Health-Related Quality of Life Among Hemodialysis Patients in Al Baha, Saudi Arabia: A Cross-Sectional Multicenter Study

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ABSTRACT

End-stage renal disease (ESRD) is a chronic, progressive condition characterized by irreversible kidney function loss, requiring renal replacement therapies like dialysis or transplantation. Health-related quality of life (HRQOL) is critical in ESRD management, aiming to enhance patient care, symptom control, and rehabilitation. In 2017, 19,659 dialysis patients were recorded in Saudi Arabia, with a prevalence of 604.42 cases per million population. The global increase in chronic kidney disease (CKD) is largely due to obesity, diabetes, and hypertension. This study aims to evaluate the quality of life (QOL) of hemodialysis patients attending dialysis centers in the Al Baha region, Saudi Arabia. A cross-sectional study was conducted between June 19 and July 4, 2023. Hemodialysis patients from three centers—King Fahad Hospital Dialysis Center, Al Aqiq Dialysis Center, and Al Mandaq Dialysis Center—were interviewed using a structured questionnaire. A total of 71 patients were included. About half showed high QOL, with mean scores exceeding thresholds for physical health, kidney disease, and mental health. Factors significantly affecting QOL included sex (p = 0.004), age (p = 0.001), marital status, education, cardiovascular conditions, diabetes, and duration since diagnosis (p < 0.0001). QOL scores were lower across all domains, especially in middle-aged, unmarried, female patients with lower education, comorbidities, and longer disease duration. These results emphasize the need for interventions to improve QOL among hemodialysis patients in Al Baha, with a focus on mitigating modifiable factors and enhancing patient support.

Keywords: Chronic Kidney Disease, ESRD, Hemodialysis, HRQOL, Saudi Arabia.

INTRODUCTION

Intractable chronic diseases such as end-stage renal disease (ESRD) are characterized by their enduring nature and slow progression[1]. ESRD manifests as an irreversible decline in glomerular filtration rate, necessitating renal replacement therapy, such as dialysis or kidney transplantation, when the filtration rate falls below 10% of normal capacity[1]. ESRD patients undergoing hemodialysis typically reside in their communities as long as their symptoms remain stable, following an extensive therapy plan that includes adherence to treatment guidelines encompassing water restriction, nutrition, and medication. Such adherence is essential in preventing permanent renal dysfunction and the associated complications[2]. Health-related Quality of Life (HRQOL) is a multifaceted and patient-centered concept that plays a critical role in improving patient care, symptom relief, and rehabilitation[3]. To assess various aspects of an individual's health, several questionnaires have been developed. The Kidney Disease Quality of Life Short Form (KDQOL-SFTM) questionnaire, specifically designed for dialysis patients, is a reliable and validated tool that incorporates the 36-item Short Form Health Survey (SF-36) as its generic core[4].

According to published data from Saudi Arabia's National Center for Kidney Disease, approximately 15% of the population is estimated to have chronic renal failure, with 65% of those affected relying on hemodialysis[5]. Recent statistics from the Saudi Center for Organ Transplantation (SCOT) in 2017 revealed a total of 19,659 dialysis patients, with 92.9% undergoing hemodialysis and the remaining 7.1% receiving peritoneal dialysis. The prevalence of end-stage renal failure treated by dialysis is estimated at 604 cases, with a total of 1,726

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deaths (9%)[6]. The global rise in chronic kidney disease (CKD) cases is primarily attributed to the increasing prevalence of obesity, diabetes, and hypertension. Renal replacement therapy, such as hemodialysis (HD), peritoneal dialysis, or kidney transplantation, is the prevailing treatment approach[7]. Despite extensive global research on the quality of life (QoL) of patients undergoing dialysis, there remains a scarcity of such studies in Saudi Arabia. Therefore, this study aims to evaluate the quality of life among patients on hemodialysis attending dialysis centers in the Al Baha region of the Kingdom of Saudi Arabia.

MATERIALS AND METHODS

This cross-sectional study was carried out over a two-week period, from June 19 to July 4, 2023. All procedures adhered to established ethical standards, and informed consent was obtained from each participant prior to inclusion. Participants were assured of the confidentiality of their responses and their right to withdraw at any stage without consequences, ensuring that ethical principles of autonomy, beneficence, and respect were upheld throughout the research process.

Study criteria: The study targeted patients with end-stage renal disease (ESRD) receiving hemodialysis in the Al Baha region of Saudi Arabia. Eligible participants were recruited from three primary dialysis centers: King Fahad Hospital Dialysis Center, Al Aqiq Dialysis Center, and Al Mandaq Dialysis Center. Inclusion criteria required participants to be aged 18 years or older, to have undergone hemodialysis for at least 12 months, and to provide informed consent to participate in the study. The objective was to assess the impact of dialysis on the quality of life (QoL) among individuals living with chronic kidney disease (CKD). Initially, the total accessible population comprised 186 patients across five dialysis centers in the region: King Fahad Hospital in Al Baha, Al Aqiq Hospital, Al Mandaq Hospital, Al Makhwah Hospital, and the Diaverum Center in Baljurashi. However, due to logistical constraints, data could not be collected from 38 patients at Al Makhwah and 47 patients at Baljurashi. This limitation reduced the effective sample Size to 91 patients. From this cohort, 20 patients were excluded based on predefined exclusion criteria: 13 declined participations, 3 had received dialysis for less than 12 months, 2 were undergoing treatment for active malignancy, 1 had significant cognitive impairment, and 1 was unconscious at the time of data collection. Ultimately, 71 participants met the eligibility requirements and were enrolled in the study. Informed consent was obtained from all participants, and the study was conducted in full compliance with ethical research standards.

Survey tool: Data was collected using a structured, interview-administered questionnaire specifically designed to address the objectives of this study. The instrument comprised two main components: a sociodemographic section and the Kidney Disease Quality of Life 36-item short form (KDQOL-36), developed by RAND and the University of Arizona[4]. To ensure linguistic and cultural relevance, the Arabic version of the KDQOL-36—formally translated and validated—was employed. This version demonstrated strong conceptual equivalence to the original English tool and exhibited high reliability, as evidenced by a robust intraclass correlation coefficient (ICC), thus confirming its suitability for use in Arabic-speaking populations. The sociodemographic section collected detailed information on participants' age, sex, dialysis center, year of diagnosis, knowledge of disease etiology, and the presence of comorbid conditions such as hypertension, asthma, diabetes mellitus, and cardiovascular disease. Additional variables included educational level, employment status, monthly income, marital status, and place of residence. The KDQOL-36 instrument was organized into four domains: (1) physical health, comprising 19 items; (2) mental health, assessed through 13 items; (3) kidney disease-specific concerns, addressed by 41 items;

and (4) satisfaction with care, evaluated through 3 items. To ensure ethical rigor, the questionnaire included a clear statement of voluntary participation, emphasizing the participants' right to decline or withdraw at any time without penalty.

Statistical analysis: All statistical analyses were performed using IBM SPSS Statistics for Windows, version 20.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were employed to summarize the data: categorical variables were reported as frequencies and percentages, while continuous variables were expressed as means with corresponding standard deviations (mean ± SD). To assess associations between categorical variables, the chi-square (χ^2) test was applied. Statistical significance was determined at a p-value threshold of less than 0.05.

RESULTS

Participant characteristics

This study was conducted with a total of 71 participants who consensually responded to the interview questionnaire. Approximately two-thirds of the participants were female (62%). Participants from Al Baha city outnumbered those from Al Aqiq and Al Mandaq (73%, 16%, and 11%, respectively) (Table 1). The results indicate that 45% of the participants scored above the overall mean for the physical health score (20.2 ± 10.4). Additionally, around half of the participants scored above the mean for both kidney disease and mental health scores. Analysis of the pooled score (sum of physical, mental health, and kidney disease scores) shows that 53.5% of the participants achieved a score above the mean (159 ± 47.4) (Table 2). Pairwise correlation analysis between physical health, mental health, and kidney disease scores indicates a significant moderate correlation (p-value < 0.0001) (Figure 1).
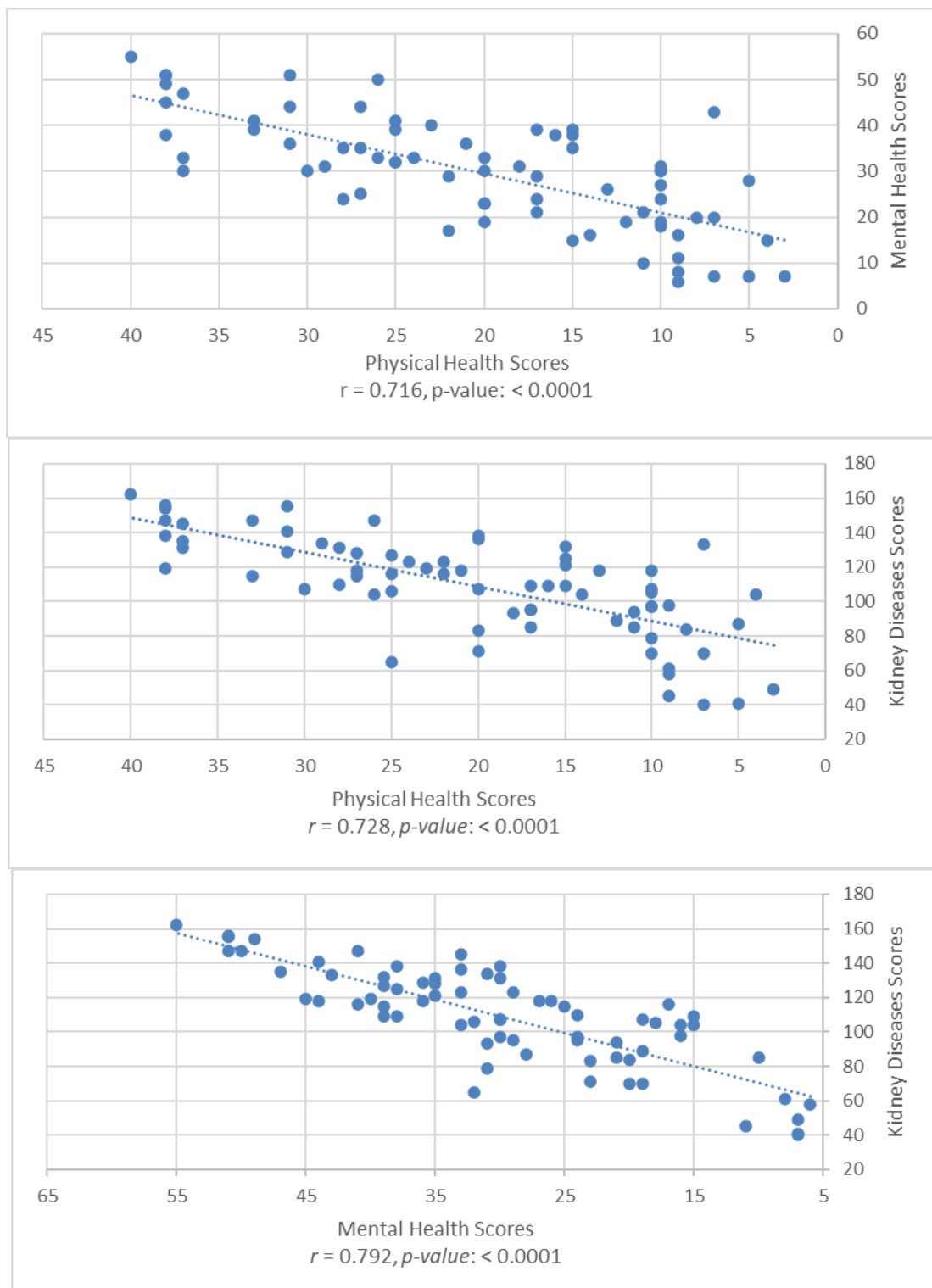
Table 1. Sociodemographic characteristics of participants.

	n	%		n	%
All	71	100	**Income**		
Sex			< 5k	51	72
Male	27	38	5–15k	16	23
Female	44	62	> 15k	4	6
Age (Years)			**Diagnosed since (Years)**		
18–30	6	9	1	12	17
31–40	3	4	2–5	38	53.5
41–50	19	27	5–10	11	15.5
51–60	14	20	>10	10	14
>60	29	41	**Awareness of cause**		
Center			Knows	39	55
Al Baha	52	73	Doesn't know	32	45
Al Aqiq	11	16	**Blood Pressure**		
Al Mandaq	8	11	Yes	65	91.5
Marital status			No	6	8.5
Married	40	56	**Asthma**		
Single	7	10	Yes	9	13
Divorced	4	6	No	62	87
Widow	20	28	**Diabetes**		
Education			Yes	32	45
General	33	46.5	No	39	55
Undergraduate	27	38	**Cardiovascular Diseases**		
Postgraduate	11	15.5	Yes	23	32
Employment			No	48	68
Employed	10	14			
Unemployed	61	86			

Table 2. An analysis of physical health, mental health, kidney diseases, and pooled scores.

	Physical health (0–45) [†]	Mental health (0–56) [†]	Kidney diseases (0–193) [†]	Pooled scores (0–294) [†]
Mean ± SD	20.2 ± 10.4	29.8 ± 12.1	108.8 ± 28.8	159 ± 47.4
Median (IQR)	20 (10–28)	30 (2–039)	110 (93–131)	163 (123–190)
Minimum	3	6	40	53
Maximum	40	55	162	257

[†] Indicates score ranges.

Figure 1. Correlation between physical health, mental health, and kidney disease scores.

Table 3. Summary and comparisons of physical health, mental health, kidney diseases, and pooled scores by different sociodemographic characteristics of participants.

	Frequencies (%)	Physical Health Score Mean (SD)	p-value	Mental Health Score Mean (SD)	p-value	Kidney Diseases Score Mean (SD)	p-value	Pooled Score Mean (SD)	p-value
Sex									
Male	27 (38)	24.26 (10.41)	0.009	34.81 (11.92)	0.005	120.15 (24.79)	0.008	179.22 (42.78)	0.004
Female	44 (62)	17.73 (9.67)		26.64 (11.38)		101.77 (29.16)		146.14 (46.60)	
Age (Years)									
18–30	6 (9)	32.50 (8.98)		38.83 (14.70)		137.33 (20.71)		208.67 (43.29)	
31–40	3 (4)	22.67 (4.62)		23.33 (0.58)		88.00 (19.98)		134.00 (24.98)	
41–50	19 (27)	25.63 (6.78)	< 0.0001	33.84 (7.45)	0.01	118.79 (21.68)	0.003	178.26 (30.78)	0.001
51–60	14 (20)	20.29 (11.47)		32.57 (14.67)		112.21 (33.23)		165.07 (55.79)	
> 60	29 (41)	13.83 (8.18)		24.48 (11.42)		96.76 (26.67)		135.07 (42.39)	
Centre									
Al Baha	52 (73)	20.52 (10.18)		30.27 (11.78)		109.35 (28.04)		160.13 (46.12)	
Al Aqiq	11 (16)	19.36 (11.63)	0.920	28.73 (14.64)	0.828	113.09 (29.08)	0.559	161.18 (53.62)	0.734
Al Mandaq	8 (11)	19.38 (11.28)		27.75 (12.56)		99.00 (35.15)		146.13 (54.25)	
Marital status									
Married	40 (56)	29.71 (10.19)		41.43 (12.05)		136.43 (25.05)		207.57 (45.17)	
Single	7 (10)	23.28 (9.58)	< 0.0001	31.55 (11.26)	0.001	112.80 (26.98)	0.001	167.63 (43.49)	< 0.0001
Divorced	4 (6)	10.70 (4.29)		22.00 (10.78)		91.55 (26.24)		124.25 (37.98)	
Widow	20 (28)	20.50 (7.59)		30.00 (5.09)		106.00 (18.39)		156.50 (26.98)	
Education									
General	33 (46.5)	13.39 (7.78)		24.06 (11.44)	< 0.0001	95.67 (28.52)		133.12 (44.13)	
Undergraduate	27 (38)	27.59 (7.77)	< 0.0001	36.15 (9.77)		123.41 (22.51)	0.001	187.15 (36.29)	< 0.0001
Postgraduate	11 (15.5)	22.55 (9.86)		31.09 (12.32)		112.09 (27.24)		165.73 (42.69)	
Employment									
Employed	10 (14)	25.30 (9.59)	0.095	38.00 (9.33)	0.02	118.00 (24.97)	0.277	181.30 (35.97)	0.107
Unemployed	61 (86)	19.38 (10.34)		28.39 (12.11)		107.25 (29.32)		155.02 (48.59)	
Income									
< 5k	51 (72)	18.96 (10.21)		28.65 (11.82)		106.98 (29.23)		154.59 (47.84)	
5–15k	16 (23)	23.00 (11.13)	0.257	32.63 (13.06)	0.484	114.69 (26.68)	0.652	170.31 (47.39)	0.504
> 15k	4 (6)	25.00 (7.79)		32.25 (14.39)		107.75 (36.85)		165.00 (51.36)	
Diagnosed since (Years)									
1	12 (17)	23.75 (11.89)		36.83 (10.99)		123.08 (25.38)		183.67 (45.57)	
2–5	38 (53.5)	18.97 (9.24)	< 0.0001	26.97 (10.84)	0.001	104.89 (28.22)	0.001	150.84 (44.11)	< 0.0001
5–10	11 (15.5)	20.09 (12.49)		30.09 (14.65)		102.55 (36.20)		152.73 (60.91)	
> 10	10 (14)	20.80 (10.85)		31.40 (13.48)		113.10 (23.33)		165.30 (43.09)	
Awareness of causes of kidney diseases									
Knows	39 (55)	20.44 (10.07)	0.842	30.21 (11.31)	0.729	109.92 (26.97)	0.711	160.56 (43.53)	0.722
Doesn't know	32 (45)	19.94 (10.90)		29.19 (13.51)		107.34 (31.44)		156.47 (52.98)	
Blood pressure									
Yes	65 (91.5)	19.42 (9.97)	0.032	29.42 (11.81)	0.455	107.80 (28.98)	0.359	156.63 (47.01)	0.227
No	6 (8.5)	28.83 (11.8)		33.33 (16.59)		119.17 (27.33)		181.33 (53.81)	
Asthma									
Yes	9 (13)	18.11 (11.47)	0.520	26.78 (9.74)	0.438	107.89 (25.47)	0.924	152.78 (43.48)	0.692
No	62 (87)	20.52 (10.28)		30.18 (12.50)		108.89 (29.45)		159.58 (48.55)	
Diabetes									
Yes	32 (45)	14.31 (8.59)	< 0.0001	25.97 (12.97)	0.017	97.16 (31.35)	0.002	137.44 (49.89)	< 0.0001
No	39 (55)	25.05 (9.22)		32.85 (10.68)		118.28 (22.88)		176.18 (38.31)	
Cardiovascular diseases									
Yes	23 (32)	11.87 (5.52)	< 0.0001	22.96 (11.51)	< 0.0001	91.13 (25.54)	< 0.0001	125.96 (38.73)	< 0.0001
No	48 (68)	24.21 (9.79)		33.00 (11.20)		117.21 (26.61)		174.42 (43.71)	

Association between sociodemographic characteristics and various indices

Factors identified to have a significant effect on physical health, mental health, and kidney disease included sex, age, marital status, education, years since diagnosis, diabetes, and CVD. Furthermore, undergraduate participants (38%) had the highest scores in physical health, mental health, and KD compared to those with a general or postgraduate education. Married participants surprisingly achieved the highest scores in all three categories of marital status, while divorcees achieved the lowest scores. Expectedly, participants aged 18 to 30 recorded the highest pooled score compared to other age groups. Participants diagnosed one year ago (17%) achieved the highest pooled scores, while participants diagnosed between 2 and 5 years ago (53.5%) had the lowest scores (Table 3).

DISCUSSION

This study evaluated health-related quality of life (HRQOL) among hemodialysis (HD) patients in Al Baha, Saudi Arabia, and explored the impact of sociodemographic and clinical factors on patient well-being. The results are consistent with literature, confirming that individuals undergoing HD frequently experience significant impairments in physical, mental, and disease-specific domains of quality of life[8]. These impairments are multifactorial and often compounded by comorbid conditions, psychosocial stressors, and socioeconomic limitations.

Gender emerged as a significant determinant of HRQOL, with female participants reporting lower scores across all domains. This observation aligns with findings from prior studies, which suggest that women with end-stage renal disease (ESRD) face disproportionate burdens related to symptom perception, psychological distress, and caregiving responsibilities[9-15]. These disparities may be further amplified in the Saudi context due to sociocultural norms and limited access to tailored psychosocial support[16,17].

Age was negatively associated with HRQOL, with younger patients reporting better physical and mental health outcomes. This finding is consistent with prior literature suggesting that younger individuals tend to exhibit better physiological reserve, greater adaptability, and fewer comorbidities[18]. However, other studies have reported that older patients may demonstrate enhanced coping mechanisms and emotional resilience due to adjusted expectations and social support. Rebollo and Ortega[19] highlighting the need for age-specific support strategies.

Marital status significantly influenced HRQOL, with married individuals achieving higher scores across all domains. This may be attributed to the emotional stability, social companionship, and logistical assistance that marriage typically provides, especially within collectivist societies such as Saudi Arabia where familial support structures are prominent[18]. Unmarried patients may face greater challenges in navigating chronic illness without a consistent source of emotional or practical assistance.

A positive association was observed between educational attainment and HRQOL scores, with participants of higher educational backgrounds reporting significantly better QoL. Specifically, undergraduate participants achieved the highest scores across physical, mental, and kidney disease-specific domains,. This finding aligns with established literature that associates lower education levels with poorer health outcomes.[20] Others have reported that individuals with lower educational levels may possess different expectations regarding health or may experience reduced psychological burden related to disease awareness[21]. These discrepancies suggest a need for further investigation into the role of health literacy and perception in shaping QoL among HD patients.

Employment status also demonstrated a strong relationship with HRQOL. A significant proportion of the study population (86%) was unemployed, and unemployment was associated with reduced physical and mental well-being. These findings are consistent with prior studies identifying unemployment as a major psychosocial stressor contributing to lower quality of life in ESRD populations[10,22,23]. Unemployment may lead to financial instability, reduced self-esteem, and limited access to social engagement, all of which may compound the burden of chronic illness. Rehabilitation programs aimed at enhancing vocational reintegration could play a pivotal role in improving outcomes for these patients.

The duration of dialysis treatment was negatively associated with HRQOL. Patients undergoing HD for less than one year demonstrated significantly higher QoL scores compared to those on long-term treatment. This decline is likely multifactorial, reflecting cumulative treatment fatigue, disease progression, and psychosocial adaptation[24,25]. While some longitudinal studies report stabilization or improvement in QoL over time, such outcomes are typically contingent upon access to high-quality care, strong social support, and effective symptom management[26].

Comorbidities, particularly cardiovascular disease (CVD) and diabetes mellitus (DM), were found to exert a pronounced negative effect on HRQOL. Patients with CVD had the lowest scores across all domains, followed by those with diabetes. These findings are consistent with previous research indicating that comorbid conditions significantly increase symptom burden, healthcare utilization, and mortality risk in ESRD populations[27,28]. Diabetes imposes additional psychological and financial stress, requiring complex self-management and strict adherence to treatment regimen[29]. Comprehensive management strategies targeting these conditions are essential to improving patient-centered outcomes.

The findings of this study have several implications for clinical practice and healthcare policy. There is a clear need to design gender-sensitive support programs, including peer support networks and mental health services tailored to the unique needs of female patients. Additionally, incorporating vocational counseling and financial support into renal care programs may mitigate the socioeconomic stressors experienced by unemployed patients. Early and structured management of comorbidities especially CVD and DM should be integrated into routine care, with an emphasis on patient education and behavioral modification. Moreover, implementing regular needs assessments within dialysis clinics can support the development of individualized, culturally appropriate interventions that reflect patients lived experiences and social contexts.

This study possesses several strengths. It draws upon contemporary, regionally relevant literature, captures cultural nuances through a locally grounded design, and includes participants from multiple dialysis centers across the Al Baha region, enhancing the external validity of the findings. However, certain limitations must be acknowledged. The cross-sectional design restricts the ability to infer causal relationships, while the relatively small sample size and uneven distribution of participants across centers may limit the generalizability of the results. Future research should employ longitudinal and mixed methods approaches to explore HRQOL trajectories and assess the effectiveness of targeted interventions.

CONCLUSION

The results of this study highlight the multidimensional burden

experienced by HD patients in Saudi Arabia and emphasize the importance of culturally attuned, patient-centered care. Addressing the psychosocial, economic, and clinical determinants of HRQOL through integrated healthcare models is essential to enhancing the overall well-being and life satisfaction of individuals living with ESRD.

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