCRP among the test population suggested that vitamin D deficiency contributes to the inflammatory process.

Key words- Dyslipidemia, High-sensitivity C-reactive protein, Vitamin D

Introduction- A significant controversy was there over the last decade concerning the effects of vitamin D on skeletal and nonskeletal tissues. The statement that the vitamin D receptor is expressed in all cells of the body and the emerging data supporting a relationship of serum 25-hydroxyvitamin D to neoplastic, chronic metabolic, cardiovascular diseases have led to widespread utilization of supplementation of vitamin D for the prevention and treatment of so many disorders.⁽⁵⁾ A variety of risk factors affect the pathogenesis of chronic cardiovascular disease. Studies have found that low serum levels of 25OHD are also closely related to the occurrence of cardiovascular diseases in addition to high cholesterol, smoking, obesity, high blood pressure and diabetes.⁽⁶⁾ Further, the incidence of hypertension is may be related to low levels 25OHD.⁽⁷⁾ The role of vitamin D in the cardiovascular system came in light because of the presence of its receptors not only on the heart but also in the entire cardiovascular system.⁽⁸⁾ The 1, 25(OH)2D3 active form of Vitamin D combines with VDR and then regulates the expression of many genes.^(9,10) A growing body of data suggests that low 25-hydroxy Vitamin D levels may adversely affect cardiovascular health. Vitamin D deficiency increases the risk of developing incident hypertension or sudden cardiac death in individuals with pre existing cardiovascular diseases.⁽¹¹⁾ Dyslipidemia is an independent risk factor for cardiovascular and cerebrovascular diseases in individuals.^(12,13) Current studies have observed that low 25-hydroxyvitamin D is associated with dyslipidemia.^(14,15) C-reactive protein (CRP) has been used as an inflammatory marker in various clinical conditions. The increased levels of CRP can increase not only the risk of cardiovascular diseases but can also increase the risk of inflammation, cancer, diabetes etc. Many studies have suggested that deficiency of vitamin D hasten the inflammatory process and hence increase the risk for CVD.⁽¹⁶⁾ Some of the previous studies conducted in our area showed high prevalence of vitamin D deficiency in the locality.⁽¹⁷⁾ Our study was conducted to compare the levels of inflammatory marker and vitamin D in subjects with and without dyslipidemia and to make a correlation of inflammatory changes with vitamin D levels in the study subjects.

2. Material and Method –This case control study was conducted in the Department of Biochemistry, Mahatma Gandhi Memorial Medical College (M.G.M.M.C.). Blood samples were taken from patients who attended medicine OPD of M.Y. hospital. Written informed consent was taken from all the participants. For this study, total 66 cases were taken, out of which 33 were cases and controls were 33 in number. As per the NCEP- ATP III criteria, patients with dyslipidemia were taken as cases.⁽¹³⁾ 33 healthy individuals (Age and gender matched) without dyslipidemia were taken as control population.

To analyze vitamin D levels, Fully automated analyzer (Mindray) was used. High-sensitivity C-reactive protein (hsCRP) and Lipid profile (Total cholesterol, triglycerides, HDL, LDL, VLDL) were measured by BioSystem BA400 Biochemistry fully automated analyzer. Statistical analysis was performed (By using SPSS version 25). Probability value of < 0.05 was considered statistically significant.

3. Results

The levels of hsCRP were significantly high (p<0.01) whereas Vit D levels were significantly low (p<0.01) in subjects with dyslipidemia compared to the control subjects (Table 1). The Pearson Correlation between hsCRP and Vitamin D showed statistically significant negative correlation suggesting that a decrease in vitamin D increase the inflammatory process (Table 4)

Table 1. T test statistic of CRP and Vitamin D

Category		Mean ± SD	T test	P Value
HsCRP (mg/L)	Control	0.83 ± 0.59	-4.227	0.001*
	Test	2.08 ± 1.59		
Vitamin D (ng/ml)	Control	20.70 ± 2.83	21.767	0.001*
	Test	7.97 ± 1.81		

*Highly significant at < 0.01 level

Figure 1: Comparison of mean hs-CRP of two groups

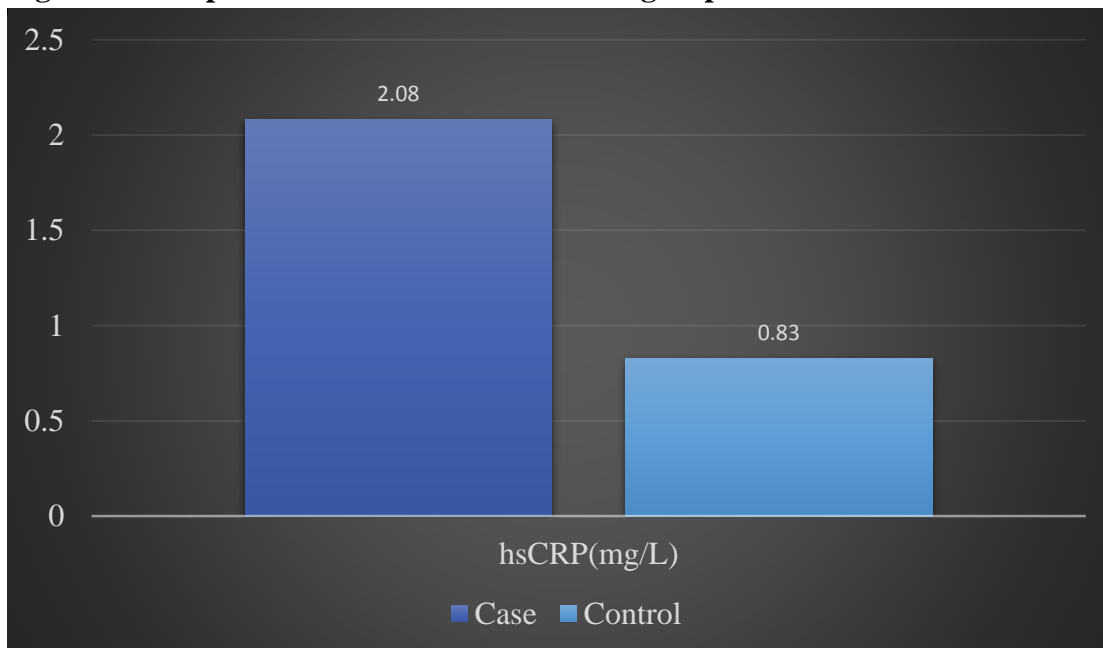


Figure 2: Comparison of mean Vitamin-D(ng/ml) levels of two groups

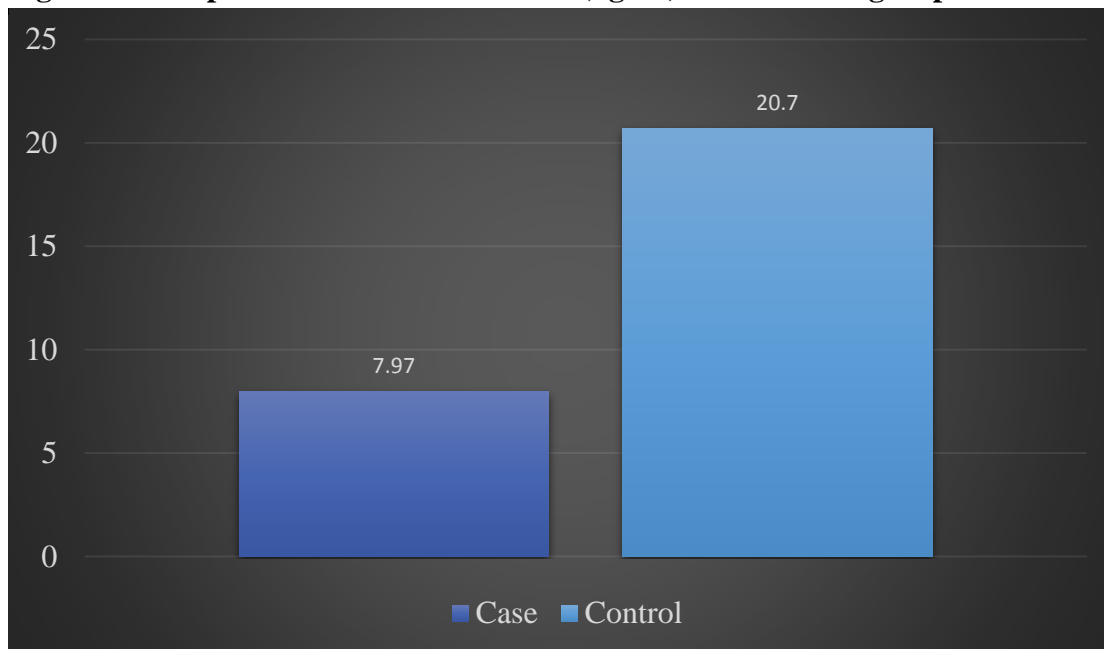


Table 2. Correlation of CRP versus Vitamin D (ng/ml)

Parameter		Vitamin D(ng/ml)
hsCRP(mg/L)	Pearson Correlation	-0.464
	Sig. (2-Tailed)	0.007*

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

4. Discussion This study showed that the Vitamin D levels were low in cases as compared to the control population. At the other side, CRP was higher in cases when compared to the control. These findings were similar with the findings of Salam Naser Zangana ⁽¹⁴⁾ and according to that study, hsCRP was positively correlated with lipid profile and inversely correlated with vitamin D. Similar result was obtained in a study conducted by Shifa K.al. They found that Vitamin D levels are low and hsCRP levels are high in subjects with dyslipidemia. ⁽¹⁵⁾ In our study, the main limitation was relatively small sample size (n= 66). The findings of our study should be confirmed in a larger sample size and in a prospective manner.

5. Conclusions In our study, vitamin D levels were low and hsCRP levels were high in subjects with dyslipidemia. So, the negative correlation between the vitamin D level and hsCRP among the cases concluded that the deficiency of vitamin D may contribute to the inflammatory process. More larger scale studies are needed to establish the role vitamin D in the inflammatory process and cardiovascular diseases.

References-

(1)V. Vanchinathan, H.W. Lim A dermatologist's perspective on vitamin D Mayo Clin Proc, 87 (2012), pp. 372-380.

[2] Lavie CJ, Lee JH, Milani RV. Vitamin D and cardiovascular disease: Will it live up to its hype? Journal of the American College of Cardiology. 2011; 58(15):1547-56.

[3]. Pittas AG, Chung M, Trikalinos T, Mitri J, Brendel M, Patel K, Lichtenstein AH, Lau J, Balk EM 2010 Systematic review: vitamin D and cardiometabolic outcomes. Ann Intern Med 152:307–314

[4] Aranow C. Vitamin D and the immune system. J Investig Med. 2011 Aug;59(6):881-6. doi: 10.2310/JIM.0b013e31821b8755. PMID: 21527855; PMCID: PMC3166406.]

[5]Rosen CJ, Adams JS, Bikle DD, Black DM, Demay MB, Manson JE, Murad MH, Kovacs CS. The nonskeletal effects of vitamin D: an Endocrine Society scientific statement. Endocr Rev. 2012 Jun;33(3):456-92. doi: 10.1210/er.2012-1000. Epub 2012 May 17. PMID: 22596255; PMCID: PMC3365859.

[6] Lavie CJ, Dinicolantonio JJ, Milani RV, O'Keefe JH(2013). Vitamin D and cardiovascular health.

[7] Ferder M, Inserra F, Manucha W, Ferder L (2013). The world pandemic of vitamin D deficiency could possibly be explained by cellular inflammatory response activity induced by the renin-angiotensin system. Am J Physiol Cell Physiol, 304: C1027-1039

[8] Somjen D, Weisman Y, Kohen F, Gayer B, Limor R, Sharon O, et al. (2005). 25-hydroxyvitamin D3- 1alpha-hydroxylase is expressed in human vascular smooth muscle cells and is upregulated by parathyroid hormone and estrogenic compounds. Circulation, 111:1666-1671

[9] Fernandes dA, D. A. (2009). Vitamin D, a neuroimmunomodulator: Implications for neurodegenerative and autoimmune diseases. Psychoneuroendocrinology, 34 Suppl 1: S265-S277

12

[10] Stumpf WE (2012). Drugs in the brain—cellular imaging with receptor microscopic autoradiography.Prog Histochem Cytochem, 47: 1-26 Circulation, 128: 2404-2406

[11] Wang TJ, Pencina MJ, Booth SL, Jacques PF, Ingelsson E, Lanier K, Benjamin EJ, D'Agostino RB, Wolf M, Vasan RS. Vitamin D deficiency and risk of cardiovascular disease. Circulation. 2008; 117(4): 503-11.

[12] Amarenco P, Bogousslavsky J, Callahan A III et al., High-dose atorvastatin after stroke

or transient ischemic attack. The New England Journal of Medicine. 2006; 355(6):549–59.
[13] Paciaroni M., Hennerici M, Agnelli G, Bogousslavsky J. Statins and stroke prevention. Cerebrovascular Diseases. 2007; 24(2-3): 170–82.

[14] The Relation of Serum High-Sensitive C- reactive Protein to Serum Lipid Profile, Vitamin D and other Variables in a Group of Hypertensive Patients in Erbil-Iraq .Salam Naser Zangana. International Journal of Science and Research (IJSR) Volume 5 Issue 9, September 2016. Paper ID: ART20161472 DOI: 10.21275/ART20161472

[15] Shifa K., Jithesh T. K., Mirshad P., Supriya Simon A., Vitamin D Deficiency and Inflammatory Marker in Subjects with Dyslipidemia, *American Journal of Biochemistry*, Vol. 7 No. 1, 2017, pp. 6-9. doi: 10.5923/j.ajb.20170701.02.