Original Research

Quality of life among patients undergoing haemodialysis for chronic kidney disease: a cross-sectional study from Western India

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Abstract

Introduction: Haemodialysis is the most often utilised therapy for extending life of chronic kidney disease (CKD) patients. Studying their quality of life (QoL) can offer valuable insights for healthcare policy makers.

Objectives: To assess the QoL and factors influencing it among CKD patients undergoing haemodialysis

Methods: A cross-sectional study was conducted among 200 patients undergoing haemodialysis at randomly selected two dialysis centres of Ahmedabad City of Gujarat, India. They were recruited using consecutive sampling method. A validated questionnaire including the Kidney Disease Quality of Life-Short Form™ version 1.3 (KDQOL-SF™ v1.3) was used to assess the QoL. Average scores for Component Summary (CS) including kidney disease (KDCS), physical (PCS) and mental (MCS) were calculated. Factors influencing the QoL were identified by comparing median CS scores using Kruskal Wallis ANOVA and Mann Whitney U test.

Results: The mean age of participants was 55.65 (SD=12.56) years and 42% were females. Mean (SD) score for KDCS, PCS and MCS were 70.49 (9.04), 57.21 (23.21) and 65.31 (15.26), respectively. The highest mean (SD) score was for 'dialysis staff encouragement' 96.25 (8.4) followed by 'social support' 91.5 (19.55) and cognitive function 88.33 (13.37). The burden of kidney disease 17.62 (25.12), work status 40 (32.48) and role limitation caused by physical health 47.87 (47.73) had the lowest scores. Patients ≥50 years and those diagnosed with both diabetes and hypertension, demonstrated markedly lower scores ($p<0.01$) across all three QoL components. Other significant factors were education and occupation.

Conclusions & Recommendations: Kidney diseases and mental component QoL scores were better compared to physical component. Factors influencing QoL were age, education, occupation and comorbidities.

Keywords: *chronic kidney failure, haemodialysis, quality of life*

Introduction

India is currently undergoing a demographic transition resulting in shifts in population dynamics. The growing elderly population and their associated health problems warrant greater attention and recognition. Along with the increasing prevalence of non-communicable diseases (NCD) like hypertension, diabetes mellitus, cancer etc., CKD is also a rising public health concern globally as well as in India. The Global Burden of Disease Study states that around 1.4 million people died from CKD in 2019, a 20% increase from 2010, one of the biggest increases among the major causes of mortality (1). Every year, about 220 000 new patients of end stage renal disease (ESRD) get added in India resulting in an additional demand for 3.4 crore dialysis every year (2). According to a 2018 estimate, the number of chronic dialysis patients in India is around 175 000, resulting in a prevalence of 129 per million population (3). In India, the National Programme for Prevention and Control of NCD (NP-NCD) has been implemented since 2010, which primarily focusses on cancer, diabetes, cardiovascular diseases and stroke (4). Despite the mounting burden of CKDs, it remains inadequately addressed within the given framework in India.

End stage renal disease is considered when the kidneys no longer work adequately to meet the daily needs, which is the last stage of CKD. Renal replacement therapy is necessary to maintain life during this period, and haemodialysis is considered to be the most commonly utilised therapy and plays an important part in extending patients' lives. Patients undergoing haemodialysis must frequently attend hospitals or dialysis facilities (about two to three times per week), which implies major adjustments to the patients' normal way of life. Haemodialysis treatment is costly, time-consuming and involves fluid and dietary restrictions. Long-term dialysis therapy frequently causes loss of independence, dependency on family members, disturbance of familial and social life (5). Most families have to undertake frequent trips, and often over long distances to access dialysis services incurring heavy travel costs and loss of wages for the patient and family members accompanying the patient, which ultimately leads to financial catastrophe (2). The majority of haemodialysis patients may have disturbing symptoms such as fatigue, loss of appetite, difficulty concentrating, swelling in their hands and feet, and cramping, all of which are distressing on a daily basis and have a significant impact on their QoL (6).

The World Health Organization (WHO) defines QoL as “an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns” (7). The QoL is recognised as a critical indicator of health care, patient experience, and a measure of effectiveness in many kinds of chronic conditions. When compared to the general population, haemodialysis patients' QoL was found to be significantly lower particularly with respect to the physical, psychological and social relationship domains (5). In previous studies examining the QoL among haemodialysis patients at a tertiary care centre in South India, lower scores were recorded for the QoL including KDCS, PCS and MCS, such as 56.99 (SD=10.24), 40.43 (SD=11.32) and 29.97 (SD=7.61), respectively (8). Findings of these studies also shed light on the impact of dialysis parameters, including frequency and duration on the overall wellbeing of patients. Symptom burden encompassing issues such as fatigue, pain, and sleep disturbances also poses significant challenges to QoL (5-6). Collecting comprehensive and timely data on the QoL of individuals undergoing haemodialysis is vital for making well-informed decisions that can significantly enhance outcomes and overall QoL for these patients. Studies assessing this aspect have been predominantly conducted at an international level (9-11) and in the context of the Indian subcontinent, such data are available primarily concentrated in the southern states (8, 12). With this background, the current study was carried out to

assess the QoL among patients undergoing haemodialysis at selected dialysis centres in Ahmedabad City of Gujarat, which represents a western province of India.

Methods

A cross-sectional study was conducted during May-July 2023 among participants undergoing haemodialysis at selected dialysis centres of Ahmedabad City. Out of the total 43 haemodialysis centres in the city (13), two were selected from urban areas using simple random sampling method. Inclusion criteria were adult patients with CKD undergoing haemodialysis who have been receiving maintenance haemodialysis for at least three months. Patients who had experienced any form of hospitalization in the last six months were excluded from the study.

The sample size was calculated using the formula, $N=4\sigma 2/E2$ (14). According to a previous study conducted by Visweswaran et al. in Kerala (15), the mean score of poor QoL in ESRD patients was 42.37 (SD=21.3). Therefore, considering a standard error (σ) of 21.3, allowable error of 15% of σ (E) and 10% non-response rate, the final sample size was calculated as 200. Participants were recruited using a consecutive sampling method; 160 recruited out of 210 from one dialysis centre and 40 out of 53 from another centre.

Personal interviews with study participants were conducted for data collection by medical personnel pursuing post-graduation in public health. The questionnaire used was KDQOL-SF™ (16), which was translated into vernacular language (i.e. Gujarati) and back translated by a bilingual language expert and validated by a team of experts in medicine and public health. The translated version of KDQOL-SF demonstrated strong validity and test-retest reliability (Cronbach's alpha coefficient of 0.71) for the total score. Along with it, a pre-tested proforma was used, which included demographic profile, details related to kidney disease and haemodialysis. The tool included 43 kidney-disease targeted items as well as 36 items that provide a generic core and an overall health rating item. These items were grouped into three main domains: a) KDCS: symptom / problem list (12 items), effects of kidney disease on daily life (8 items), burden of kidney disease (4 items), cognitive function (4 items), work status (2 items), sexual function (2 items), quality of social interaction (3 items), sleep (4 items), social support (2 items), dialysis staff encouragement (2 items) and patient satisfaction (1 item); b) PCS: physical functioning (10 items), role-physical (4 items), bodily pain (2 items) and general health (5 items); and c) MCS: vitality/energy (4 items), social functioning (2 items), role emotional (5 items) and mental health (3 items). The scale scores of the KDQOL-SF™ v1.3 questionnaire was transformed to 0-100 with higher scores indicating better QoL (17). Questionnaire also included details on the socio-demographic and clinical profiles of the participants. Socio- economic status was recorded as per the modified BG Prasad Classification (18-19).

Data analysis

Jamovi software was used for statistical analysis. Normality was assessed for outcome variables using the Kolmogorov-Smirnov test. Demographic characteristics, clinical variables and the three domains of KDQOL-SF™ were summarized using percentages. In kidney disease component related to sexual activity, only a small number of patients responded it, therefore the authors opted to exclude these questions from the analysis. As the data were non-normal in distribution, the three domains and demographic characteristics were compared using Kruskal Wallis ANOVA and Mann Whitney U test as indicated.

Results

The response rate was 76%. Mean age of the participants was 55.65 years (SD=12.56). Around 58% were males and 89.5% were residing in urban

Table 1: Socio-demographic profile of study participants (N=200)

Socio-demographic variables	No. (%)
Age (in years)	
Under 30	6 (3.0)
31-50	61 (30.5)
51-70	112 (56.0)
Above 70	21 (10.5)
Gender	
Female	84 (42.0)
Male	116 (58.0)
Current marital status	
Married	170 (85.0)
Unmarried	28 (14.0)
Divorced/ Separated	2 (1.0)
Highest level of education	
Illiterate	28 (14.0)
Primary	66 (33.0)
Secondary	73 (36.5)
Graduate	28 (14.0)
Postgraduate	5 (2.5)
Occupation	
Housewife	79 (39.5)
Labourer	14 (7.0)
Private job	19 (9.5)
Unemployed	34 (17.0)
Retired	54 (27.0)
Religion	
Hindu	174 (87.0)
Muslim	24 (12.0)
Christian	1 (0.5)
Sindhi	1 (0.5)
Residence	
Urban	179 (89.5)
Rural	21 (10.5)
Type of family	
Joint	65 (32.5)
Nuclear	86 (43.0)
Three generation	49 (24.5)
Socioeconomic status*	
Upper class	38 (19.0)
Upper middle class	94 (47.0)
Middle class	44 (22.0)
Lower middle class	23 (11.5)
Lower class	1 (0.5)

*According to Modified Prasad Classification, using AICPI for June 2023 (18-19)

areas. Only 16.5% were employed (Table 1). Among the study participants, 22 (11%) reported a family history of renal disease. Patients diagnosed with hypertensive nephropathy were 85 (42.5%), whereas 77 (38.5%) had diabetic nephropathy. About 24% were undergoing haemodialysis for less than one year and 43.5% for more than three years. Approximately 3/5th participants were attending the

centre thrice a week.

Mean (SD) score for QoL including KDCS, PCS and MCS were 70.49 (SD=9.04), 57.21 (SD=23.21) and 65.31 (SD=15.26), respectively. Highest mean (SD) score was for 'dialysis staff encouragement' followed by 'social support' and cognitive function. Components like burden of kidney disease, work status and role limitation caused by physical health had the lowest scores (Table 2).

Table 2: Mean scores of kidney disease, physical and mental component scales as per KDQOL-SFTM (N=200)

Domain	Scales	Mean (SD)	Confidence interval
Kidney-Disease Component Summary (KDCS)	Symptom/problem list	82.92 (9.35)	81.62, 84.21
	Effects of kidney disease	74.73 (14.27)	72.74, 76.71
	Burden of kidney disease	17.62 (25.12)	14.12, 21.11
	Work status	40.00 (32.48)	35.48, 44.51
	Cognitive function	88.33 (13.37)	86.47, 90.18
	Quality of social interaction	68.63 (14.2)	66.65, 70.6
	Sleep	72.41 (15.99)	70.18, 74.63
	Social support	91.5 (19.55)	88.78, 94.21
	Dialysis staff encouragement	96.25 (8.4)	95.08, 97.41
	Patient satisfaction	72.58 (15.75)	70.39, 74.76
	Total	**70.49 (9.04)**	**69.23, 71.74**
Physical Component Summary (PCS)	Physical functioning	51.17 (26.68)	47.46, 54.87
	Role limitations-physical	47.87 (47.73)	41.23, 54.5
	Pain	72.22 (21.12)	69.28, 75.15
	General health	57.57 (20.66)	54.69, 60.44
	Total	**57.21 (23.21)**	**53.98, 60.43**
Mental Component Summary (MCS)	Emotional wellbeing	55.84 (12.9)	54.04, 57.63
	Role limitations-emotional	70.66 (42.99)	64.68, 76.63
	Social function	81.06 (20.74)	78.17, 83.94
	Energy/fatigue	53.67 (11.41)	52.08, 55.25
	Total	**65.31 (15.26)**	**63.18, 67.43**

Of the three domains of KDQOL, KDCS and MCS domains showed skewed distribution (Figure 1). Patients who were older than 50 years, illiterate and not employed exhibited lower median scores compared to their counterparts. Patients experiencing both hypertension and diabetes demonstrated lower median scores for all components of KDQOL (Table 3). A statistically significant difference ($p<0.001$) was observed in all three components of KDQOL concerning age, education, occupation, and comorbidities. Moreover, a significant difference in both PCS and MCS was noted with respect to gender ($p<0.001$).

Discussion

The present study was conducted among 200 dialysis patients attending dialysis centres of Ahmedabad City. The mean age of the participants was 55.65 (SD=12.56) years. The finding was similar to the study conducted by Sethi et al. and Visweswaran et al. who conducted study among patients undergoing haemodialysis at tertiary care centres of North and South India, respectively (14, 20). Another study conducted by Gebri et al. among patients attending dialysis centres in South Africa reported a younger mean age of 45.5 years (SD=12.3) (9). These

variations could be because of demographic differences or variation in prevalence of kidney diseases. In the current study, males constituted 58% and females 42%. Similar gender-wise distribution among ESRD population was noticed in other studies (21-22). Females may exhibit a comparatively lower incidence of chronic kidney disease due to potential protective effects of oestrogen, lower blood pressure and a slightly higher glomerular filtration rate (23-24).

Hypertension followed by diabetes mellitus were the commonest conditions leading to ESRD among the study subjects. The findings were analogous with the results reported by Thenmozhi who conducted the study at one of the dialysis centres at Chennai, India (21). Nayana et al. identified kidney disease followed by diabetes as the predominant cause of CKD among the patients attending tertiary care institute of Kerala (12). Study conducted by Sethi et al. revealed diabetes as the commonest condition leading to ESRD followed by hypertension (20). Better implementation of preventive measures for control of hypertension and diabetes are the need of the hour for control of CKDs.

In the current study, assessment of QoL was conducted using the KDQOL-SF™, where KDSC domain had a higher median score (70.49) compared to MCS (65.31) and PCS (57.21). These findings are consistent with a study conducted by AL-Jumaih et al. at dialysis centre in Saudi Arabia (11). A study conducted by Manavalan et al. among patients attending the dialysis centre at Puducherry revealed relatively lower scores for QoL as compared to the current study for all the components viz. KDCS, MCS and PCS (8). The present study indicates that unemployment, retirement and illiteracy were associated with significantly lower KDCS, MCS and PCS scores, the findings were similar to the research conducted by Cruz MC et al. in Brazil (25). In the present study, role limitation caused by physical health in PCS domain reported the lowest mean score, consistent results were noted in the study conducted by Manju at Trivandrum (26).

The current study revealed a significant difference between different age groups and KDCS, PCS and MCS. Conversely, in a study conducted at South India by Manavalan et al., age was found to be associated only with the PCS domain (8). The present study results demonstrated a significant difference between gender and PCS as well as MCS. Females were having lower scores for PCS and MCS, the findings aligned with the study conducted by Veerappan et al. at Bangalore (27). The study conducted by Visweswaran et al. also revealed a lower score for physical component among female patients (14). In the study conducted by Shethi et al., male patients were having better scores in all domains of QoL (20).

The present study observed low scores in the domains of burden of kidney disease, work status, role- physical and fatigue, which were similar to the study conducted by Manavalan et al. (12). The current study reported higher scores for cognitive functioning. Finding differs from the similar studies conducted in the countries other than India (10-11). Variations in demographic characteristics, cultural influences and healthcare systems could be the reasons behind discrepancies in the scoring pertaining to QoL. A study conducted by Manju at Trivandrum observed the lowest mean score of 26.87 (SD=12.16) for work status, while in the current study, the lowest mean score of 17.62 (SD=25.12) was observed for burden of kidney disease (26).

The study's findings underscore the significance of adapting interventions for CKD based on demographic and clinical characteristics, as evidenced by variations in age, gender and predominant causes of ESRD. Additionally, the identification of specific domains, such as burden of kidney disease and work status, with consistently low QoL scores emphasizes the need for targeted support programmes and interventions to improve the overall wellbeing of dialysis patients.

Table 3: Median scores of kidney disease (KDCS), physical (PCS) and mental (MCS) component scales as per the KDQOL-SFTM by demographic and clinical variables of the study participants (N=200)

Variable	KDCS		PCS		MCS	
	Median (IQR)	Test value (p)	Median (IQR)	Test value (p)	Median (IQR)	Test value (p)
Age in years [1]						
≤ 30	73.78 (10.37)	**11.26**	70.83 (26.5)	**20.95**	72.54 (15.32)	**7.85**
31 - 50	74.94 (9.65)	**(0.01)**	67.11 (23.79)	**(<0.001)**	68.15 (15.92)	**(0.04)**
51 - 70	70.23 (8.28)		53.21 (21.34)		61.15 (15.02)	
Above 70	70.16 (9.25)		45.89 (19.57)		61.13 (13.38)	
Gender[2]						
Female	70.99 (7.4)	5277	52.55 (22.39)	**5838**	61.8 (16.32)	**5992**
Male	72.33 (10.12)	(0.32)	60.58 (23.31)	**(0.02)**	67.84 (13.97)	**(0.006)**
Marital status[2]						
Married	72.23 (8.43)	2946	57.36 (23.01)	2604	65.37 (15.25)	2593
Unmarried	69.17 (11.99)	(0.175)	56.35 (24.72)	(0.85)	64.92 (15.55)	(0.88)
Education[1]						
Illiterate	68.14 (7.32)	**19.82**	45.35 (21.84)	**25.25**	63.11 (13.12)	**12.31**
Primary	69.72 (7.45)	**(<0.001)**	50.32 (19.86)	**(<0.001)**	62.11 (14.78)	**(0.02)**
Secondary	72.01 (9.06)		62.51 (22.87)		66.99 (16.13)	
Graduate	78.7 (9.77)		68.88 (23.51)		69.86 (14.05)	
Postgraduate	76.71 (13.64)		71.75 (25.68)		69.72 (20.63)	
Occupation[1]						
Working	78.88 (15.73)	**4212**	77.5 (16.69)	**3762.5**	76.25 (23.75)	**3413.5**
Non-working	69.98 (9.75)	**(<0.001)**	52.5 (38.12)	**(0.01)**	69.25 (23.5)	**(0.03)**
Socioeconomic status[1]						
Upper	71.35 (9.75)	1.06	51.94 (25.88)	2.9	62.72 (15.4)	3.17
Upper middle	72.26 (8.7)	(0.9)	59.46 (22.31)	(0.57)	66.46 (15.19)	(0.53)
Middle	71.39 (9.12)		55.99 (20.99)		64.8 (14.78)	
Lower middle	71.02 (10.01)		58.55 (26.52)		66.22 (16.81)	
Lower	75.01 (0.00)		68.75 (0.00)		56.5 (0.00)	
Duration of CKD since diagnosis[1]						
<12 months	70.62 (9.59)	2.9	54.27 (24.35)	7.7	62.05 (16.04)	5.87
13 -36 months	73.04 (8.69)	(0.41)	61.49 (23.24)	(0.05)	67.2 (15.54)	(0.12)
37-60 months	71.68 (9.08)		60.22 (19.89)		67.69 (13.9)	
>60 months	70.94 (9.35)		50.61 (24.72)		62.13 (15.53)	
Duration of haemodialysis[1]						
<12 months	71.69 (9.41)	3.64	58.37 (24.59)	3.84	64.86 (16.97)	3.01
13-36 months	73.37 (8.41)	(0.3)	60.05 (21.31)	(0.28)	67.64 (13.58)	(0.39)
37-60 months	69.9 (9.66)		57.17 (22.23)		64.43 (16.24)	
>60 months	71.51 (8.81)		50.59 (25.57)		62.93 (14.34)	
Comorbidities[1]						
Hypertension	71.79 (8.8)	**21.66**	54.73 (22.57)	**38.01**	63.48 (16.09)	**21.47**
Diabetes	71.18 (8.21)	**(<0.001)**	59.96 (23.13)	**(<0.001)**	68.3 (12.42)	**(<0.001)**
Both	67.97 (8.27)		45.12 (18.57)		59.18 (15.49)	
None	78.26 (8.98)		76.15 (18.59)		73.06 (13.37)	
No. of haemodialysis per week[2]						
Thrice a week	70.13 (10.43)	**3634.5**	51.25 (40.62)	**3705**	68.62 (23.12)	**3791**
Twice a week	72.34 (14.14)	**(0.008)**	61.87 (39.37)	**(0.01)**	73.5 (25.33)	**(0.02)**

[1]Kruskal Wallis Test; [2]Mann Whitney U test; Significant p values given in bold

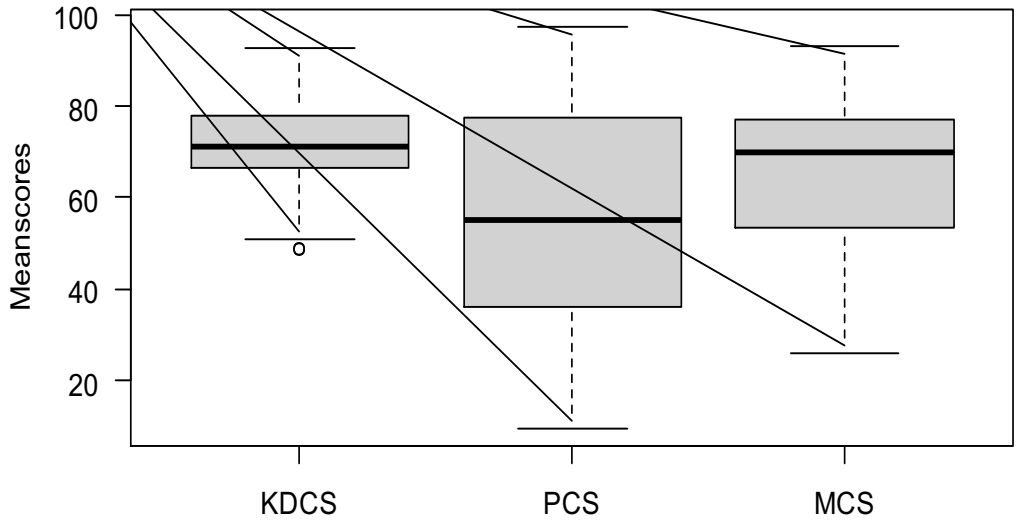

Figure 1: Distribution of Mean scores for KDCS, PCS and MCS

Conclusions & Recommendations

On assessing the QoL according to KDQOL-SF™ among patients undergoing haemodialysis, KDCS and MCS were better as compared to PCS. Age of patients, education, occupation and presence of selected comorbidities were found to be statistically significantly associated with QoL. Supporting environment in terms of social support and dialysis staff encouragement played a role in better QoL among the patients. Based on the study findings, a recommendation could be to focus on improving and tailoring interventions that specifically target the physical aspects of QoL for these patients. This may include specialized exercise programs, dietary adjustments, pain management strategies, or other physical therapies to enhance their overall wellbeing and QoL. Additionally, integrating mental health support and interventions for coping with the challenges of kidney disease could further enhance their overall QoL. Few recommendations based on the factors influencing QoL can be increasing health literacy, vocational rehabilitation especially in younger patients, integrated health care approach for comorbidities.

Author Declarations

Competing interests: The authors declare that they have no competing interests.

Ethics approval and consent to participate: Ethics clearance was granted by the Ethics Review Committee of the GCS Medical College, Gujarat, India (Reference No: GCSMC/EC/research Project/APPROVE/2023/570. Prior permissions were obtained from the institutional ethics committee as well as from institutional heads of both dialysis centres. Written informed consent was taken from the participants before collecting data. Confidentiality and privacy were maintained.

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Author contributions: DS participated in the data collection, and performed the statistical analysis, drafted the first version of the manuscript. VS participated in the design of the study, performed the statistical analysis, interpreted the data and drafted the final version of the manuscript. VD participated in the design of the study, interpreted the data and drafted the final version of the manuscript and All authors read and approved the final manuscript.

Public Health Implications

- Assessment of the QoL using KDQOL-SF™ among patients undergoing haemodialysis suggested diminished life quality mainly pertaining to physical and mental component. The need for offering pre-defined, well-planned multifaceted optimized treatment strategies incorporating physiotherapy, psychotherapy, life-skill and vocational rehabilitation components to improve all domains of QoL is endorsed in current research findings.
- National health program pertinent to dialysis is in very nascent stage in India not catering all needs to improve multi-dimensional health with prima-foci on treatment only. Policy makers shall implement multi-centric pilot research to incorporate all additional social, economic, psychological and physical health-needs to improve QoL of patients with undergoing haemodialysis.

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