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ORIGINAL ARTICLE

Vitamin D Deficiency in End-Stage Renal Disease Patients on Maintenance Hemodialysis

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ABSTRACT

Objective: To determine the frequency of vitamin D deficiency in end stage renal disease patients on maintenance hemodialysis.

Study Design: Descriptive Cross-Sectional study.

Place and Duration of Study: Department of Nephrology, JPMC, Karachi, from 12th October, 2019 to 11th April 2020.

Methodology: One hundred and thirty three patients were enrolled. Venous blood sample of each patient was taken and sent to the laboratory for measuring the vitamin D levels. Serum vitamin D levels <20 ng/ml was taken as vitamin D deficiency.

Results: Eighty six (64.7%) were male**s** while 47 (35.3%) were females with mean age was 54.1±7.8 years, mean duration of ESRD was 11.6±4.8 months. Vitamin D deficiency was found in 48 (36.1%) patients**.**

Conclusion: **T**he findings of this study support the idea that deficiency of vitamin D is fairly common in end stage renal disease patients on maintenance hemodialysis.

Keywords: Vitamin D Deficiency, End stage renal disease (ESRD), Hemodialysis, Chronic kidney disease (CKD)

INTRODUCTION

Nutrient vitamin D deficiency is a developing issue overall.[1] Because of the wide conveyance of the vitamin D receptor in human body, the impact of vitamin D ranges past calcium-phosphorus and bone digestion. Vitamin D insufficiency is related with higher pervasiveness of hypertension, diabetes mellitus, and neoplasia.[2,3] As kidneys assume a significant part in its digestion, patients with CKD are at expanded danger for insufficiency of vitamin D.[3,4]

In Pakistan, there is a conundrum that notwithstanding satisfactory daylight, inadequacy of vitamin D is very predominant in everybody. This might be clarified by clothing propensities for our populace, their pigmented skin, and changing way of life with restricted outside activities. Considering that most "free living" Pakistani are vitamin D inadequate or insufficient, it makes sense that patients with CKD on hemodialysis will be significantly more so. However, routine supplementation of these patients with vitamin D isn't polished.[5]

In hemodialysis patients, the prevalence of vitamin D deficiency varies with geographical location and on searching the literature, I have found many studies regarding in this issue but these studies have shown large variations in results and also no local data available on this, so I have intended to determine the frequency of vitamin D deficiency in maintenance hemodialysis patients in local population. My study will provide the local magnitude of the issue and thus help the clinicians for early screening and managing this condition in these particular patients which will further reduce their morbidity.

MATERIALS AND METHODS

This Descriptive Cross-Sectional study was conducted at Department of Nephrology, JPMC Karachi from 12th October 2019 to 11th April 2020. The calculated sample size was 133 taking percentage of vitamin D deficiency in hemodialysis patients as 32.7%.[6] All cases of either gender of age 20-60 years with end stage renal disease patients on hemodialysis with duration of ESRD >3months were included in the study. While pregnant females**, p**atients who took steroids for last one month, Patients with acid peptic disease, who already took vitamin D supplements and patients with acute kidney injury were excluded from the study.

After approval from ERC of the institute, total 133 patients presenting to the Outpatient Department of Nephrology, JPMC, Karachi, fulfilling the inclusion criteria were selected. Informed consent was taken from each patient for inclusion in the study. After this, venous blood sample of each patient was taken by the researcher himself and sent to the laboratory for measuring the vitamin D levels. Serum vitamin D levels <20 ng/ml was taken as vitamin D deficiency. All the data (age, gender, BMI, duration of ESRD, duration of dialysis, number of dialysis/week, time of hemodialysis, place of living (rural/urban), occupation (field work/office work/domestic), sun exposure (low/medium/high), monthly income (<20000/20001- 40000/>40000) and vitamin D deficiency (present/absent)) were recorded.

Data was entered and analyzed using computer program SPSS-22. Stratification will be done for age, gender, BMI, duration of ESRD, duration of dialysis, number of dialysis/week, time of hemodialysis, occupation (field work/office work/domestic), sun exposure (low/medium/high), place of living (rural/urban) and monthly income (<20000/20001-40000)>40000). Post-stratification Chi square test was applied and p-value <0.05 was considered as significant.

RESULTS

Eighty six (64.7%) were males while 47 (35.3%) were females**.** Mean age was 54.1±7.8 years, mean height was 1.63±0.9 meters, mean weight was 67.8±8.3 kg, mean body mass index was 27.5±5.4 kg/m^2, mean duration of dialysis was 6.2±3.7 months, mean duration of ESRD was11.6±4.8 months, mean number of dialysis was 4.9±2.7 weeks and mean time of dialysis was 2.4±1.1 hours (Table 1). Place of residence showed that 55 (41.4%) were living in rural areas while 78 (58.6%) were living in urban areas.

Table 1: Descriptive statistic of the patients (n=133)

Variable	Mean±SD
Age (years)	54.1±7.8
Height (meters)	1.63±0.9
Weight (kg)	67.8±8.3
BMI (kg/m^2)	27.5±5.4
Duration of dialysis (months)	6.2±3.7
Duration of ESRD (months)	11.6±4.8
Number of dialysis (weeks)	4.9±2.7
Timeof hemodialysis (hours)	2.4±1.1

Occupational status showed that 39 (29.4%) patients were field worker, 72 (54.1%) office worker while 22 (16.5%) were attached with domestic work**.** In exposure to sunlight, 46 (34.6%) patients were exposed for lower period, 61 (45.8%) were exposed

for medium time while 26 (19.6%) patients were exposed for higher time period**.** Monthly income showed that 29 (21.8%) patients had income <20,000, 54 (40.6%) had income between (20,001-40,000) while 50 (37.6%) patients had income >40,000. Vitamin D deficiency was documented in 48 (36.1%) patients. Stratification of age group, gender, body mass index, duration dialysis, duration of ESRD, number of dialysis/weeks, time of hemodialysis, occupation& place of living was done with respect to vitamin D deficiency in order to found significant difference (Table 2).

Table 2: Stratification with vitamin D deficiency with age group, gender, BMI, duration dialysis, duration of ESRD, number of dialysis/weeks, time of hemodialysis, occupation and place of living (n=133)

Variable	Vitamin D Deficiency		P value
	Yes	No	
Age (years			
20-40	16 (12%)	25 (18.8%)	0.306
>40	32 (24%)	60 (45.2%)	
Gender			
Male	27 (20.3%)	42 (31.5%)	0.127
Female	21 (15.7%)	43 (32.5%)	
BMI (kg/m^2)			
18-24	31 (23.3%)	60 (45.1%)	0.0001
>24	17 (12.7%)	35 (26.3%	
Duration of ESRD (months(			
6-12	30 (22.5%)	57 (42.9%)	0.286
>12	18 (13.5%)	28 (21.1%)	
Duration of dialysis (months)			
1-6	28 (21%)	45 (33.8%)	0.465
>6	20 (15.1%)	40 (30.1%)	
Number of dialysis (weeks)			
1-5	25 (18.7%)	55 (41.4%)	0.670
>5	23 (17.3%)	30 (22.6%)	
Time of hemodialysis (hours)			
1-3	22 (16.5%)	40 (30.1%)	0.149
>3	26 (19.5%)	45 (33.9%)	
Place of living			
Rural	20 (15%)	53 (39.8%)	0.956
Urban	28 (21%)	32 (24.2%)	

DISCUSSION

In the present study, the average age was 54.1±7.8 years. A study conducted by Bhan et al[7] stated the mean age was 58±16 years. Another study done by Bansal et al[8] reported the age as 55±13 years. Ammar et al[9] noted the mean age 45.20±10.40 years. However, Marquardt et al[5] also reported a very high age of 71.1 years.

In this study, the mean height was found as 1.63±0.9 meters while the mean weight was found as 67.8±8.3 kg. Bansal et al[8] noted the weight as 59±6.7kg. This study showed that average body mass index was reported as 27.5±5.4 kg/m^2. Bhan et al[7] reported the mean body mass index was 32.0±9.5kg/m^2. In the present study, the mean duration of dialysis was noted as 6.2±3.7 months. Bansal et al[8] also noted the duration of dialysis as 5.5 months.

The current study showed that the mean duration of ESRD was noted as 11.6±4.8 months. Furthermore, the average number of dialysis was 4.9±2.7 weeks and the mean time of dialysis was 2.4±1.1 hours. In current study, 86 (64.7%) were male while 47 (35.3%) were female. Bhan et al[7] also reported the male dominance in his study as 28 (84.9%). Bansal et al[8] reported that out of 45, 32 (71%) were males. Ammar et al[9] stated that there were 55% males in their study.

This study showed that residence status showed that 55 (41.4%) were living in rural areas while 78 (58.6%) were living in urban areas whereas the occupational status showed that 39 (29.4%) patients belonged to field work, 72 (54.1%) were from office work while 22 (16.5%) were from domestic work. The exposure to sunlight, 46 (34.6%) patients were exposed for lower period, 61 (45.8%) were exposed for medium time while 26 (19.6%) patients were exposed for higher time period. Monthly income showed that 29 (21.8%) patients had income <20,000, 54 (40.6%) had income between (20,001-40,000) while 50 (37.6%) patients had income >40,000.

In present study, vitamin D deficiency was documented in 48 (36.1%) patients. Bhan et al[7] reported the vitamin D deficiency in 34% patients. However, Bansal et al[8] noted a high prevalence of 88.0% patients who were vitamin D deficient. Marquardt et al[5] noted the deficiency in 32.7% patients.

Vitamin D deficiency and insufficiency were seen in 88.9 and 6.7%, respectively, in patients on hemodialysis as compared to 91.2 and 6.8%, respectively, in “normal” adult population from North India.[10] El-Arbagy[11] observed vitamin D deficiency in 78% of study populace. Our findings suggest that vitamin D deficiency is universal in hemodialysis patients and they probably require routine supplementation.

CONCLUSION

The deficiency of vitamin D is fairly common in end stage renal disease patients on maintenance hemodialysis. Future prospective, there is a need to conduct randomized studies using large sample size with multiple study centers in Pakistan are needed to confirm the findings of the present study.

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