Original Article

Quality of Life of End-Stage Kidney Disease Patients Undergoing Dialysis: A Multi-Center Study from Saudi Arabia

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Abstract

Background: Limited studies from Saudi Arabia have assessed the quality of life (QoL) of end-stage kidney disease (ESKD) patients on hemodialysis and its associated factors.

Objective: To determine the physical, psychological, familial, and social factors that impact the QoL of ESKD patients in Saudi Arabia.

Materials and Methods: This cross-sectional study included adult patients with ESKD who underwent hemodialysis at King Salman Center for Kidney Disease and King Fahad Medical City, Riyadh, Saudi Arabia, between June and July 2021, and had been on dialysis for ≥1 year were included. The Arabic version of the Quality of Life Index–Dialysis (QLI-D) version III was used, which has four sub-scales.

Results: A total of 173 respondents completed the questionnaire. The overall mean (±SD) QoL score was 22.2 (±4.30), while the scores for the sub-scales ranged from 20.8 (±5.25) (Health and Functioning subscale) to 26.0 (Family subscale). Respondents aged >70 years had significantly lower average score ($P < 0.05$) and lower Health and Functioning subscale score ($P < 0.05$). Education and higher income had significant positive correlation with the Social and Economic subscale ($r = 0.234$, $P < 0.01$; and $r = 0.162$, $P < 0.05$, respectively). Diabetes was significantly associated with lower scores in the Health and Functioning subscale ($P < 0.05$). There was a positive linear trend in the association between the number of years on dialysis and the overall QLI-D score and the subscales of QLI-D ($P < 0.05$).

Conclusion: Higher education level and income and longer duration of dialysis were factors associated with better QoL, while older age and having diabetes were associated with poorer QoL. Awareness among healthcare providers regarding these factors can help improve the QoL of these patients.

Keywords: Age, diabetes, end-stage kidney disease, hemodialysis, quality of life, renal failure, renal replacement therapy, socioeconomic factors

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INTRODUCTION

End-stage kidney disease (ESKD) is the permanent deterioration of the kidney function, necessitating treatment with renal replacement therapy that consists of three main modalities: dialysis, hemofiltration, and kidney transplant.[1,2] The global epidemic of diabetes and hypertension has resulted in ESKD growing dramatically globally, as these are the main causes of kidney diseases.[3] This is also the case in the Gulf Cooperation Council countries including in Saudi Arabia.[4]

The Saudi Center for Organ Transplantation found that in 2016, 0.06% of the population in Saudi Arabia was on dialysis, and between 1993 and 2016, the average year-on-year increase in cases was about 6%. Further, hemodialysis was the most commonly used renal replacement therapy.[5] Hemodialysis is performed 3 times/week, with each session typically lasting about 4 hours; therefore, on the one hand this treatment significantly improves a patients functionality and disease-related quality of life (QoL), while on the other it imposes negative changes socially, psychologically, and financially.[6,7] Measuring QoL is important, as it helps in the assessment of care quality, clinical-oriented decision-making, and health care needs estimation in the community and it can also be reliable predictor for the prognosis of patients with ESKD.[8,9]

In ESKD patients undergoing hemodialysis, age, gender, education level, occupation, and marital status have been reported as the sociodemographic factors significantly associated with QoL, and anemia, hepatitis C virus infection, and diabetes as the comorbidities that significantly impact the QoL of these patients.[10] However, factors relating to QoL can differ according to ethnicity and culture.[11] In Saudi Arabia, there is lack of recent studies in the literature that have assessed the QoL of ESKD patients on dialysis and its associated factors. This study was conducted with the aim of filling this gap in the literature. The findings of this study would determine the physical, psychological, familial, and social factors that impact the QoL of ESKD patients in Saudi Arabia, and thus would help in the development and implementation of support management plan for these patients.

MATERIALS AND METHODS

This manuscript adheres to the STROBE reporting guidelines.

Study design, setting, and participants
Adult patients (aged ≥18 years) with ESKD who underwent hemodialysis at King Salman Center for Kidney Disease (KSCKD) and King Fahad Medical City (KFMC), Riyadh, Saudi Arabia, between June and July 2021, and had been on dialysis for ≥1 year were included in this cross-sectional study if they consented to participate. Patients who had cognitive impairment and/ or debilitating diseases (except hypertension, diabetes, and cardiovascular diseases) were excluded from the study to avoid confounding effects. This study used convenience sampling.

KSCKD is the main outpatient dialysis unit in Riyadh Second Health Cluster, and the largest dialysis center in Riyadh with a total capacity of 600 patients, and with >52,000 hemodialysis sessions per year.[12] The dialysis unit at KFMC, a tertiary hospital at Riyadh Second Health Cluster, has a total capacity of up to 100 patients. KSCKD and KFMC are two of the largest centers for both hemodialysis and peritoneal dialysis not only in Saudi Arabia but also in the Middle East. Therefore, the patient population undergoing in these centers is diverse and representative of the population.

Ethical approval for this study was obtained from the Institutional Review Board of KFMC. Written informed consents were obtained from the patients before participation.

Study tool and survey administration
The Arabic version of the Ferrans and Powers Quality of Life Index–Dialysis version III (QLI-D) was used to determine the QoL in this study.[13] The questionnaire was distributed to eligible consenting patients at both the centers during the waiting time before the start of dialysis. The patients were informed of the study objectives, the estimated time for completing the questionnaire, that participation is voluntary, and of their rights to withdraw at any time. In addition, they were assured of anonymity and data confidentiality. No identifying information was collected. No incentives were provided for participation.

Quality of life index–dialysis version III
QLI-D has four subscales: Health and Functioning, Social and Economic, Psychological/spiritual, and Family subscales. The overall reliability score of the Arabic QLI-D is 0.93, and the score of the subscales range from 0.79 to 0.86. In addition, the content validity of this translated version had been found to be adequate.[13,14]

The QLI-D consists of 34 pairs of questions, with each question pair assessing the satisfaction and importance levels. In this tool, 32 questions represent the core QLI, while 2 items are specifically pertaining to CKD (i.e., life changes

because of kidney failure and regarding kidney transplant). All questions are scored using a six-point Likert scale. For satisfaction, the scoring range from 1 (very dissatisfied) and 6 (very satisfied), and for importance, the scoring range from 1 (very unimportant) to 6 (very important). The items and scoring in each subscale are shown in Appendix A. The scoring for the overall and each subscale ranged from 0–30, with higher scores indicating a better QoL.

Outcomes

The primary outcome is to assess the QoL in CKD patients undergoing hemodialysis and its associated factors. The secondary outcome is to measure the internal consistency of the subscales.

Statistical analysis

Data were encoded and presented using the SPSS version 26. SPSS was used to compute the overall and subscale scores for the QLI-D questionnaire using the publicly available syntax.[12] Categorical variables were presented through frequency and percentages. Mean and standard deviation were used to summarize the scores of the QLI-D questionnaire. One-way ANOVA and unpaired *t*-test were used to assess socio-demographic characteristics–QLI-D score (overall score and subscales) relationship for categorical variables with two and more than two levels, respectively. Association between education and income with the QoL was performed using Spearman's correlation coefficient. Chi-square test for linear trend was used to assess the association between years of dialysis and QLI-D. Reliability of the QLI-D subscales was evaluated using Cronbach's alpha. Hypothesis testing was performed at the 5% level of significance.

Complete response was defined as completing all the relevant questions (some questions, such as 10, 12, 13, 22, and 23, were not applicable/appropriate for some of the participants). Partial response was defined as one or more missing responses in the questionnaire. The percentage of missing items did not exceed 10% for any of the respondents (maximum of 4%). Missing values were not replaced to avoid bias and were excluded in a pairwise fashion. The average score for each respective domain for these respondents were calculated by averaging the scores for items with non-missing data.

RESULTS

The study questionnaire was completed by 173 respondents. Most of the respondents were aged 31–70 years old (81.5%), males (68.6%), married (65.9%), and had an education level of secondary school and above (63.4%). Almost an equal proportion of the respondents were employed

and unemployed (37.6% and 34.7%, respectively). About half of the respondents had a monthly income of <5000 Saudi Riyals. Regarding comorbidities, 54.3%, 71.7%, and 24.9% of the patients had diabetes, hypertension, and cardiovascular disease, respectively. Most of the respondents had been on dialysis for <5 years (60.2%). Most of the respondents were from KSCKD (82.6%) [Table 1].

Reliability

The reliability of all subscales ranged from 0.7 to 0.87. The reliability of the overall scale was 0.9 and 0.93 for satisfaction and importance, respectively [Table 2].

Quality of life and its associated factors

The overall mean (±SD) QoL score was 22.2 (±4.30), while the scores for the subscales ranged from 20.8 (±5.25)

Table 1: Sociodemographic, dialysis characteristics, and comorbidities of the respondents (*N*=173)

Variables	*n* (%)
Age (years)	
18-30	19 (11.0)
31-50	66 (38.2)
51-70	75 (43.4)
>70	13 (7.51)
Gender	
Male	118 (68.6)
Female	54 (31.4)
Marital status	
Married	114 (65.9)
Single	31 (17.9)
Widowed	18 (10.4)
Divorced	10 (5.78)
Education level	
None	27 (15.7)
Elementary school	16 (9.30)
Middle school	20 (11.6)
Secondary school	55 (32.0)
University	48 (27.9)
Postgraduate	6 (3.49)
Employment status	
Employed	64 (37.6)
Unemployed	59 (34.7)
Retired	34 (20.0)
Disabled	13 (7.65)
Income (Saudi Riyals/month)	
<5000	77 (45.6)
5000-9999	33 (19.5)
10,000-15,000	39 (23.1)
>15,000	20 (11.8)
Diabetes	94 (54.3)
Hypertension	124 (71.7)
Cardiovascular disease	43 (24.9)
Years on dialysis	
<1	34 (19.7)
1-<5	70 (40.5)
5-10	41 (23.7)
>10	28 (16.2)
Hemodialysis center	
KFMC	30 (17.4)
KSCKD	142 (82.6)

KFMC – King Fahad Medical City; KSCKD – King Salman Center for Kidney Disease

(Health and Functioning subscale) to 26.0 (Family subscale) [Table 2]. The mean scores of QoL according to socio-demographic characteristics is presented in Table 3.

Gender was not significantly associated with any of the QLI-D subscales and the overall score. Age was a significantly associated factor with the overall QoL. Post hoc pairwise comparisons showed that respondents aged >70 years had a lower average score than respondents in any of the remaining three groups (*P* < 0.05). Similarly, respondents aged >70 years had a lower average score on the Health and Functioning subscale than the remaining three groups (*P* < 0.05).

Education and higher income had significant positive correlations with the Social and Economic subscale (education: *r* = 0.234, *P* < 0.01; higher income: *r* = 0.162, *P* < 0.05). Similarly, employment was also significantly associated with higher scores in the Social and Economic subscale (*P* = 0.005). In terms of comorbidities, only diabetes was significantly associated with lower scores in the Health and Functioning subscale (*P* < 0.05) [Table 4].

Chi-square test for linear trend showed a statistically significant positive linear trend in the association between the duration of dialysis and the overall QLI-D score and the subscales of QLI-D (*P* < 0.05) [Table 4 and Figure 1]. This indicates that an increase in the number of years on dialysis is associated with better QoL.

DISCUSSION

This study, which was conducted at two of the largest centers for hemodialysis in Saudi Arabia and the Middle East, found that higher education level and income as well as longer duration (years) on dialysis were factors associated with better QoL, while being older aged and having diabetes were associated with poorer QoL. The findings of our study are very similar to the findings of a study from Bahrain, a culturally similar and neighboring

Table 2: Mean scores and internal consistencies of the overall and subscales

Variable	Mean±SD	Cronbach's alpha	
		Satisfaction	Importance
Quality of life	22.2±4.30	0.9	0.93
Health and functioning subscale	20.8±5.25	0.89	0.87
Social and Economic subscale	20.9±5.03	0.78	0.7
Psychological/spiritual subscale	23.9±5.34	0.89	0.87
Family subscale	26.0±3.91	0.72	0.7

Table 3: Quality of life based on sociodemographic characteristics

Variables	Mean±SD				
	Overall QoL	Health and Functioning subscale	Social and Economic subscale	Psychological/ spiritual subscale	Family subscale
Gender					
Male	22.05±4.20	20.29±5.08	21.29±4.57	23.65±5.18	26.03±3.95
Female	22.60±4.55	21.81±5.56	20.03±5.90	24.51±5.70	26.10±3.88
Age (years)	0.453	0.1	0.169	0.348	0.904
18-30	20.73ᵃ±4.80	19.68ᵃ±5.48	19.81±5.23	21.70±6.27	24.42±4.44
31-50	22.85ᵃ±4.36	21.77ᵃ±4.97	21.57±4.75	24.06±5.64	26.24±4.10
51-70	22.56ᵃ±4.01	20.96ᵃ±5.14	20.96±5.20	24.55±4.97	26.53±3.41
>70	19.22ᵇ±3.50	16.05ᵇ±4.72	18.55±4.69	22.76±3.57	24.47±4.31
P	0.014	0.003	0.179	0.173	0.1
Education level¶					
None	21.63±5.60	20.50±6.41	19.18±7.24	24.03±6.86	25.12±4.51
Elementary school	22.50±4.13	21.05±5.28	19.80±5.07	24.84±5.18	27.36±3.05
Middle school	22.34±3.98	21.07±5.32	20.09±3.75	24.15±5.54	26.84±3.01
Secondary school	21.53±4.61	20.04±5.63	20.19±4.68	22.76±5.61	26.13±4.14
University	23.20±3.08	21.63±3.90	23.14±3.55	24.71±3.94	25.74±3.84
Postgraduate	22.11±5.08	19.60±6.63	22.19±5.76	24.00±5.22	26.37±3.93
P	>0.05	>0.05	<0.01	>0.05	>0.05
Employment status					
Employed	22.21±4.08	20.41±5.01	22.07ᵃ±4.40	23.58±4.89	25.56±4.02
Unemployed	21.66±4.98	21.00±5.80	18.98ᵇ±5.84	23.31±6.23	25.50±4.41
Retired	22.91±3.67	21.00±5.13	21.52ᵃᵇ±4.22	25.02±4.21	27.39±2.67
Disabled	22.75±3.96	20.49±4.99	21.44ᵃᵇ±4.24	24.99±6.19	27.90±2.47
P	0.566	0.918	0.005	0.405	0.1
Income (Saudi Riyals/month)¶					
<5000	22.27±4.83	21.15±5.73	19.90±5.70	24.41±5.78	26.19±4.21
5000-9999	21.86±4.20	20.42±5.45	21.24±4.39	22.94±4.88	25.43±3.42
10,000-15,000	22.87±3.16	21.06±3.93	22.96±4.05	24.12±4.37	26.00±3.66
>15,000	22.16±3.32	19.77±5.00	21.08±2.90	24.51±3.39	27.13±3.19
P	>0.05	>0.05	<0.05	>0.05	>0.05

¶Analysis was performed using Spearman's correlation. Statistical analysis was performed using *t*-test and one-way ANOVA for variables with two and more than two levels, respectively. Letters represent the results of pairwise comparisons. Groups with different letters have means that are significantly different at the 0.05 level. SD – Standard deviation; QoL – Quality of life

Table 4: Association between comorbidities, dialysis characteristics and quality of life

Variables	Mean±SD				
	Overall QoL	Health and Functioning subscale	Social and Economic subscale	Psychological/ spiritual subscale	Family subscale
Diabetes					
Yes	21.75±4.23	19.93±5.33	20.57±5.09	23.78±5.06	25.88±4.05
No	22.77±4.33	21.74±5.02	21.26±4.96	24.07±5.67	26.22±3.76
P	0.121	0.023	0.368	0.729	0.573
Hypertension					
Yes	22.36±4.39	20.99±5.21	21.07±5.21	24.04±5.49	25.90±4.19
No	21.87±4.08	20.17±5.37	20.42±4.55	23.59±4.97	26.39±3.11
P	0.488	0.365	0.416	0.609	0.397
CVD					
Yes	21.84±4.16	20.19±5.16	20.21±5.69	23.73±5.29	26.28±3.98
No	22.35±4.35	20.95±5.29	21.11±4.79	23.97±5.37	25.95±3.90
P	0.493	0.413	0.353	0.797	0.637
Years on dialysis[¶]					
<1	21.72±4.75	20.02±5.26	20.97±5.49	22.76±6.25	26.39±4.33
1-5	21.29±4.29	20.02±5.48	19.47±5.06	23.17±5.37	24.98±4.11
5-10	22.42±3.50	20.59±4.54	21.72±3.85	24.31±4.12	26.07±3.21
>10	24.85±3.87	23.75±4.83	23.09±5.05	26.58±4.89	28.19±2.89
P	0.002	0.005	0.016	0.002	0.028
HD center					
KFMC	21.77±3.70	19.69±4.53	21.31±3.97	23.25±4.68	26.60±3.39
KSCKD	22.30±4.43	20.98±5.40	20.73±5.19	24.03±5.48	25.97±3.97
P	0.49	0.179	0.499	0.427	0.381

[¶]Analysis was performed using Chi-square test for linear trend. Statistical analysis was performed using *t*-test. KFMC – King Fahad Medical City; KSCKD – King Salman Center for Kidney Disease; SD – Standard deviation; CVD – Cardiovascular disease; HD – Hemodialysis; QoL – Quality of life
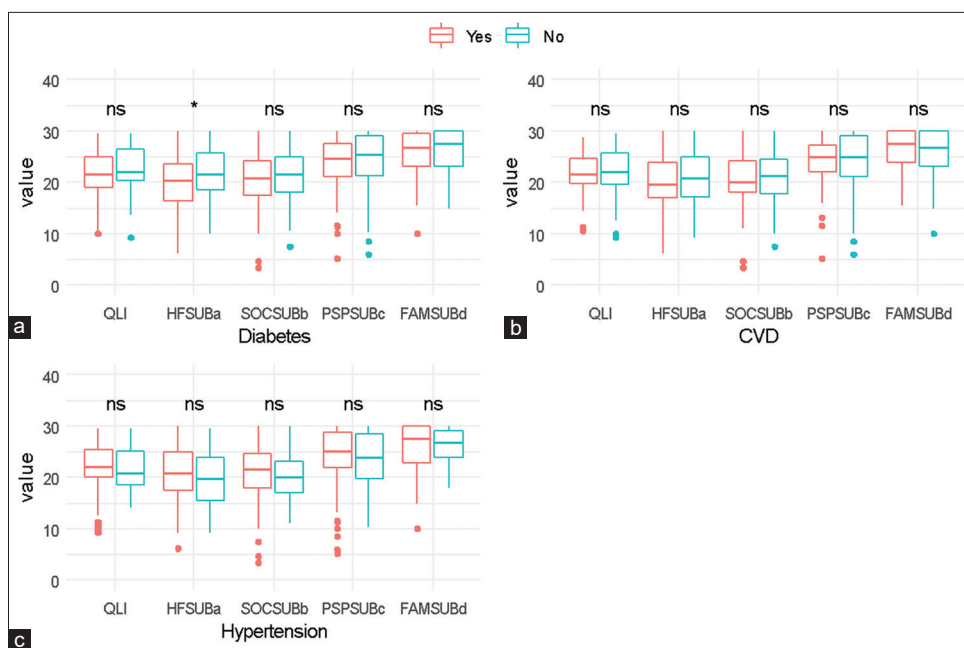

Figure 1: Association between QLI-D scores and (a) diabetes, (b) cardiovascular diseases, and (c) hypertension. NS – Non-significant, CVD – Cardiovascular disease, QLI-D – Quality of life index–dialysis, HFSUBa – Health and Functioning subscale, SOCSUBb – Social and Economic subscale, PSPSUBc – Psychological/spiritual subscale, FAMSUBd – Family subscale

country of Saudi Arabia, wherein higher level of education and income as well as being employment was associated with better quality of life.[15] Likewise, in a study from Oman, older age and lower income and education levels and having diabetes were all associated with poorer quality of life among ESKD patients undergoing dialysis.[16] In a study from Egypt, patients on hemodialysis with diabetes had lower health-related QoL scores than those with other comorbidities, which is similar to our findings wherein only diabetes was found to be significantly associated.[10]

In terms of age, the current study also found better QoL among patients aged <50 years, but this was only in the functioning, economics, and social domains. Similarly, in

a single center study from Saudi Arabia, younger age was significantly associated with better QoL in the physical domain, but not in other domains.[11] The current study did not find gender to be associated with either the overall score or with any of the subscales. Similarly, in studies from Bahrain,[15] Oman[16], and Palestine[17], gender has not been reported as a significant factor that impacts the QoL. In contrast, in studies from Rwanda[18] and India,[19] it was found that male patients on dialysis had better QoL scores. These discrepancies in findings indicate the social differences across countries, rather than disease-specific factors, may be a contributing factor on the QoL with respect to gender. Nonetheless, it should also be noted that the current study had a higher proportion of male participants, and this may have had a confounding effect on the findings, but similar gender-wise proportions have been reported previously.[15]

In the current study, employment was also significantly associated with higher scores in the Social and Economic subscale. Similar findings have been reported in the study from Bahrain[15] and from Rwanda.[18] More than half of the patients in the current study were unemployed, which is unsurprising given that requiring dialysis three times/week can impact the employment status of these patients coupled with the fact that about 43% of the participants were aged 51–70 years.

The current study found that a linear relationship between the duration of dialysis and QoL, i.e., longer duration of dialysis was related to higher scores of QoL. Similar findings were reported from a recent study from Rwanda, wherein dialysis vintage of 13–24 months was positively associated with higher scores of QoL. These findings may be owing to survivorship bias as well as the patients having adapted to the requirements of dialysis. In contrast, several studies have also found increase in the duration of dialysis is inversely correlated with QoL, which has been related to the earlier optimism being replaced with despondency, while some have not found any association.[20]

Limitations
A limitation of this study is its study design, which can result in recall and responder biases. In addition, despite the scale of both the centers, the generalizability of the findings may be limited, and thus there is need for further such studies across the country.

CONCLUSION

Higher education level and income as well as longer duration (years) on dialysis were factors associated with better QoL, while being older aged and having diabetes were associated with poorer QoL. Awareness among healthcare providers regarding these factors can help improve the QoL of these patients.

Ethical considerations
Ethical approval for this study was obtained from the Institutional Review Board of KFMC (Ref. no.: 21-215E) on May 31, 2021. Written and verbal informed consent were obtained from all participants. The study was carried out in accordance with the Declaration of Helsinki, 2013.

Data availability statement
The datasets generated and/or analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

Peer review
This article was peer-reviewed by two independent and anonymous reviewers.

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Conflicts of interest
There are no conflicts of interest.

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Appendix A: Quality of Life Index-Dialysis version III items

Health and Functioning subscale	Social and Economic subscale	Psychological/spiritual subscale	Family subscale
1. Health 2. Health care	14. Friends 16. Emotional support from people other than your family	28. Peace of mind 29. Faith in God	9. Family health 10. Children
3. Energy (fatigue) 4. Ability to take care of yourself without help 5. Likelihood of kidney transplant 6. Changes made in life because of kidney failure	20. Neighborhood 21. Home 22/23. Job/not having a job 24. Education	30. Achievement of personal goals 31. Happiness in general 32. Life satisfaction in general 33. Personal appearance	11. Family happiness 13. Spouse, lover or partner 15. Emotional support from family
7. Control over life 8. Chances for living as long as you would like 12. Sex life 17. Ability to take care of family responsibilities 18. Usefulness to others 19. Worries 26. Things for fun 27. Chances for a happy future	25. Financial needs	34. Self	