ISSN 2664-4169 (Print) & ISSN 2664-7923 (Online)
South Asian Research Journal of Biology and Applied Biosciences
Abbreviated Key Title: South Asian Res J Bio Appl Biosci

| Volume-8 | Issue-4 | Jul-Aug -2026 | **DOI: https://doi.org/10.36346/sarjbab.2026.v08i04.001**

Original Research Article

Assessing Vitamin D Levels and Certain Physiological Aspects in Chronic Kidney Disease

Omar Qahtan Yaseen[1]*

[1]Department of Heet Education, General Directorate of Education in Anbar, Ministry of Education, Hit, Anbar 31007, Iraq

***Corresponding Author:** Omar Qahtan Yaseen
Department of Heet Education, General Directorate of Education in Anbar, Ministry of Education, Hit, Anbar 31007, Iraq

Article History
Received: 12.04.2026
Accepted: 01.06.2026
Published: 11.07.2026

Abstract: The vitamin D deficiency is commonly among the people with chronic kidney diseases. The current study amid to evaluation vitamin D levels in blood serum of the patients, this study discovered the relationship between physiology markers and vitamin D levels the current study included 39 patients, these patients register in dialysis center. The patients were divided to 5 phases Based on to the KDIGO guidelines and their estimated glomerular filtration rate (eGFR). Physiological indicators, including serum creatinine, eGFR, aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase, albumin, bilirubin, and 25-hydroxyvitamin D, were analyzed. This study is comfier vitamin D deficiency present of patient's chronic kidney disease, more than 90% have insufficient or low vitamin D levels, and the disease in advance phases observed a vitamin D levels in severe vitamin D deficiency. In addition, the current study can to showing inverse relationship between disease phases and evaluation glomerular filtration rate (eGFR), while creatinine levels increased with disease progression. So, the determine vitamin D level is necessary to diagnosis the phases disease among the patients as this knowledge help in disease management and reducing complications.

Keywords: 25-Hydroxyvitamin D, CKD, Vitamin D Deficiency, Physiological Indicators, Renal Function.

INTRODUCTION

Humans, as well as higher animals, need vitamin D, which is considered an essential hormone for life. This vitamin is not commonly found in food, but only in a few types of food. The main factory for this vitamin is the skin, where it is produced through a photochemical reaction. Vitamin D deficiency in individuals with chronic kidney disease [2], increases with increasing kidney dysfunction [3-6]. A blood vitamin D level between 50 and 74 nmol/L (15-29 ng/ml) is considered low, while a severe deficiency is diagnosed when the vitamin D concentration is less than 50 nmol/L (15 ng/ml) [7]. In one hospital, a study was conducted on 75 patients with chronic kidney failure. The sample was classified into three groups based on stage III, IV, and V, according to the glomerular filtration rate (GFR), with each group consisting of 25 patients. None of the individuals in the sample was undergoing hemodialysis or peritoneal dialysis.

Individuals who underwent thyroidectomy were excluded from the study. Vitamin D deficiency may be linked with numerous public diseases, including chronic kidney disease-related bone and mineral disorder. It may also be linked to malignancies, infections, and autoimmune diseases [8-10]. It has been displayed that vitamin D deficiency in patients with chronic kidney disease can accelerate disease progression and lead to unexplained death [11-13]. Individuals with a vitamin D concentration of less than 15 ng/ml are more likely to die from any cause, even after correcting for other risk factors, including chronic kidney disease. This was recorded in the information of the Third National Health and Nutrition Investigation Analysis (NHANES III) [14]. Vitamin D deficiency is associated with several risk factors, including advanced age, lack of physical activity, proteinuria [15], female sex, diabetes mellitus [16], and the use of calcineurin inhibitors [17]. Our study targeted to estimate vitamin D levels in patients pre-diagnosed chronic kidney disease (CKD) all phases 1-5 before initiating dialysis, and to determine its association with various predictive factors for vitamin D deficiency in CKD.

MATERIALS AND METHODS

Study Design

The current study included 39 patients and 39 healthy individuals. Samples were collected from chronic kidney disease patients at the Ramadi and Hit dialysis units in Iraq. The study targeted to estimate the connection between serum vitamin D levels and certain physiological parameters in these patients.

Study Community

Samples were drawn from 39 individuals with an unknown stage (stages 3-5). Samples from the infected individual were studied according to the criteria for the Assistance in Detecting Global Causes of Illness (KDIGO) based on estimated glomerular filtration rate (eGFR) nominations. For healthy individuals, a match with the cases was considered, as well as having preferential renal function and no history of an undetectable disease.

Physiological Indicators

Serum creatinine, serum urea, estimated glomerular filtration rate (eGFR), aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), serum albumin, total bilirubin, 25-hydroxyvitamin D [25(OH)D] in serum. Vitamin D status was classified according to the Endocrine Society guideline as follow: Deficiency (<20 ng/mL), Inadequate (20–29 ng/mL), Adequate (≥30 ng/mL).

RESULTS AND DISSCUSSION

The study included 39 patients with chronic kidney disease (CKD). The mean age of the participants was 54.62 ± 11.70 years, ranging from 35 to 75 years. The mean serum creatinine concentration was 3.32 ± 1.75 mg/dL, with values ranging from 1.20 to 7.20 mg/dL. The mean glomerular filtration rate (eGFR) was 31.01 ± 22.13 mL/min/1.73 m², with values ranging from 5.40 to 72.30 mL/min/1.73 m². This demonstrates the significant impairment of kidney function in most people with chronic kidney disease. The liver function tests showed an average AST enzyme of 34.80 ± 13.10 units/L and an average ALT enzyme of 33.60 ± 12.40 units/L. The average ALP enzyme was 120.50 ± 41.60 units/L, with a range between 70 and 220 units/L. The average serum albumin was 3.45 ± 0.76 g/dL, with values between 2.00 and 4.50 g/dL, and the average total bilirubin was 1.15 ± 0.63 mg/dL, with a range between 0.40 and 2.80 mg/dL.

Table 1: Descriptive Statistics

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Age (years)	39	54.62	11.70	35	75
CKD Stage	39	4.05	0.83	3	5
Creatinine (mg/dL)	39	3.32	1.75	1.20	7.20
eGFR (mL/min/1.73m²)	39	31.01	22.13	5.40	72.30
AST (U/L)	39	34.80	13.10	18.20	65.10
ALT (U/L)	39	33.60	12.40	18.70	62.30
ALP (U/L)	39	120.50	41.60	70	220
Albumin (g/dL)	39	3.45	0.76	2.00	4.50
Bilirubin (mg/dL)	39	1.15	0.63	0.40	2.80

Table 2 shows the frequency spreading of chronic kidney disease stages. The majority of patients were in stage IV, numbering 14 (35.9%). The next stage is the third stage, where the number of infected individuals reached 11, representing (28.2%). The lowest stage among them is the fifth stage, with those undergoing hemodialysis, where the number of infected individuals reached 4, representing (10.3%). The outcomes of current study displayed that most of the infected or those who showed symptoms of the disease are in advanced stages of chronic kidney failure, specifically stages (fourth and fifth). The results of this study show the severity of the disease among the sample.

Table 2: Frequency Distribution of CKD Stages

CKD Stage	Frequency	Percent	Valid Percent
Stage 3	11	28.2	28.2
Stage 4	14	35.9	35.9
Stage 5	10	25.6	25.6
Stage 5D	4	10.3	10.3
Total	**39**	**100.0**	**100.0**

The results presented in Table 3 showed the distribution of vitamin D levels among the 39 individuals in the study sample. The results were as follows: Vitamin D levels were sufficient for a small number of individuals in the sample, namely 3 individuals (7.7%). Vitamin D levels were insufficient for 10 individuals with chronic kidney disease. Vitamin

D levels were deficient for 17 individuals (43.6%), which is the largest percentage. Vitamin D levels were severely deficient for 9 individuals (23.1%). Therefore, 91.3% of individuals with chronic kidney disease showed varying degrees of vitamin D deficiency. Therefore, 91.3% of the participants showed varying levels of vitamin D deficiency. These results suggest that a high rate of vitamin D deficiency in CKD patients may be associated with advanced stages of the disease and with mineral and bone metabolism disorders.

Table 3: Vitamin D Status Frequency

Vitamin D Status	Frequency	Percent	Valid Percent
Sufficient (≥30)	3	7.7	7.7
Insufficient (20–29)	10	25.6	25.6
Deficient (10–19)	17	43.6	43.6
Severely Deficient (<10)	9	23.1	23.1
Total	**39**	**100.0**	**100.0**

Table 4 shows a statistically significant correlation between the studied variables, Based on the correlation coefficient. In addition, the study results discovered strong positive relationship between total bilirubin and liver enzymes, exactly aspartate aminotransferase (AST) (r = 0.97), alanine aminotransferase (ALT) (r = 0.95), and alkaline phosphatase (ALP) (r = 0.97), also the results discovered strong positive relationship between total bilirubin and both serum creatinine (r = 0.93) and serum urea nitrogen (BUN) (r = 0.91). From all these results indicate present relationship liver function and kidney filtration capacity the results discovered also negative relationship was found amongst total bilirubin and albumin (r = -0.94) and estimated glomerular filtration rate (eGFR) (r = -0.74). In the other side, the creatinine explains a strong negative relationship with eGFR (r = -0.88), while a strong positive relationship was presented with serum urea nitrogen (r = 0.97).

Table 4: Pearson Correlation Matrix

Variable	Age	Creatinine	eGFR	BUN	AST	ALT	ALP	Albumin	Bilirubin
Age	1.00	0.16	-0.23	0.15	0.09	0.09	0.11	-0.17	0.09
Creatinine	0.16	1.00	-0.88	0.97	0.91	0.89	0.90	-0.92	0.93
eGFR	-0.23	-0.88	1.00	-0.85	-0.73	-0.70	-0.72	0.78	-0.74
BUN	0.15	0.97	-0.85	1.00	0.92	0.90	0.91	-0.93	0.91
AST	0.09	0.91	-0.73	0.92	1.00	0.98	0.97	-0.95	0.97
ALT	0.09	0.89	-0.70	0.90	0.98	1.00	0.96	-0.94	0.95
ALP	0.11	0.90	-0.72	0.91	0.97	0.96	1.00	-0.93	0.97
Albumin	-0.17	-0.92	0.78	-0.93	-0.95	-0.94	-0.93	1.00	-0.94
Bilirubin	0.09	0.93	-0.74	0.91	0.97	0.95	0.97	-0.94	1.00

Table 5 showed a strong, statistically significant inverse correlation between chronic kidney disease (CKD) phase and valued glomerular filtration rate (eGFR) ($r = -0.720$, $p < 0.01$), indicating a decrease in eGFR as the disease developments. As well as, Presented great positive relationship with statically significate between CKD stage and serum creatinine levels ($r = 0.649$, $p < 0.01$). In addition, the result discovered about the inverse strong relationship with statically significate between eGFR and creatinine ($r = -0.681$, $p < 0.01$), reflecting that present physiological relationship between both markers of kidney function.

Table 5: Correlations (Pearson)

Variables	CKD Stage	eGFR	Creatinine
CKD Stage	1	–0.720**	0.649**
eGFR	–0.720**	1	–0.681**
Creatinine	0.649**	–0.681**	1

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

Table 6 clarifies how the vitamin D Level Distribution about the disease phase, where is showed clear correlation among severe vitamin D deficiency and, disease progression. In the third stage, all patients have either insufficient (6 patients) or relatively sufficient (3 patients) vitamin D levels. Regarding the deficiency and severe deficiency stages, a specific number of individuals in the sample fell into this category. Moving to the fourth stage, statistical analysis revealed a clear distribution of deficiency cases, with 12 out of 14 individuals diagnosed with vitamin D deficiency. No cases of adequate vitamin D levels were diagnosed at this stage. In the fifth stage, six out of ten participants exhibited severe vitamin D deficiency. Three out of four participants in the fifth stage, who were undergoing dialysis, were diagnosed with severe vitamin D deficiency. No individuals with adequate or insufficient vitamin D levels were diagnosed. Therefore, 28 out of 39 individuals with chronic kidney disease (71.8%) suffered from vitamin D deficiency or severe deficiency, indicating that their chronic kidney disease was in its advanced stages.

Table 6: Correlation between CKD Stage and Vitamin D Status

CKD Stage	Sufficient	Insufficient	Deficient	Severe Deficiency	Total
Stage 3	2	6	2	1	11
Stage 4	0	2	12	0	14
Stage 5	0	1	3	6	10
Stage 5D	0	0	1	3	4
Total	**2**	**9**	**18**	**10**	**39**

The results of this study showed that the average age of the sample was in the mid-fifties. Furthermore, the distribution of the sample by disease stage revealed that the majority were in stages 4 and 5, which are advanced stages of the disease. This suggests that the disease may have been diagnosed late. Additionally, the study results indicated a gradual progression in disease stage among the sample. Upon closer examination of the analysis results, a moderate increase in creatinine levels was observed, along with a decrease in the estimated glomerular filtration rate (eGFR). The study results explain a reduction in kidney function with the samples of the study, where, in succession, the fourth stage, third stage, and fifth stage are more common. As well as the samples in the fifth stage are the dialysis. In the current study, the results explain that patients with kidney failure are frequently in the latest stages of the disease, this help us understand the different disorders in biochemistry. In addition, the results showed 90% from the patients had some degree of deficiency, which was equally common and specific. The reason is assumed to involve the change of vitamin D to a specific form; on the other hand, sun exposure, stress, and mineral metabolism. Correlation analysis suggests a strong inverse relationship between individuals with estimated glomerular filtration rate (GFR) and creatinine levels, reflecting research indicating disease progression. These findings can be further defined by pathological analyses of specific diseases and patient subtypes. No specific analysis exists for statistically significant differences in function and albumin variability across different diagnostic groups. Decreased albumin levels may indicate a decline in nutritional status, which increases with disease progression. These differences or changes in enzymes may reflect the systemic effects of a serious illness and associated metabolic disturbances. For this reason, the result is linked to vitamin D deficiency, which is commonly observed, particularly in stage 5 and stage 5 with laundry syndrome. This highlights the lack of a definitive cause for vitamin D deficiency, especially given the increased nutrient and mineral intake observed in advanced stages of the disease. A statistically significant association was observed between vitamin D deficiency and the diagnosis, supporting the hypothesis of a causal link. These efforts have focused on influencing the activators of vitamin D levels, which will contribute to further understanding this issue.

CONCLUSION

This study indicated that, particularly in advanced stages of development, vitamin D levels exhibit significant variation across specific locations, identifying a common trend in vitamin D and demonstrating this across several biomarkers. These findings are significant for understanding vitamin D levels and title role in promoting the health of these patients.

REFERENCES

1. Umar, M., Sastry, K. S., Al Ali, F., Al-Khulaifi, M., Wang, E., & Chouchane, A. I. Vitamin D and the pathophysiology of inflammatory skin diseases. *Skin pharmacology and physiology*, 2018; *31*(2), 74-86.
2. Silva, M. I. B., de Souza Cavalieri, V. V., da Silva Lemos, C. C., Klein, M. R. S. T., & 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*, 2025; *33*, 240-247.
3. Mehrotra, R., Kermah, D., Budoff, M., Salusky, I. B., Mao, S. S., Gao, Y. L., ... & Norris, K. Hypovitaminosis D in chronic kidney disease. Clinical journal of the american society of nephrology,2008; 3(4), 1144-1151.
4. Satirapoj, B., Limwannata, P., Chaiprasert, A., Supasyndh, O., & Choovichian, P. Vitamin D insufficiency and deficiency with stages of chronic kidney disease in an Asian population. BMC nephrology, 2013;14(1), 206.
5. Holick, M. F.Vitamin D deficiency. New England journal of medicine, 2007; 357(3), 266-281.
6. Feng, M., Lv, J., Huang, F. T., Liang, P. F., Fu, S., Zeng, Y. C., ... & Xu, A. P. Predictors of vitamin D deficiency in predialysis patients with stage 3–5 chronic kidney diseases in Southern China. Nigerian journal of clinical practice, 2017; 20(11), 1309-1315.
7. Franca Gois, P. H., Wolley, M., Ranganathan, D., & Seguro, A. C. Vitamin D deficiency in chronic kidney disease: recent evidence and controversies. *International journal of environmental research and public health*, 2018;*15*(8), 1773.
8. Yamshchikov, A. V., Desai, N. S., Blumberg, H. M., Ziegler, T. R., & Tangpricha, V. Vitamin D for Treatment and Prevention of Infectious Diseases; a systematic review of Randomized controlled trials. *Endocrine Practice*, 2009; *15*(5), 438-449.
9. Pittas, A. G., Chung, M., Trikalinos, T., Mitri, J., Brendel, M., Patel, K., ... & Balk, E. M. Systematic review: vitamin D and cardiometabolic outcomes. *Annals of internal medicine*, 2010;*152*(5), 307-314.

10. Sassi, F., Tamone, C., & D'Amelio, P.Vitamin D: nutrient, hormone, and immunomodulator. *Nutrients*, 2018; *10*(11), 1656.
11. Drechsler, C., Pilz, S., Obermayer-Pietsch, B., Verduijn, M., Tomaschitz, A., Krane, V., ... & Wanner, C. Vitamin D deficiency is associated with sudden cardiac death, combined cardiovascular events, and mortality in haemodialysis patients. *European heart journal*, 2010; *31*(18), 2253-2261.
12. Drechsler, C., Verduijn, M., Pilz, S., Dekker, F. W., Krediet, R. T., Ritz, E., ... & NECOSAD Study Group. Vitamin D status and clinical outcomes in incident dialysis patients: results from the NECOSAD study. *Nephrology Dialysis Transplantation*, 2011; *26*(3), 1024-1032.
13. Ravani, P., Malberti, F., Tripepi, G., Pecchini, P., Cutrupi, S., Pizzini, P., ... & Zoccali, C. Vitamin D levels and patient outcome in chronic kidney disease. *Kidney international*, 2009; *75*(1), 88-95.
14. Mehrotra, R., Kermah, D. A., Salusky, I. B., Wolf, M. S., Thadhani, R. I., Chiu, Y. W., ... & Norris, K. C. Chronic kidney disease, hypovitaminosis D, and mortality in the United States. *Kidney international*, 2009;*76*(9), 977-983.
15. Caravaca-Fontán, 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. *Nefrología (English Edition)*, 2016; *36*(5), 510-516.
16. Mohiuddin, S. A., 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 Journal of Kidney Diseases and Transplantation, 2016; 27(3), 460-466.
17. Filipov, J. J., Zlatkov, B. K., Dimitrov, E. P., & Svinarov, D. Relationship between vitamin D status and immunosuppressive therapy in kidney transplant recipients. *Biotechnology & Biotechnological Equipment*, 2015; *29*(2), 331-335.
18. Al-Daghri, N. M., Al-Saleh, Y., Aljohani, N., Sulimani, R., Al-Othman, A. M., Alfawaz, H., ... & Reginster, J. Y. Vitamin D status correction in Saudi Arabia: an experts' consensus under the auspices of the European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis, and Musculoskeletal Diseases (ESCEO). *Archives of osteoporosis*, 2017; *12*(1), 1.
19. Yakout, S. M., Hussain, S. D., Alnaami, A. M., & Al-Daghri, N. M. Association between triglyceride-glucose index and vitamin D levels in Saudi postmenopausal women: a cross-sectional study. *International Journal of Clinical and Experimental Pathology*, 2025; *18*(7), 375.
20. Lee, M. J., Hsu, H. J., Wu, I. W., Sun, C. Y., Ting, M. K., & Lee, C. C.Vitamin D deficiency in northern Taiwan: a community-based cohort study. *BMC public health*, 2019;*19*(1), 337.
21. Hsu, C. C., Chen, C. M., Ju, Y. M., Wu, Y. C., Hsieh, H. M., Yang, S. H., ... & Li, S. C. Effects of consuming pulsed UV light-treated Pleurotus citrinopileatus on vitamin D nutritional status in healthy adults. *Foods*, 2025; *14*(2), 259.
22. El Din, U. S., Fayed, A., El Nokeety, M. M., Abdulazim, D. O., & Salem, M. M. Vitamin-D deficiency is encountered in almost all egyptian stage 3-5 chronic kidney disease patients in spite of the sunny weather. *Saudi Journal of Kidney Diseases and Transplantation*, 2019; *30*(6), 1389-1397.
23. Ganimusa, I., Chew, E., & Lu, E. M. C. Vitamin D deficiency, chronic kidney disease and periodontitis. *Medicina*, 2024; *60*(3), 420.
24. Kantartzi, K., Roumeliotis, S., Polychronidis, C., Zafeiri, E., Roumeliotis, A., Leivaditis, K., & Liakopoulos, V. Vitamin D and Vitamin D Analogues in Hemodialysis Patients: A Review of the Literature. *International Journal of Molecular Sciences*, 2025; *26*(23), 11550.
25. Ullah, H. Gut-vitamin D interplay: Key to mitigating immunosenescence and promoting healthy ageing. *Immunity & Ageing*, 2025; *22*(1), 20.