Advances in Bioresearch
Adv. Biores., Vol 11 (6) November 2020: 177-181
©2020 Society of Education, India
Print ISSN 0976-4585; Online ISSN 2277-1573
Journal's URL:http://www.soeagra.com/abr.html
CODEN: ABRDC3
DOI: 10.15515/abr.0976-4585.11.6.177181

Advances in Bioresearch

ORIGINAL ARTICLE

Evaluation of Serum Vitamin D levels in patients with rheumatic heart disease

Ahmad Tariq[1], Rana Khurram Aftab[1], Farhat Ijaz[2*]
[1]Punjab Institute of Cardiology, Lahore, Pakistan
[2]CMH Lahore Medical College & Institute of Dentistry(NUMS).Lahore, Pakistan
Corresponding Author's Email: *farhat_khurram_rana@cmhlahore.edu.pk

ABSTRACT
Rheumatic Heart Disease (RHD) keeps on being a significant medical problem. Patients with rheumatic diseases more prone to developed vitamin D deficiency. But, there is no local study found which could help us in determining the extent of problem in local population. This study was aimed to determine the frequency of vitamin D levels in patients with rheumatic heart disease. It was cross sectional Study done at Punjab Institute of Cardiology, Lahore after the approval from institutional review board from 02-08-2017 to 02-02-2018.150patients who satisfied the choice models were selected the examination.Then blood sample was obtained for assessment of vitamin D level. Reports were assessed and if level was low, then vitamin D deficiency was labelled. This data was recorded on proforma. The gathered information was investigated measurably by utilizing SPSS form 21. The mean age of patients was 44.77±15.09years. There were 83 (55.33%) males and 67 (44.67%) females. The average BMI of patient was 22.73±3.82kg/m². The average duration of RHD was 5.79±3.18years. There were 45 (30%) smokers and 105 (70%) non-smokers. The mean vitamin D level was 23.67±12.04mg/dl. There were 98 (65.33%) patients with vitamin D deficiency and 52 (34.67%) had normal vitamin D level. The frequency of vitamin D deficiency is high in RHD patients, which can complicate the prognosis of patients.
Keywords: *Vitamin D deficiency, rheumatic heart disease, Vitamin D level*

Received 01.08.2020 Revised 03.10.2020 Accepted 29.10.2020

How to cite this article:
A Tariq, R K Aftab, F Ijaz. Evaluation of Serum Vitamin D levels in patients with rheumatic heart disease . Adv. Biores., Vol 11 (6) November 2020: 148-155

INTRODUCTION

Rheumatic heart disease (RHD) continues to be a major public health problem in developing countries like Pakistan [1]. Over the last few decades, there has been a recurring trend in cardiac nutritional science. Observational data shows a strong association between a nutritional deficiency and worse cardiovascular outcomes, generating a hype for supplementation [2].

Vitamin D has multiple physiological implications, including significant role in the regulation of the immune system, has raised great interest of researchers in recent decades [3]. Vitamin D deficiency affects up to 50 % of the general population in the Northern hemisphere in Winter [4, 5].

Patients with rheumatic diseases show an increased risk of having 25(OH)D deficiency [6]. One study showed that in patients with RHD, the frequency of vitamin D deficiency was 70% [7].

Vitamin D is important nutrient of human body and plays an important role in health and growth of human body. Vitamin D deficiency leads to severe consequences in a normal human being, but if the deficiency occurs in an ill patient, it may cause hazardous outcome. Literature has showed that frequency of Vitamin D deficiency is high in cases with RHD. But, there is no local study found which could help us in determining the extent of problem in local population. So to get local evidence, we want to conduct this study and to confirm whether the frequency is high. The objective of this study is to determine the frequency of Vitamin D deficiency in patients with RHD in local population. It will help us check whether Vit D supplementation is necessary in people with RHD or not so that preventive measures can be taken and patients can be managed as soon as possible to prevent the hazardous consequences of RHD along with Vitamin D deficiency. This will help to improve the condition of RHD patient by giving an early treatment and improves life.

MATERIAL AND METHODS

It was cross sectional Study done at Punjab Institute of Cardiology, Lahore after the approval from institutional review board from 02-08-2017 to 02-02-2018. Sample size was 150 with 95% confidence interval and 7.5% error margin. Non-Probability consecutive sampling was done.

Patients of age 20-70 years of either sex giving RHD were included. Revised Jones criteria was used for diagnosis of RHD.[8]Following exclusion criteria was used to exclude the patients:

1. Patients with malnutrition, or vitamin D deficiency before RHD (on medical record)
2. Patients having abnormal kidney function (creatinine>1.2mg/dl) or on dialysis
3. Patients taking vitamin D supplements or diabetic (BSR>186mg/dl)

Data collection:

150 patients fulfilling the inclusion criteria were enrolled. Informed consent was taken. Demographic data (name, age, sex, BMI, smoking and duration of RHD) was taken. Blood sample was taken with 3cc BD needle under aseptic measures. Samples were sent for Labs. Reports were assessed and Vit D level<25ng/ml was labelled as Vit D deficiency. This data was recorded on pre-designed forms.

Data Analysis:

Data was analyzed using SPSS version 21. Quantitative variables (age, BMI and span of RHD)are given as mean ± SD. Qualitative factors like gender, smoking and vitamin D deficiency are given as frequencies and percentages. Information was stratified for age, sex, BMI, smoking and term of RHD. Chi-square test was applied to compare frequencies. P-value ≤0.05 was considered significant.

RESULTS

In our study, the mean vitamin D level was 23.67±12.04mg/dl. There were 98 (65.33%) patients with vitamin D deficiency and 52 (34.67%) had normal vitamin D level.

The mean age of patients was 44.77±15.09years. Data was stratified for age of patients. In patients aged 20-45years, vitamin D levels were low in 49 (64.5%)subjects (p>0.05).(Table 2)

There were 83 (55.33%) males and 67 (44.67%) females. While vitamin D levels were deficient in 53 (63.9%) male patients and in 45 (67.2%) female patients. No statistical significant difference was found between male and female patients (p>0.05).(Table 3)

The mean BMI of patients was 22.73±3.82kg/m^2. Thus, 27 (18%) patients were underweight, 78 (52%) had normal weight while 45 (30%) were overweight. The difference between different categories on the basis of BMI was insignificant (p>0.05).(Table 4)

The mean duration of RHD was 5.79±3.18years. (Table 5) There were 45 (30%) smokers and 105 (70%) non-smokers. Low vitamin D levels were found among26 (57.8%) smokers and in 72 (68.6%) non-smoker patients.(Table 6).

Table 1: Descriptive Statistics of patients

Age (years)	n	150
	Mean	44.77
	SD	15.09
	Minimum	20
	Maximum	70
BMI (kg/m^2)	n	150
	Mean	22.73
	SD	3.82
	Minimum	16.50
	Maximum	29.98
Duration of RHD (years)	n	150
	Mean	5.79
	SD	3.18
	Minimum	1
	Maximum	10
Vitamin D level (mg/dl)	n	150
	Mean	23.67
	SD	12.04
	Minimum	10
	Maximum	50

Table 2: Comparison of vitamin D deficiency in age strata

		Age (years)		Total
		20-45	46-70	
Vitamin D deficiency	Yes	49 (64.5%)	49 (66.2%)	98 (65.3%)
	No	27 (35.5%)	25 (33.8%)	52 (34.7%)
Total		76 (100%)	74 (100%)	150 (100%)

Chi-Square Test = 0.050
p-value = 0.823 (Insignificant)

Table 3: Comparison of vitamin D deficiency in gender strata

		Sex		Total
		Male	Female	
Vitamin D deficiency	Yes	53 (63.9%)	45 (67.2%)	98 (65.3%)
	No	30 (36.1%)	22 (32.8%)	52 (34.7%)
Total		83 (100%)	67 (100%)	150 (100%)

Chi-Square Test = 0.179
p-value = 0.672 (Insignificant)

Table 4: Comparison of vitamin D deficiency in BMI strata

		BMI (kg/m^2)			Total
		Underweight	Normal	Overweight	
Vitamin D deficiency	Yes	18 (66.7%)	52 (66.7%)	28 (62.2%)	98 (65.3%)
	No	9 (33.3%)	26 (33.3%)	17 (37.8%)	52 (34.7%)
Total		27 (100%)	78 (100%)	45 (100%)	150 (100%)

Chi-Square Test = 0.275
p-value = 0.872 (Insignificant)

Table 5:Comparison of vitamin D deficiency in duration of RHD strata

		Duration of RHD (years)		Total
		1-5	6-10	
Vitamin D deficiency	Yes	48 (67.6%)	50 (63.3%)	98 (65.3%)
	No	23 (32.4%)	29 (36.7%)	52 (34.7%)
Total		71 (100%)	79 (100%)	150 (100%)

Chi-Square Test = 0.307
p-value = 0.579 (Insignificant)

Table 6:Comparison of vitamin D deficiency in smoking strata

		Smoking		Total
		Yes	No	
Vitamin D deficiency	Yes	26 (57.8%)	72 (68.6%)	98 (65.3%)
	No	19 (42.2%)	33 (31.4%)	52 (34.7%)
Total		45 (100%)	105 (100%)	150 (100%)

Chi-Square Test = 1.620
p-value = 0.203 (Insignificant)

DISCUSSION

In our study, the mean vitamin D level was 23.67±12.04mg/dl. There were 98 (65.33%) patients with vitamin D deficiency and 52 (34.67%) had normal vitamin D level.

One study showed that in patients with RHD, the frequency of vitamin D deficiency was 70% [8]. This is in accordance to our study as we found that 65.33% patients of RHD were suffering from vitamin D deficiency.

Vitamin D is known to affect T cells to modulate Cell mediated to immune response [9].It acts through vitamin-D receptors(VDR) present on CD4+ T cells [10]. It also induces the formation of regulatory T cells that are anti-inflammatory.[11] They also inhibit the proliferation of effector CD4+ T cells [12-14]. Vitamin D also has anti-inflammatory effects due to its ability to inhibit the production of inflammatory cytokines such as TNF-α , Interferon γ and Interleukin 17 [12, 15, 16]. Studies also associate Vit D deficiency with

decreased levels calcification inhibitors such fetuin A (its levels are also reduced in RHD) [17] and GI matrix proteins [18].

From the above discussion, it can be inferred that vitamin D deficiency in our participants may be due to exaggerated immune response and greater valvular damage in these subset of patients.

To date there is no definite therapy to check the progressive valvular damage associated with RHD, hence correction of Vit D levels (note that Vit D deficiency is seen in 65.3% subjects of our study) might help to check the immunological progressive valvular damage. This has been implicated in animal studies on other Th1/Th17 mediated auto-immune diseases such as multiple sclerosis, Type 1 diabetes, and inflammatory bowel disease [19-22].

CONCLUSION

The frequency of vitamin D deficiency is high in RHD patients, which can complicate the prognosis of patients. Now we have local evidence and found the extent is very high in local population. Now we will implement the results of this study and will recommend the screening of RHD patients for Vitamin D deficiency. So that an early diagnosis or preventive measures can be taken and patients can be managed as soon as possible to prevent the hazardous consequences of RHD along with Vitamin D deficiency.

REFERENCES

1. Abrar A, Khan S, urRehman M, Jan T, Faisal M, Khan N. (2015). Frequency of rheumatic heart disease in patients undergoing echocardiography in district Dera Ismail Khan. Gomal Journal of Medical Sciences;12(3).12-14
2. Nijjar P. (2015). Vitamin D and Cardiovascular Disease: Where We Currently Are.; Available from: http://www.acc.org/latest-in-cardiology/articles/2015/06/08/12/06/vitamin-d-and-cardiovascular-disease-where-we-currently-are.
3. Brance ML, Brun LR, Lioi S, Sánchez A, Abdala M, Oliveri B. (2015). Vitamin D levels and bone mass in rheumatoid arthritis. Rheumatology international;35(3):499.
4. Gatenby P, Lucas R, Swaminathan A. (2013). Vitamin D deficiency and risk for rheumatic diseases: an update. Current opinion in rheumatology ;25(2):184-91.
5. Wöbke TK, Sorg BL, Steinhilber D.(2014). Vitamin D in inflammatory diseases. Frontiers in physiology : 4;5.19-24
6. Urruticoechea-Arana A, Martín-Martínez MA, Castañeda S, Piedra CAS, González-Juanatey C, Llorca J, et al. (2015). Vitamin D deficiency in chronic inflammatory rheumatic diseases: results of the cardiovascular in rheumatology [CARMA] study. Arthritis Research & Therapy. 14;17(1):211.
7. MD Mag. (1970). Vitamin Deficiency in Rheumatic Diseases.; Available from: http://www.mdmag.com/medical-news/vitamin_deficiency_in_rheumatic.
8. Kumar D, Bhutia E, Kumar P, Shankar B, Juneja A, Chandelia S. (2016). Evaluation of the American Heart Association 2015 revised Jones criteria versus existing guidelines. Heart Asia. 1;8(1):30-5.
9. Cantorna MT, Snyder L, Lin Y-D, Yang L. (2015). Vitamin D and 1,25(OH)$_2$D Regulation of T cells. ***Nutrients***. 7(4):3011-3021.
10. Veldman CM, Cantorna MT, DeLuca HF. (2000). Expression of 1, 25-dihydroxyvitamin D3 receptor in the immune system. Archives of biochemistry and biophysics. ;374(2):334-8.
11. Korf H, Wenes M, Stijlemans B, Takiishi T, Robert S, Miani M, Eizirik DL, Gysemans C, Mathieu C. (2012). 1, 25-Dihydroxyvitamin D3 curtails the inflammatory and T cell stimulatory capacity of macrophages through an IL-10-dependent mechanism. Immunobiology. ;217(12):1292-300.
12. Tsoukas CD, Provvedini DM, Manolagas SC. (1984). 1, 25-dihydroxyvitamin D3: a novel immunoregulatory hormone. Science. ;224(4656):1438-40.
13. Rigby WF, Yirinec B, Oldershaw RL, Fanger MW. (1987). Comparison of the effects of 1, 25-dihydroxyvitamin D3 on T lymphocyte subpopulations. European journal of immunology. 17(4):563-6.
14. Rigby WF, Noelle RJ, Krause KA, Fanger MW. (1985). The effects of 1, 25-dihydroxyvitamin D3 on human T lymphocyte activation and proliferation: a cell cycle analysis. The Journal of immunology. ;135(4):2279-86.
15. Provvedini DM, Tsoukas CD, Deftos LJ, Manolagas SC. (1983). 1, 25-dihydroxyvitamin D3 receptors in human leukocytes. Science.221(4616):1181-3.
16. S. Joshi, L.C. Pantalena, X.K. Liu, et al. (2011). 1,25-zaxdihydroxyvitamin D(3) ameliorates Th17 autoimmunity via transcriptional modulation of interleukin-17A. Mol Cell Biol. 31 (17): 3653-69.
17. Mukhopadhyay S, Pandit BN, Saran RK, Mazumdar K, Yusuf J, Minhas HS, Trehan V, Tyagi S. (2014). Systemic and local levels of fetuin-a in calcified mitral valves of rheumatic heart disease. The Journal of Heart Valve Disease. 1;23(1):55-65.
18. Drüeke TB, Massy ZA. (2012). Role of vitamin D in vascular calcification: bad guy or good guy?*Nephrology Dialysis Transplantation*. 27(5):1704–7, https://doi.org/10.1093/ndt/gfs046
19. Zella JB, McCary LC, DeLuca HF. (2003). Oral administration of 1, 25-dihydroxyvitamin D3 completely protects NOD mice from insulin-dependent diabetes mellitus. Archives of biochemistry and biophysics. 1;417(1):77-80.
20. Gregori S, Giarratana N, Smiroldo S, Uskokovic M, Adorini L. (2002). A 1α, 25-dihydroxyvitamin D3 analog enhances regulatory T-cells and arrests autoimmune diabetes in NOD mice. Diabetes. ;51(5):1367-74.

21. Cantorna MT, McDaniel K, Bora S, Chen J, James J.(2014). Vitamin D, immune regulation, the microbiota, and inflammatory bowel disease. Experimental biology and medicine. ;239(11):1524-30.
22. Cantorna MT. (2012). Vitamin D, multiple sclerosis and inflammatory bowel disease. Archives of biochemistry and biophysics. ;523(1):103-6.