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Original Article

Evaluation of Health-Related Quality of Life in Chronic Kidney Disease Patients in Tertiary Care Teaching Hospital

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ABSTRACT

Background: Chronic Kidney Disease (CKD) is a global health issue characterized by a gradual decline in kidney function, often leading to reduced health-related quality of life (HRQoL). Despite CKD affecting 8-16% of the global population, limited research exists on HRQoL predictors and targeted interventions. **Objectives:** This study evaluates HRQoL among CKD patients, focusing on the impact of disease stage, co-morbidities and treatment modalities using the KDQOL-SF 1.3 instrument. **Materials and Methods:** A cross-sectional observational study was conducted from August 2023 to January 2024, including 150 CKD patients at Vivekananda General Hospital, India. Patients were categorized based on CKD stages and treatment types. **Results:** CKD significantly reduced HRQoL, with pronounced declines in PCS (mean: 37.14±6.09) and MCS (mean: 35.42±7.29). BKD exhibited the poorest scores, particularly in advanced stages (mean: 17.19 in ESRD). Dialysis patients reported higher scores in mental health (MCS: 35.59±7.43) and socio-psychological domains (SPKD: 46.35±16.81) compared to non-dialysis patients. Alcohol consumption correlated significantly with EKD (p=0.027), indicating its role in disease progression. Correlations between clinical domains revealed significant interactions, particularly between BKD, EKD and MCS. **Conclusion:** CKD profoundly impacts HRQoL, with the BKD domain being most adversely affected. HRQoL deterioration correlates with disease progression, emphasizing the need for holistic interventions targeting physical, mental and socio-psychological aspects. These findings underscore the importance of tailored strategies to improve HRQoL, particularly in advanced CKD stages.

Keywords: Chronic Kidney Disease, Dialysis, Non-Dialysis, Cross-sectional

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INTRODUCTION

Chronic Kidney Disease is a slow decline of kidney function and it happens over many months or years. The kidneys are vital to our overall health: they do this by taking waste out of the blood through many tiny filters called nephrons (NCD Alliance, 2022). CKD is categorized into five stages, with the early stages often showing few symptoms, making it hard to detect. As the disease advances, symptoms like fatigue, swelling and changes in urination may emerge. The main focus of CKD management is to slow kidney damage, typically by addressing underlying conditions such as diabetes and hypertension. If untreated, CKD can progress to end-stage renal failure, requiring dialysis or a kidney transplant for survival. Early detection and regular screenings are essential for the effective management of this silent but serious condition (NIDDK, 2023). Globally, CKD ranks 16th among all causes of death (Chen *et al.*, 2019). Approximately 13 million people die from renal disease each year, while another 14 million die from cardiovascular disease and its effects on kidney function (NCD Alliance, 2022). Globally, CKD affects 8-16% of the population, but both patients and medical professionals frequently misdiagnose the condition (Coresh *et al.*, 2007).

The definition of Health-Related Quality of Life is an individual's valuation of their health and how it impacts their overall well-being about their culture, values and aspirations. It includes all facets of health-mental, physical and social-as well as how each affects a person's overall well-being (Tabish, 2023). Over the past thirty years, deviations in the concepts of health and disease have made QoL more important for health systems. A patient's QoLin relation to their health is greatly reduced by CKD (Hussien, Apetrii and Covic, 2021). Nevertheless, not enough research has been done to compile global data on the burden of HRQOL and CKD symptoms in order to provide targeted measurements of the most crucial patient-specific data in a way that lessens patient

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burden (Fletcher *et al.*, 2022). Improving or maintaining HRQoL is a primary goal. The capacity of the patient to control the illness in its early stages has emerged as a key area of research during the course of CKD. However, there is an absence of data on the various aspects of Renal Dysfunction (RHD) and predictors (HRQoL objectives) as intervention targets (Aggarwal *et al.*, 2016). KDQOL-TM Instrument is a self-reported tool used to evaluate the QoL of patients with kidney disease and those receiving dialysis. The KDQOL-SFTM, version 1.3, is a collection of items customized to particular diseases that emphasize the particular health-related issues that these people face. It also includes the comprehensive 36-item inventory known as the SF-36TM, or RAND 36-Item Health Survey 1.0, which is used to evaluate overall health condition (RAND Corporation, 2006).

MATERIALS AND METHODS

Study Design

A Cross-sectional observational study was conducted from August 2023 to January 2024 A pilot study was conducted to determine the sample size. After that, the research comprised 150 patients with CKD diagnosis who were admitted to the Nephrology department at Vivekananda General Hospital Hubballi, India.

Study population

Inclusion criteria

Subjects diagnosed CKD of any Stage, Subjects on both Dialysis and Non-Dialysis, Subjects of both genders, Patients admitted in Nephrology and General Medicine Department, Subjects with other comorbidities.

Exclusion criteria

Patient with incomplete Data, Patients diagnosed with Psychiatric disorders, Patients diagnosed with Cancer, Outpatient Department, Subjects who are not willing to give consent.

Statistical Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS) for Windows version 27.0. Continuous variables are presented as mean and standard deviation, while categorical variables are shown as numbers and percentages. Pearson's correlation was used to examine the relationship between clinical variables and HRQOL. A *p*-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1 presents the demographic characteristics of Chronic Kidney Disease (CKD) patients, offering valuable insights into their health status and needs. The study comprised 150 participants, with a notable male predominance 103(69%) compared to females 47(31%). The age distribution reveals that the majority of patients (32%) are within the 40-49 age group, suggesting that CKD predominantly affects middle-aged individuals, with only 0.66% under 20 years of age. Regarding lifestyle habits, a significant proportion of participants are non-smokers (92%) and non-drinkers (86%), indicating a lower prevalence of these risk factors in this cohort, which may have a positive impact on their health outcomes. The data also shows that the majority of subjects are classified under CKD Stage 5 (46%), reflecting advanced kidney dysfunction that necessitates intensive management. Hemodialysis is the most common treatment, with 66% of participants undergoing it, while 34% are non-dialysis patients. Interestingly, no participants were on peritoneal dialysis. Co-morbidities play a significant role in CKD management, with HTN being the most prevalent (73%), followed by T_2DM (42%) and anemia (19%). Other co-morbid conditions, such as UTI, pneumonia, nephritis and uremic gastritis, further complicate CKD management. Overall, the demographic profile underscores the need for targeted healthcare interventions to address the multifaceted nature of CKD, improve HRQoL and optimize patient care by focusing on lifestyle factors, co-morbidities and treatment strategies (Table 1).

The Figure 1 displays the mean and Standard Deviation (SD) for five clinical domains in CKD patients: Physical Component Summary (PCS), Mental Component Summary (MCS), Socio-Psychological Kidney Domain (SPKD), End-Stage Kidney Disease Domain (EKD) and Blood Kinetics Domain (BKD). The PCS has a mean of 37.14±6.09, indicating moderate physical health. The MCS shows a mean of 35.42±7.29, reflecting the mental health status. SPKD has the highest mean of 49.44±16.66, pointing to a significant socio-psychological impact. The EKD and BKD domains have mean scores of 35.00±17.28 and 20.62±13.02, respectively, emphasizing the severity of kidney disease and blood-related markers (Figure 1).

The Table 2 provides a comprehensive overview of various clinical domains in CKD, including Acute on CKD and ESRD, across different stages. These domains include the PCS, MCS, BKD, SPKD and EKD. Analysis shows how kidney function decline impacts both physical and psychological health. PCS, which measures physical health, remains mostly stable across CKD stages, with slight declines in CKD 4, 5 and ESRD. MCS, assessing mental health, improves in CKD 3 but decreases in CKD 4 and 5, reflecting the rising psychological burden as the disease progresses. BKD, which tracks kidney function and blood markers, increases through CKD stages, peaking in CKD 4 before declining in CKD 5 and ESRD due to the complexities of treatments like dialysis. SPKD, measuring socio-psychological aspects such as social functioning, fluctuates but peaks in CKD 5, suggesting that despite the severity of later-stage CKD, patients may experience improved social and psychological well-being. EKD, reflecting the overall impact of kidney disease, increases in CKD 3 but decreases in CKD 4 and 5 due to treatments like

Table 1: Demographic Data of CKD Patients.

Demographic Data			
Sl. No.	**Subjects Characteristics**	**Number of Subjects (n)**	**Percentage (%)**
1	**Gender distribution**		
	Female	47	31
	Male	103	69
2	**Age distribution (in years)**		
	10-19	1	0.66
	20-29	11	7.33
	30-39	17	11.33
	40-49	48	32
	50-59	34	22.66
	60-69	32	21.33
	70-80	7	4.66
3	**Smoking**		
	Smokers	12	8
	Non-Smokers	138	92
4	**Alcoholic**		
	Alcoholic	21	14
	Non-Alcoholic	129	86
5	**CKD STAGES**		
	Acute on CKD	57	38
	CKD 3	7	4.6
	CKD 4	13	8.6
	CKD 5	69	46
	ESRD	4	2.6
6	**Dialysis**		
	Haemodialysis	99	66
	Peritoneal Dialysis	0	0
	Non-Dialysis	51	34
7	**Co-morbidities**		
	HTN	110	73
	T_2DM	64	42
	Anemia	29	19
	UTI	7	4.6
	Pneumonia	7	4.6
	Nephritis	7	4.6
	Uremic gastritis	5	3.3

dialysis. These insights underscore the importance of a holistic approach to CKD care, addressing physical, mental and social needs for better patient outcomes (Table 2).

The Table 3 compares clinical domain scores between dialysis and non-dialysis patients in five critical areas: PCS, MCS, SPKD, EKD and BKD. For PCS, dialysis patients have a slightly higher score (36.60±5.50) than non-dialysis patients (35.13±7.08), suggesting a small improvement in physical health associated with dialysis. In terms of MCS, dialysis patients report notably better mental health, scoring 35.59±7.43, compared to a much lower score of 5.59±1.18 in non-dialysis patients, highlighting the

Table 2: HRQOL of Respective Stages and Domains.

Sl. No.	Domains	CKD STAGE				
		Acute on CKD	CKD 3	CKD 4	CKD 5	ESRD
1	PCS (Mean)	37.05	39.15	38.01	36.84	37.36
2	MCS (Mean)	35.29	40.86	34.02	35.23	35.71
3	BKD (Mean)	18.20	22.32	24.52	21.92	17.19
4	SPKD (Mean)	46.64	51.08	46.40	52.28	45.98
5	EKD (Mean)	31.09	49.11	34.62	37.05	32.03

Table 3: Mean of Dialysis and Non-Dialysis Patient HRQoL Domain.

Sl. No.	Domains	Dialysis	Non-Dialysis
1	PCS	36.60±5.50	35.13±7.08
2	MCS	35.59±7.43	5.59±1.18
3	SPKD	46.35±16.81	34.60±17.19
4	EKD	35.22±17.42	21.29±12.35
5	BKD	20.24±13.44	38.09±6.97

positive psychological effects of dialysis. In the SPKD domain, dialysis patients score significantly higher (46.35±16.81) than non-dialysis patients (34.60±17.19), indicating that dialysis may enhance social well-being and overall quality of life. For EKD, dialysis patients have a higher score (35.22±17.42) compared to non-dialysis patients (21.29±12.35), which could be due to the more severe impacts of kidney disease in non-dialysis patients, despite dialysis potentially alleviating some of these burdens. Lastly, in BKD, non-dialysis patients score higher (38.09±6.97) than dialysis patients (20.24±13.44), indicating that dialysis patients face more challenges related to blood function and kidney markers. These findings highlight the varying impacts of dialysis on patient health across multiple domains (Table 3).

The Table 4 outlines the correlations and *p*-values across five clinical domains: PCS, MCS, BKD, SPKD and EKD, with asterisks (*) indicating statistically significant results. For MCS, the correlation with PCS is weakly negative (-0.103), with no statistical significance (p=0.208). However, MCS shows a moderate positive correlation with BKD (0.279, p=0.01*), which is statistically significant. It has a negative correlation with SPKD (-0.135, p=0.100) and a positive, significant correlation with EKD (0.231, p=0.004*). In BKD, the correlation with PCS is strong (0.65), but not significant (p=0.430). BKD shows significant positive correlations with MCS (0.279, p=0.001*), SPKD (0.222, p=0.006*) and EKD (0.462, p=0.000*), indicating important links between kidney function and these domains. SPKD shows a weak negative correlation with PCS (-0.158, p=0.054) and MCS (-0.135, p=0.100), but significant positive correlations with EKD (0.467, p=0.000*) and BKD (0.222, p=0.006*), suggesting its influence on the progression of kidney disease. EKD demonstrates weak negative correlations with PCS (-0.107, p=0.194) and MCS (0.231, p=0.004*), with significant positive correlations with SPKD (0.467, p=0.000*) and BKD (0.462, p=0.000*), emphasizing the systemic effects of kidney disease. In summary, the Table highlights the complex relationships between physical, psychological and kidney function domains in CKD, with significant correlations observed mainly between MCS, BKD, SPKD and EKD (Table 4).

The Table 5 presents the p-values for smoking and alcohol consumption across various clinical domains in CKD patients, including the PCS, MCS, BKD, SPKD and EKD. For PCS, the p-values for smoking (0.608) and alcohol (0.681) suggest no significant correlation with physical health, as both values exceed the 0.05 significance threshold. Similarly, MCS shows no substantial effect from smoking (0.351) or alcohol (0.642) on mental well-being. In the BKD domain, both smoking (0.954) and alcohol (0.328) also fail to show any significant relationship with blood kinetics. In terms of Symptoms or Problems, there is no significant association with smoking (0.804) or alcohol (0.719) concerning CKD-related symptoms. However, in the EKD domain, both smoking (0.005*) and alcohol (0.027*) are significantly associated with the overall systemic impact of kidney disease, suggesting that these factors may contribute to the worsening of CKD. In summary, while smoking and alcohol do not have a significant impact on most clinical domains, they are notably linked to the progression of end-stage kidney disease, underlining their role in the overall burden of CKD (Table 5).

Table 4: Correlation of clinical domains with chronic kidney disease stages

Sl. No.	Domains			
1	MCS			
Pr. Correlation	PCS	BKD	SPKD	EKD
p Value	-0.103	0.279	-0.135	0.231
	0.208	0.01*	0.100	0.004*
2	BKD			
Pr. Correlation	PCS	MCS	SPKD	EKD
p Value	0.65	0.279	0.222	0.462
	0.430	0.001*	0.006*	0.000*
3	SPKD			
Pr. Correlation	PCS	MCS	BKD	EKD
p Value	-0.158	-0.135	0.222	0.467
	0.054	0.100	0.006*	0.000*
4	EKD			
Pr. Correlation	PCS	MCS	BKD	SPKD
p Value	-0.107	0.231	0.462	0.467
	0.194	0.004*	0.000*	0.000*
5	PCS			
Pr. Correlation	MCS	BKD	SPKD	EKD
p Value	-0.103	0.65	-0.158	-0.107
	0.208	0.430	.054	.194

*Significant($p<0.05$)

Table 5: Correlation of HRQoL in Smoking and Alcohol Population

Sl. No.	Domains	Smoking	Alcohol
		p Value	*p* Value
1	PCS	0.608	0.681
2	MCS	0.351	0.642
3	BKD	0.954	0.328
4	Symptoms or Problems	0.804	0.719
5	EKD	0.005*	0.027*

*Significant($p<0.05$)

DISCUSSION

The current study investigated HRQOL and its correlates in CKD patients prospectively. We found that there was a clinically significant reduction in HRQOL among patients with a CKD. The severity grade of CKD has a major impact on HRQOL scores, Physical functions, Mental functions, age, gender, Social Habits, Medication adherence. In our study, we analyzed overall HRQOL Using KDQOL-SF-36 Questionnaire by running Descriptive analysis and Exhibits mean 35.52±7.67. As per the guideline the lesser the score indicates that Lower the QOL. However, some studies have found a non-significant declining trend in PCS and MCS scores with worsening renal function, in contrast to the clear decline seen in the EKD and BKD (Priyamvada *et al.*, 2017). The studies provided focus on HRQoL in different stages of CKD. They highlight the progressive decline in HRQoL across CKD stages, with the most significant deterioration observed in end stage kidney disease (Pagels *et al.*, 2012). A relationship between CKD stage and HRQoL has been reported in our study which shows a deterioration in following domain, were BKD domain showing poor QoL compare to other domain, which was average 18.20 in Acute on kidney disease, 22.32 in CKD 3 stage, 24.52 CKD 4 stage, 21.92 in CKD 5, 17.19 in ESRD stage, As shown in Table 2. These scores which indicates poorer HRQoL with respect to the CKD stages by the standard guidelines KDQoL-SF-36. The deterioration of HRQOL with time in patients with CKD has been observed in patients on dialysis 99 and Non dialysis were 51 patients. The survey using KDQoL-SF-36 has been widely

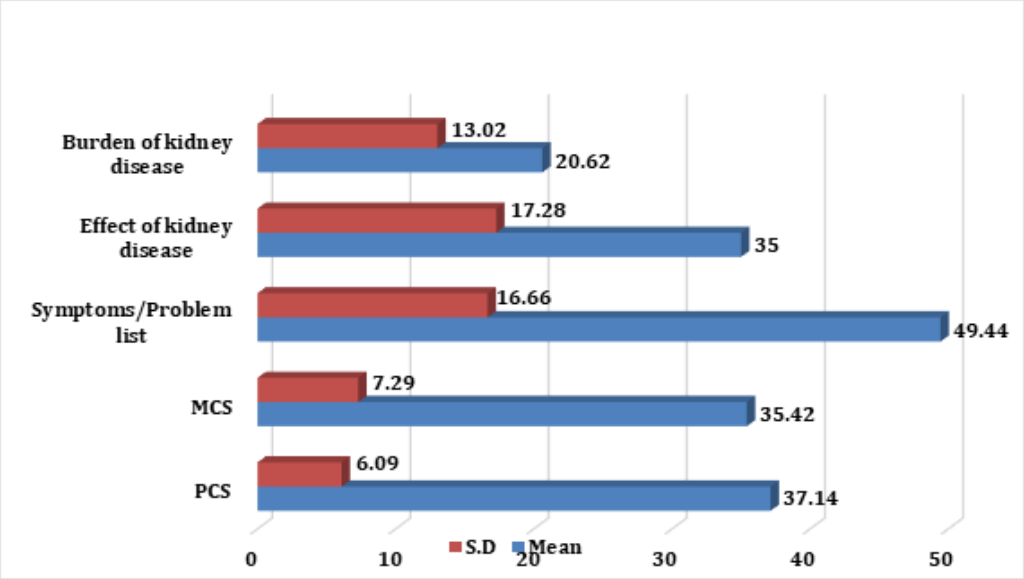

Figure 1: HRQoL of Respective Domain.

used and validated as QoL assessment tool for the CKD higher stages by Eduardo Lacson *et al.*, (2009). Our study has explored this phenomenon in greater detail and identified correlates of the progression by using SF 36 questionnaire. Assessment of average Dialysis patients HRQOL by categorizing into respective Domains, which shown in Table 3, where BKD shown poor QoL. The average non-dialysis patient HRQOL by categorizing into respective Domains, which includes PCS, MCS, SPKD, EKD, BKD as shown in Table 3. Where MCS shown poor QoL, which concludes that lower mental function which was impacting non dialysis patients. The impact of CKD on HRQoL was significant, with patients generally reporting lower scores across various domains compared to healthy controls. This was evident from the lower scores on the SF-12/SF-36 PCS and MCS, as well as the disease-specific KDQOL subscales. Specifically, the "EKD on daily life" and "BKD" subscales of the KDQOL show the greatest. We analyzed the Inter-Domain relation of MCS over other domains by using Pearsson's Correlation, which shows MCS, BKD and EKD are statistically significant with EKD as shown in Table 4. When we have Correlated a BKD with other domains We analyzed Inter-Domain relation of MCS over other domain by using Pearsson's Correlation, which shows MCS, Symptom/ problem list and EKD are statistically significance with BKD as shown in Table 4. In addition, we compared an HRQoL with alcoholic patients and non-alcoholic patients, heavy alcoholic consumption was associated with faster progression of CKD confirms the study by young su joo *et al.*, (2019). In our study we compered HRQOL by Domain wise with Alcoholic population using ANOVA test and shown a statistical significance with EKD which was p value=0.027 as showed in Table 5. As the patient consuming an alcohol shown an impact on affecting the EKD Domain in HRQoL.

CONCLUSION

Patients with CKD experience significant reductions in their HRQOL and this impact decreases sharply as the disease makes worse. We shed light on important factors influencing the well-being of CKD patients by investigating multiple facets of HRQOL and its correlates in this prospective study. The KDQOL-SF-36 questionnaire was used to analyze HRQOL and the results showed a significant decline in scores, indicating a lower quality of life among CKD patients. This reduction in both mental and physical abilities demonstrated the disease's all-encompassing effects on a range of facets of life. Notably, our research showed a direct correlation between the HRQOL decline and the stage of CKD, with the BKD domain being most suggestively impacted as the disease advanced.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

CKD: Chronic Kidney Disease; **HRQoL:** Health-Related Quality of Life; **QoL:** Quality of Life; **PCS:** Physical Component Summary; **MCS:** Mental Component Summary; **SPKD:** Socio-psychological

Kidney Domain; **EKD:** End-Stage Kidney Disease Domain; **BKD:** Blood Kinetics Domain.

ETHICAL CONSIDERATIONS

The study's purpose was explained to both the patients and their families and all participants provided written informed consent. Approval for the study was granted by the KLE College of Pharmacy, Hubballi Ethical Committee, under IEC Reference Number KLECOPH/IEC/2023-24/03.

AUTHORS' CONTRIBUTION

Each author had equal responsibility for the study's conception, literature review's execution, manuscript writing and revision.

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