

ORIGINAL ARTICLE

Frequency of Vitamin D Deficiency in Maintenance Hemodialysis Patients

ZAHID UL ZAHIDEEN¹, UBAID ULLAH², RAJA MUHAMMAD RASHID³, SYED AZRA⁴, HAFIZ FURQAN AHMAD KHAN⁵, ZAHID NABI⁶¹Consultant Nephrologist and HOD Dialysis and Nephrology, IYB District Hospital Attock²Medical Specialist, THQ hospital Paroa, D. I. Khan³Consultant Nephrologist, KRL Hospital Islamabad.⁴Medical Officer, MCH Unit 2, PIMS, Islamabad⁵Senior registrar nephrology, HBS General Hospital, Islamabad⁶Consultant Nephrologist and HOD Nephrology KRL Hospital, IslamabadCorrespondence to: Ubaid Ullah, Email: ubed.kmc@gmail.com, Cell: +92 333 9960986

ABSTRACT

Objective: To determine the frequency of vitamin D deficiency in maintenance hemodialysis patients.**Design of the Study:** It's a descriptive cross-sectional study.**Study Settings:** This study was carried out at Department of Nephrology, KRL Hospital, Islamabad from 14th November 2017 to 13th May 2018.**Material and Methods:** There were 85 ESRD (GFR 15 ml/min) patients between the ages of 25 and 65, male and female. Acid reflux, vitamin D supplementation, and steroid use in the last month all ruled out. Vitamin D levels were measured in each patient's 3 ml blood sample, which was delivered to the institution's pathology laboratory for analysis.**Results of the Study:** From 25 to 65 years old, participants in this study had a mean age of 51.85 ± 12.83 years. Seventy-nine percent of the patients (79%) ranged in age from 46 to 65. A male to female ratio of 1.4:1 was observed among the 85 total patients, with 49 (57.65 percent) and 36 (42.35%) patients being men. In our study, the average length of illness was 10.61 ± 7.90 years. Dialysis lasted an average of 5.14 ± 8.14 months. The average BMI was 23.54 ± 4.88 kg/m² (standard deviation). In our study, we observed that 70.59 percent of patients on maintenance hemodialysis were deficient in vitamin D.**Conclusion:** It is concluded that prevalence of vitamin D deficiency in individuals on continuous hemodialysis is extremely high.**Keywords:** Vitamin D deficiency, Hemodialysis, GFR, BMI

INTRODUCTION

Chronic kidney disease (CKD) affects a large number of people and is a severe public health problem. The World Health Organization considers serum levels of 25(OH)D (25(OH)D) below 30 ng/ml to be insufficient (WHO).¹ Vitamin D deficiency is more widespread among African-Americans and Hispanics in the United States than among Caucasians, affecting 40% of the population.^{2,3} Cancer and myopathy, diabetes mellitus, infection, multiple sclerosis (MS), cardiovascular disease, mental health concerns, and autoimmune disorders have all been linked to a low in vitamin D.^{4,5}

End-stage renal illness and kidney transplant recipients have high rates of vitamin D deficiency/insufficiency.^{6,7} In a study, prevalence of vitamin D deficiency in hemodialysis patients was 32.7%.⁸ In another study, this prevalence was found to be 88.9%.⁹ One more study has shown this prevalence as 35.0%.¹⁰ Local data is scanty on this issue. To better understand the prevalence of vitamin D deficiency in the local hemodialysis population, this research will be conducted.

MATERIAL AND METHODS

This descriptive cross-sectional study was undertaken at Department of Nephrology, KRL Hospital, Islamabad from 14th November 2017 to 13th May 2018. Sample size is 85 cases is calculated taking the expected prevalence of deficiency of vitamin D in hemodialysis maintenance patients to be 32.7%.¹⁰ Patients meeting the enrollment criteria were selected after taking the informed written consent and approval from institutional ethical review committee. All ESRD (GFR <15 ml/min) patients on maintenance hemodialysis having both genders having age 25-65 years were included in this study. Patients taking steroids for last one month (assessed on history), patients with acid peptic disease were excluded. An additional three millilitres of blood were drawn for testing for vitamin D deficiency in each patient, and the results were sent to the pathology lab for analysis.

STUDY RESULTS

From the age of 25 to 65 years old, participants in this study had an average age of 51.85 ± 12.83 years. 70.59 percent of the patients were between the ages of 46 and 65. A male to female ratio of 1.4:1 was observed among the 85 total patients, with 49 (57.65 percent) and 36 (42.35%) patients being men.

Table 1: Different parameters have different socio-demographic characteristics.

Parameter	Frequency	Percentage	
Age	25-45	25	29.41
	46-65	60	70.59
Duration of disease	<10	50	58.82
	>10	35	41.18
Gender	Male	49	57.65
	Female	36	42.35
Duration of dialysis	≤5	64	75.29
	>5	21	24.71
BMI (in kg/m ²)	<30	77	90.59
	≥30	08	9.41
Place of living	Rural	13	15.29
	Urban	72	84.71
Monthly income	<20000	05	5.88
	20001-40000	24	28.24
	>40000	56	65.88
Occupation	Office	27	31.76
	Field	01	1.18
Sun exposure	Domestic	57	67.06
	Low	29	34.12
	Medium	54	63.53
vitamin D deficiency	High	02	2.35
	Present	60	70.59%
	Absent	25	29.41%

Table 2: Vitamin D deficiency is stratified by gender, dialysis duration, BMI, and sun exposure.

Vitamin D Deficiency		Present	Absent	P-value
Gender	Male	34	15	0.777
	Female	26	10	
Duration of Dialysis	≤5	47	17	0.314
	>5	13	08	
BMI kg/m ²	≤30	53	24	0.270
	>30	07	01	
Sun Exposure	Low	23	06	0.050
	Medium	37	17	
	High	00	02	

There was a mean of 10.61 ± 7.90 years of kidney illness in our study. Mean duration of being on dialysis was 5.14 ± 8.14 months. Mean BMI was 23.54 ± 4.88 kg/m² and remaining all demographics of patients are given in Table 1. Stratification of

vitamin D deficiency with respect to gender, duration of dialysis, BMI, sun exposure is shown in Table 2.

DISCUSSION

Fat-soluble vitamin D has a receptor in the cell's cytoplasm. This hormone system controls over 3% of the human genome.¹¹ For optimal health, a blood 25(OH)D level of 21 to 29 ng/mL is considered to be deficient and insufficient, according to some experts.^{12,13} Since the metabolic approval rate of calcitriol appears to have remained unchanged, it is likely that renal dysfunction is the primary cause of 25(OH)D insufficiency.^{14,15}

From the age of 25 to 65 years old, participants in this study had an average age of 51.85 ± 12.83 years. Seventy-nine percent of the patients (70.59 percent) ranged in age from 46 to 65. A male to female ratio of 1.4:1 was observed among the 85 total patients, with 49 (57.65 percent) and 36 (42.35%) patients being men. Vitamin D deficiency was found in 32.7 percent of hemodialysis patients by Marquardt et al.⁸ and 35.0 percent by Galunskaja et al.¹⁰, however our study found that 70.59 percent of maintenance hemodialysis patients were deficient in vitamin D.

Vitamin D insufficiency has been linked to kidney disease, according to numerous researches. [citation needed] (VDD).¹⁶ In 79 percent of cases, those on chronic hemodialysis (HD) had 25(OH)-VD levels less than 30 ng/mL, and in 57 percent of cases, HD patients had 25(OH)-VD levels less than 20 ng/mL.¹⁷ Hypoalbuminemia, a dark skin tone, and starting dialysis in the dead of winter are all signs that you have VDD.¹⁸ According to the researchers, only 29% and 17% of patients with stage 3 and stage 4 CKD showed sufficient 25(OH)-VD levels, respectively.

In a study by Del Valle et al, 84% of patients with CKD, especially those on HD, had less sunlight exposure than the general population, which is consistent with previous research.¹⁹ UVB exposure may also reduce the plasma VD response to uremia. The VD response of chronic HD patients was lower than that of healthy individuals when exposed to the same dosage of UVB.²⁰

Nutritional variables may potentially play a role in the poor 25(OH)-VD status seen in patients with CKD. Reduction in appetite, urinary tract symptoms, and restrictive diets all contribute to limited food intake in patients with chronic kidney disease (CKD), particularly in those on conservative therapy.²¹ VD may not be well absorbed in the gastrointestinal tract due to a lack of urination. Hence our study results are comparable to previous studies done but no local data was available. And slight variation in frequency may be due to difference in climate, activities and social habits. Our study has provided solid evidence that Vitamin D levels should be done in all hemodialysis patients

CONCLUSION

It is concluded that prevalence of vitamin D deficiency in individuals on continuous hemodialysis is extremely high. So, we recommend that early screening and managing vitamin D deficiency in every maintenance hemodialysis patient should be done to improve the results and thus reducing the morbidity of our population.

REFERENCES

1. Manson JE, Brannon PM, Rosen CJ, Taylor CL. Vitamin D deficiency—is there really a pandemic. *N Engl J Med.* 2016;375:1817–20.

2. Porter A, Gilmartin C, Srisakul U, Arruda J, Akkina S. Prevalence of 25-OH vitamin d deficiency in a population of hemodialysis patients and efficacy of an oral ergocalciferol supplementation regimen. *Am J Nephrol.* 2013;37(6):568–74.
3. Jean G, Souberbielle JC, Chazot C. Vitamin D in chronic kidney disease and dialysis patients. *Nutrients.* 2017;9:328–42.
4. Ngai M, Lin V, Wong HC, Vathsala A, How P. Vitamin D status and its association with mineral and bone disorder in a multi-ethnic chronic kidney disease population. *Clin Nephrol.* 2014;82:231–9.
5. Caravaca-Fontan F, Gonzales-Candia B, Luna E, Caravaca F. Relative importance of the determinants of serum levels of 25-hydroxy vitamin D in patients with chronic kidney disease. *Nefrologia.* 2016;36:510–6.
6. Mohiuddin SA, Marie M, Ashraf M, Hussein M, Almalki N. Is there an association between Vitamin D level and inflammatory markers in hemodialysis patients? a cross-sectional study. *Saudi J Kidney Dis Transpl.* 2016;27:460–6.
7. Silva MB, Cavalieri VV, Lemos CC, Klein MR, Bregman R. Body adiposity predictors of vitamin D status in nondialyzed patients with chronic kidney disease: a cross-sectional analysis in a tropical climate city. *Nutrition.* 2017;33:240–7.
8. Marquardt P, Krause R, Schaller M, Bach D, von Gersdorff G. Vitamin D status and cancer prevalence of hemodialysis patients in germany. *Anticancer Res.* 2015;35(2):1181–87.
9. Bansal B, Bansal S, Mithal A, Kher V, Marwaha R. Vitamin D deficiency in hemodialysis patients. *Indian J Endocrinol Metab.* 2012;16(2):270–3.
10. Galunskaja BT, Gerova DI, Paskalev DN, Zorcheva BY, Ikononov VC, Vladimirov V, Svinarov DA. Prevalence of vitamin D deficiency in different groups of chronic renal failure patients. *J IMAB.* 2015;21(3):887–90.
11. Holick MF. Vitamin D deficiency. *N. Engl. J. Med.* 2007;357:266–281.
12. Souberbielle JC, Body JJ, Lappe JM. Vitamin D and musculoskeletal health, cardiovascular disease, autoimmunity and cancer: Recommendations for clinical practice. *Autoimmune Rev.* 2010;9:709–715.
13. Manson JE, Brannon PM. Vitamin D Deficiency—Is There Really a Pandemic? *N. Engl. J. Med.* 2016;375:1817–1820.
14. Nguyen-Yamamoto L, Karaplis AC, St-Arnaud R, Goltzman D. Fibroblast Growth Factor 23 Regulation by Systemic and Local Osteoblast-Synthesized 1,25-Dihydroxyvitamin D. *J. Am. Soc. Nephrol.* 2017;28:586–597.
15. Kidney Disease: Improving Global Outcomes (KDIGO) CKD-MBD Work Group KDIGO Clinical practice guideline for the diagnosis, evaluation, prevention, and treatment of Chronic Kidney Disease—Mineral and Bone disorder (CKD-MBD) *Kidney Int.* 2009;76(Suppl. S113):S1–S130.
16. Holick M. Vitamin D for Health and In Chronic Kidney Disease. *Semin. Dial.* 2005;8:266–275.
17. Bhan I, Burnett-Bowie SAM, Ye J, Tonelli M, Thadhani R. Clinical measures identify vitamin D deficiency in dialysis. *Clin. J. Am. Soc. Nephrol.* 2010;5:460–467.
18. LaClair RE, Hellman RN, Karp SL. Prevalence of calcitriol deficiency in CKD: A cross-sectional study across latitudes in the United States. *Am. J. Kidney Dis.* 2005;45:1026–1033.
19. Del Valle E, Negri AL, Aguirre C, Fradinger E, Zanchetta JR. Prevalence of 25(OH) vitamin D insufficiency and deficiency in chronic kidney disease stage 5 patients on hemodialysis. *Hemodial. Int.* 2007;11:315–321.
20. Kolla PK, Desai M, Pathapati RM, Mastan Valli B, Pentylala S, Madhusudhan Reddy G. Cutaneous Manifestations in Patients with Chronic Kidney Disease on Maintenance Hemodialysis. *ISRN Dermatol.* 2012;2012:1–4.
21. Rhee CM, Ahmadi SF, Kovesdy CP, Kalantar-Zadeh K. Low-protein diet for conservative management of chronic kidney disease: A systematic review and meta-analysis of controlled trials. *J. Cachexia Sarcopenia Muscle.* 2017;9:235–245.