Characteristics of Patients Undergoing Hemodialysis in Saudi Arabia

Abdullah Hussien Alghamdi, MD*

ABSTRACT

Chronic kidney disease (CKD) is a well-recognized worldwide disorder that has been associated with multiple risk factors including concomitant chronic illnesses. This study focuses on the characteristics of patients who are currently undergoing hemodialysis in Saudi Arabia. This is a cross-sectional study that was conducted at Dr. Sulaiman Al-Habib Hospital in Riyadh, Saudi Arabia between June and October 2025. Descriptive statistics were presented as mean and standard deviation (SD) for continuous variables and frequency and percentage for categorical variables. This study included 93 HD patients. The majority of patients had undergone dialysis for 1-5 years (49.5%), followed by less than 1 year (28.0%). Arteriovenous fistula (AVF) was utilized by 40 participants (43.0%) and 55.9% reported using a catheter for dialysis access. Calcium levels were normal in (50.5%, whereas PTH levels ranged from 14 to 63 pg/ml in 50 patients (53.8%). Sevelamer was utilized by 58.1%, calcium by 61.3%, cinacalcet by 31.2%, and vitamin D by 59.1%. The prevalence of CKD has been increasing annually worldwide, and with this global increase, Saudi Arabia has seen a significant expansion in dialysis facilities covering the entirety of the region, and although participants of this study have shown mineral and hormonal disturbances, the treatment of such disturbances closely follows KDIGO guidelines in Saudi Arabia. Understanding the characteristics of patients on HD is essential for the understanding of disease patterns in the area and proper ways to manage these diseases.

Keywords: Characteristics; Chronic kidney disease; hemodialysis; Saudi Arabia

INTRODUCTION

Chronic kidney disease (CKD) is a well-recognized worldwide disorder that has been associated with multiple risk factors including concomitant chronic illnesses like diabetes mellitus[1,2], hypertension, and other cardiovascular diseases[3]. Studies have also suggested a significant correlation between hyperuricemia which is the increase of uric acid in blood, and the new onset of CKD[4,5]. Obesity and sex were also deemed as potential risk factors for the development of CKD, as it was shown to be more prevalent in females compared to males[6], a study by Mills et al, showed the prevalence of CKD stages 1-5 in (≥20 age group) to be 10.4% and 11.8% for men and women respectively[7].

In 2017, it was indicated that worldwide around 850 million individuals are diagnosed with kidney diseases[8]. A different study performed a comprehensive review and meta-analysis of 100 studies including around 6.9 million patients, reported a worldwide prevalence of CKD stages 1-5 to be 13.4%[6]. In Saudi Arabia, the prevalence of CKD has also been increasing, a study in 2018 by Cyrus et al, reported an incidence of CKD affecting around 1.72 million people in the region[9].

Dialysis, a process of externally and artificially filtering a patient's blood who suffers from CKD of other forms of kidney failure, was introduced to Saudi Arabia in the 1970s as reported by El Hafeez et al[10], and since then, dialysis centers have seen a noticeable expansion in the region, covering different geographic parts of Saudi Arabia. This expansion has been related to the overall economic development in the region[11]. In early 2019, Shaheen et al, reported that there are 243 dialysis centers in Saudi Arabia[12], and in 2024, the number of dialysis centers was increased to 275, and over 8000 hemodialysis (HD) machines[11].

Hemodialysis is known to be the cause of many side effects, including electrolyte and hormone disturbances, fatigue, cardiovascular morbidities, ophthalmological issues, a negative mental burden, and an increased mortality rate, especially with long-term vascular access[13-18]. This study focuses on the characteristics of patients who are currently undergoing hemodialysis in Saudi Arabia, as it helps us better understand the disease patterns in the region, as well as determine the potential socioeconomic and sociodemographic influences, such as age, gender, level of education, and most importantly, access to hemodialysis in the area.

METHODS

Study design: This is a cross-sectional study that was conducted at Dr. Sulaiman Al-Habib Hospital in Riyadh, Saudi Arabia between June and October 2025.

Study population: This research was performed in the hemodialysis unit at Dr. Sulaiman Al-Habib Hospital in Riyadh, a comprehensive tertiary care facility catering to a varied demographic of patients with chronic renal disease. The study population comprised adult patients aged 18 years or older receiving hemodialysis.

Ethical approval: This study was approved by the Research Center at Dr. Suliman AL Habib hospital, Riyadh, Saudi Arabia (RC25.11.109).

Statistical analysis: Data were analyzed using Statistical Package for Social Science (SPSS) version 27. Descriptive statistics were presented as mean and standard deviation (SD) for continuous variables and frequency and percentage for categorical variables.

RESULTS

This study included 93 HD patients. Among participants, 57.0% were males. The majority were Saudi nationals (90.3%). A total of 35.5% reported having less than high school. Employment status included (26.9%). Refer to Table 1 for further details.

* Department of Internal Medicine, College of Medicine
Imam Mohammad Ibn Saud Islamic University (IMSIU)
Riyadh, Saudi Arabia.
Email: Dr.alhomrani@gmail.com

The majority of patients had undergone dialysis for 1-5 years (49.5%), followed by less than 1 year (28.0%). Around 76.3% of participants reported a mild case of pruritus. In terms of dialysis access, arteriovenous fistula (AVF) was utilized by 40 participants (43.0%), but only one patient employed an arteriovenous graft (AVG) (1.1%), and 55.9% reported using a catheter for dialysis access. Calcium levels were normal in (50.5%, whereas PTH levels ranged from 14 to 63 pg/ml in 50 patients (53.8%). Sevelamer was utilized by 58.1%, calcium by 61.3%, cinacalcet by 31.2%, and vitamin D by 59.1%, Table 2.

Table 1. The sociodemographic characteristics of participants

The sociodemographic characteristics		N	%
Gender	Male	53	57.0
	Female	40	43.0
Nationality	Non-KSA	9	9.7
	KSA	84	90.3
Region of residence	Central	66	71.0
	Western	11	11.8
	Eastern	3	3.2
	Northern	2	2.2
	Southern	11	11.8
Educational level	Less than high school	33	35.5
	High school graduate	16	17.2
	Diploma	17	18.3
	Bachelor's degree	20	21.5
	Postgraduate degree	7	7.5
Employment status	Employed	25	26.9
	Unemployed	37	39.8
	Student	2	2.2
	Retired	29	31.2

Table 2. Clinical characteristics and dialysis related factors among study participants

Clinical characteristics and dialysis related factors		% (frequency)
Years on dialysis	<1	28.0 (26)
	1-5	49.5 (46)
	5-10	18.3 (17)
	>10	4.3 (4)
Access of dialysis	AVF	43.0 (40)
	AVG	1.1 (1)
	Catheter	55.9 (52)
Number of HD sessions missed per month	1-2	91.4 (85)
	3-4	8.6 (8)
Hb level	<=8	8.6 (8)
	8-10	30.1 (28)
	10-12	52.7 (49)
	>12	8.6 (8)
PO4	Low	7.5 (7)
	Normal	50.5 (47)
	High	41.9 (39)
Ca	Low	47.3 (44)
	Normal	50.5 (47)
	High	2.2 (2)
PTH	Less than 14	11.8 (11)
	14-63	53.8 (50)
	Above 63	34.4 (32)
Kt/v	<1.2	18.3 (17)
	1.2-1.4	48.4 (45)
	>1.4	33.3 (31)
Using of sevelamer	Yes	58.1 (54)
Using of calcium	Yes	61.3 (57)
Using of Cinacalcet	Yes	31.2 (29)
Using any type of Vitamin D	Yes	59.1 (55)

DISCUSSION

In our study, most participants reported venous catheter access as the route of hemodialysis (55.9%) followed by AVF access (43.0%) and only one participant reported AVG access (1.1%). These percentages are somewhat similar to a previous study in the United States in 2010/2011 which was mentioned in 2024, indicating a venous catheter access of (80.8%) followed by AVF access of (16.2%) and lastly, AVG access of only (3.0%)[19]. These percentages are well-explained by many previous papers, as AVGs are known to cause a higher rate of infection and thrombosis when compared to AVF[20], even though AVGs take around 2-4 weeks to mature, while AVF requires around 3 to 6 months to completely mature[21]. Catheter access was more popular since dialysis could be initiated immediately after catheter access, as well as the minimally invasive nature of the procedure[21,22].

Our results also show that 91.4% of the participants have missed one or two hemodialysis sessions per month, while 8.6% of participants have missed three or four sessions per month, and no participants in this study were shown to miss more than four sessions in one month, and based on our results of Kt/V levels of 1.2 – 1.4 in 48.4% of participants, which translates into them receiving an adequate dialysis dose and regiment of three sessions per week, this behavior could be explained by many factors including hospitalization events caused by other comorbidities in patients with CKD, as it was indicated in a previous study in the U.S, that around 47.1% of missed dialysis sessions were due to a medical event, including hospitalization, emergency department visits, or other relevant outpatient practices[23]. Other factors including transportation could be the cause, but due to the socioeconomic status of Saudi Arabia's residents, however, this factor was found to be irrelevant.

In this study, hemoglobin (Hb) levels in 52.7% of participants were 10-12g/dL, while they were 8-10g/dL in 30.1% of participants. These low levels of hemoglobin (anemia) are well-documented in CKD and kidney-related diseases patients, due to the underproduction of erythropoietin[24], usually patients with low hemoglobin levels, undergo additional pharmacological treatment like ESA, usually these agents slightly help to normalize Hb levels in patients with CKD. Besides, although high doses of ESA were shown to significantly increase Hb levels, it was also found that increasing the dose of ESAs in patients on hemodialysis to be the cause of increased cardiovascular morbidity and mortality rates[25], and as such, different pharmacological approaches were recognized in the treatment guidelines, for example, the initiation of iron therapy in the treatment of CKD-related anemia[26].

In the present study, we also focused on Phosphate (PO4), Calcium (Ca), and Parathyroid Hormone (PTH) levels, as results have shown that PO4 levels were normal in 50.5% of participants, and high in 41.9% of participants. On the contrary, calcium levels were normal in 50.5% of participants and low in 47.3% of patients. These levels are well explained by the fact that Calcium and Phosphate have an inverse relationship. In our study, 58.1% of participants were using Sevelamer (Phosphate binder), and 61.3% were using calcium, while only 31.2% of participants were using Cinacalcet (a calcimimetic), the lower incidence of Cinacalcet use corresponds to the lower incidents of high PTH levels in this study, as it was reported that about 34.4% of participants have a high PTH levels. This treatment regimen represents a clear trend of following the latest KDIGO guidelines, as it was recommended to assess the levels of these hormones and minerals, prior to initiating replacement therapy, as well as lowering phosphate levels to the normal range as one of the initial steps[27].

Pruritus (itching) was also a relevant factor discussed in this study, as 76.3% of participants reported a mild case of pruritus. CKD-associated pruritus (CKD-aP) is a serious condition described by the discomfort of itchiness all over the body, specific reasons behind this itching are still vague, and it was shown to significantly and negatively affect the quality of life of HD recipients. As it was indicated that CKD patients who suffer from CKD-aP could experience depression, sleep-deprivation and a longer period of recovery after hemodialysis, often, this itching is not relieved by corticosteroids or other typical pruritus treatment therapies[28].

Based on the results of this study, we recommend multiple approaches to improve the quality of life of hemodialysis recipients, starting with further research regarding CKD-aP. We also recommend increasing the accessibility of dialysis clinics further, regardless of the socioeconomic state of the residents, as it was indicated by Alghamdi et al[29], that there is a significant socioeconomic fluctuation between different parts of Saudi Arabia regarding knowledge and attitudes towards CKD and CKD treatment. The previous point also leads to the next recommendation, which is the implementation of education campaigns regarding CDK management in all parts of the region, to further decrease and potentially eliminate the occurrence of missed dialysis appointments. We also recommend the implementation of support groups in dialysis centers that could potentially uplift the general mental state of HD recipients.

CONCLUSION

In conclusion, the prevalence of CKD has been increasing annually worldwide, and with this global increase, Saudi Arabia has seen a significant expansion in dialysis facilities covering the entirety of the region, and although participants of this study have shown mineral and hormonal disturbances, the treatment of such disturbances closely follows KDIGO guidelines in Saudi Arabia. Understanding the characteristics of patients on HD is essential for the understanding of disease patterns in the area and proper ways to manage these diseases.

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Competing Interest: None

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REFERENCE

1. Saran R, Robinson B, Abbott K C, et al. US Renal Data System 2019 Annual Data Report: Epidemiology of Kidney Disease in the United States. Am J Kidney Dis 2020;75(1):6–7.
2. American Diabetes Association Professional Practice Committee. 11. Chronic Kidney Disease and Risk Management: Standards of Care in Diabetes-2024. Diabetes Care 2024;47(1):219–30.
3. Jankowski J, Floege J, Fliser D, et al. Cardiovascular Disease in Chronic Kidney Disease: Pathophysiological Insights and Therapeutic Options. Circulation 2021;143(11):1157–72.
4. Li L, Yang C, Zhao Y, et al. Is hyperuricemia an independent risk factor for new-onset chronic kidney disease?: A systematic review and meta-analysis based on observational cohort studies. BMC Nephrol 2014;15(122):1-11.

5. Yanai H, Adachi H, Hakoshima M, et al. Molecular Biological and Clinical Understanding of the Pathophysiology and Treatments of Hyperuricemia and Its Association with Metabolic Syndrome, Cardiovascular Diseases and Chronic Kidney Disease. Int J Mol Sci 2021;22(17):1-14.
6. Hill N R, Fatoba S T, Oke J L, et al. Global Prevalence of Chronic Kidney Disease - A Systematic Review and Meta-Analysis. PLoS One 2016;11(7):1-15.
7. Mills K T, Xu Y, Zhang W, et al. A systematic analysis of worldwide population-based data on the global burden of chronic kidney disease in 2010. Kidney Int 2015;88(5):950–7.
8. Jager K J, Kovesdy C, Langham R, et al. A single number for advocacy and communication-worldwide more than 850 million individuals have kidney diseases. Kidney Int 2019;96(5):1048–50.
9. Cyrus C, Al-Mueilo S, Vatte C, et al. Assessing known chronic kidney disease associated genetic variants in Saudi Arabian populations. BMC Nephrol 2018;19(1):88-95.
10. Abd ElHafeez S, Dounousi E, Barsoum R. A journey through the history of dialysis in sub-Saharan Africa. Arch Hell Med 2020;37(2):203–7.
11. Alghamdi L S, Alonazi W. The utilization of renal dialysis: a comprehensive study in Saudi Arabia. BMC Public Health 2024;24(1):1914-20.
12. Shaheen F, Al-Attar B, Santiago D, et al. Health Indicators for Renal Replacement Therapy in Saudi Arabia. Transplant Proc 2019;51(2):509–11.
13. Jin L, Zhou J, Shao F, et al. Long-term effects on PTH and mineral metabolism of 1.25 versus 1.75 mmol/L dialysate calcium in peritoneal dialysis patients: a meta-analysis. BMC Nephrol 2019;20(1):213-9.
14. Ramer S J, Scherer J S. Moving the Science of Patient-Reported Outcome Measures Forward: Measuring Fatigue in Hemodialysis Patients. Clin J Am Soc Nephrol 2020;15(11):1546–48.
15. Cohen-Hagai K. Cardiovascular Disease and Hemodialysis. Medicina (Kaunas) 2025;61(10):
16. Protsyk O, Lacorzana J. The effects of hemodialysis on the eye. Indian J Ophthalmol 2025;73(5):648–55.
17. Wang Y, Qiu Y, Ren L, et al. Social support, family resilience and psychological resilience among maintenance hemodialysis patients: a longitudinal study. BMC Psychiatry 2024;24(1):76-9.
18. Gil Giraldo Y, Muñoz Ramos P, Ruano P, et al. Vascular access-related mortality in hemodialysis patients during and after hospitalization. Ther Apher Dial 2020;24(6):688–94.
19. Besarab A, Frinak S, Margassery S, et al. Hemodialysis Vascular Access: A Historical Perspective on Access Promotion, Barriers, and Lessons for the Future. Kidney Med 2024;6(9):1-10.
20. Arasu R, Jegatheesan D, Sivakumaran Y. Overview of hemodialysis access and assessment. Can Fam Physician 2022;68(8):577–82.
21. Lok C E, Huber T S, Orchanian-Cheff A, et al. Arteriovenous Access for Hemodialysis: A Review. Jama 2024;331(15):1307–17.
22. MacRae J M, Oliver M, Clark E, et al. Arteriovenous Vascular Access Selection and Evaluation. Can J Kidney Health Dis 2016;3(2):1-11.
23. Gray K S, Cohen D E, Brunelli S M. In-center hemodialysis absenteeism: prevalence and association with outcomes. Clinicoecon Outcomes Res 2017;9(307):1–15.
24. da Silva V, Corrêa H, Neves R, et al. Impact of Low Hemoglobin on Body Composition, Strength, and Redox Status of Older Hemodialysis Patients Following Resistance Training. Front Physiol 2021;12(6):1-9.
25. Singh A K, Blackorby A, Cizman B, et al. Study design and baseline characteristics of patients on dialysis in the ASCEND-D trial. Nephrol Dial Transplant 2022;37(5):960–72.
26. Kidney Disease: Improving Global Outcomes (KDIGO) Anemia Work Group. KDIGO 2026 Clinical Practice Guideline for the Management of Anemia in Chronic Kidney Disease (CKD). Kidney Int 2026;109(1):1–99.
27. Kidney Disease: Improving Global Outcomes (KDIGO) CKD-MBD Update Work Group. KDIGO 2017 Clinical Practice Guideline Update for the Diagnosis, Evaluation, Prevention, and Treatment of Chronic Kidney Disease-Mineral and Bone Disorder (CKD-MBD). Kidney Int Suppl 2017;7(3):1-59.
28. Sukul N, Zhao J, Pisoni R L, et al. Pruritus in Hemodialysis Patients: Longitudinal Associations With Clinical and Patient-Reported Outcomes. Am J Kidney Dis 2023;82(6):666–76.
29. Alghamdi A, Alaryni A, AlMatham K, et al. Knowledge, Attitudes, and Practices of High-Risk Patients towards Prevention and Early Detection of Chronic Kidney Disease (CKD) in Saudi Arabia. Int J Environ Res Public Health 2023;20(1):1-12.