Original Article

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Public Health Section

Impact of Chronic Kidney Disease on Health-Related Quality of Life: A Prospective Observational Study using the KDQoL-36 Instrument

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ABSTRACT

Introduction: Chronic Kidney Disease (CKD) is an umbrella term that describes a wide range of disorders affecting the structure and function of the kidney, seriously devastating the patients' health-related quality of life (HRQoL). A great deal of research has been conducted in an attempt to understand the factors that influence HRQoL in CKD patients.

Aim: To identify the HRQoL of patients with CKD in Vietnam and to reveal the association between several socio-demographic factors and the patients' HRQoL.

Materials and Methods: The research consisted of a prospective observational study among patients referred to a general hospital for CKD from January to February 2018. The Kidney Disease Quality of Life 36 questionnaire (KDQoL-36) was administered via direct interviews with the patients.

Results: Total 316 participants were recruited, including 194 patients with Stage 5 CKD (61.4%) with an average age of 54.2±15.8 years. The mean HRQoL scores of the CKD patients were below average (42.9±9.7) with the lowest score in burden of disease domain (21.2±17.3). Patients with Stage 1–4 CKD scored better than those with Stage 5 CKD in all subscales including Symptom/Problem list (SoD), Burden of Disease (BoD), Physical Component Summary (PCS) ($p<0.05$), except for Effect of Disease (EoD) and Mental Component Summary (MCS). The multivariable regression analysis results in each HRQoL subscales, exercise and CKD stage were found to be significantly associated with most of the HRQoL indicators in each subscale. CKD stage is predictor of SoD ($p<0.001$), BoD ($p=0.033$), PCS ($p<0.001$), MCS ($p=0.015$).

Conclusion: The findings illustrate that HRQoL in Vietnamese patients with CKD is below average and there are several socio-demographic characteristics influencing on HRQoL in this population. To improve HRQoL in CKD patients, these socio-demographic factors should be considered by medical researchers and practitioners.

Keywords: HRQoL, KDQoL-36, Vietnam

INTRODUCTION

CKD describes a wide range of disorders affecting the structure and function of the kidney [1]. CKD has become a major public health issue worldwide [2]. The global prevalence of CKD is 13.4%, indicating that it may be more common than diabetes, which has an estimated prevalence of 8.2% [3]. CKD compromises not only physical health but also psychological health, daily functioning, general wellbeing and social functioning, which are all determinants of a patient's quality of life [4,5].

In recent decades, many researchers have found that HRQoL is significantly compromised in patients with CKD. According to Perlman RL et al., the HRQoL of CKD patients is poorer than that of the general population [6], which leads to increased mortality and hospitalisation [7,8]. As such, HRQoL has been suggested as a predictor to measure clinical outcomes in patients with CKD [9].

To date, many instruments have been used to assess HRQoL in CKD patients, including generic and disease-specific measurements. Generic HRQoL instruments include the SF-36, a short health survey consisting of 36 items, or the EuroQol 5-dimension (EQ-5D) questionnaire [10]. Disease-specific HRQoL instruments, such as the KDQoL survey, take into account the concerns of patients as a direct result of their CKD [11]. The KDQoL-36 was introduced in 1994 as a shorter version of the KDQoL, and it includes both generic and disease-specific components.

Recently, there has been an increased interest in factors that impact HRQoL in CKD patients, but it has not yet been confirmed, which factors have the strongest influence. A great deal of research has been conducted in an attempt to understand the factors that influence the condition and its progression in CKD patients [12-14]. In Vietnam, however, such studies are limited. Van KN et al., studied 95 End-Stage Renal Disease (ESRD) patients in Hanoi, Vietnam to identify the associations between monthly income, comorbidity, social support and HRQoL [15]. Similarly, another author [16] determined the relationships between comorbidity, social support, symptom status and HRQoL among 115 patients with ESRD. No studies exist concerning Vietnamese patients with stage 1–5 CKD and the influence of socio-demographic characteristics on their HRQoL. Therefore, the aim of the present study is to identify the HRQoL of patients with CKD in Vietnam, using the KDQoL-36 questionnaire, and to reveal the association between several socio-demographic factors and the patients' HRQoL.

MATERIALS AND METHODS

The present prospective observational study was conducted among patients referred to a general hospital for CKD. The study was conducted from January to February 2018' the KDQoL-36 questionnaire was administered via direct interviews with the patients.

In this study, a convenient sampling technique was used to select the participants. All patients who were diagnosed with CKD and enrolled in the hospital from January to February 2018 were invited to participate in the study. Patients who were able to complete questionnaires in Vietnamese via direct interview were included, while those who were unable to complete the questionnaire due to serious physical or psychological limitations were excluded. A total of 316 participants were interviewed by the researchers using the items of the KDQoL-36, as shown in [Table/Fig-1].

Demographic Variables: Several demographic variables were recorded as possible determinants for HRQoL, including age, gender, educational attainment, occupation, location, marital status, Body Mass Index (BMI), religion, smoking habits, drinking habits, exercise, family history and stage of CKD. The participants' BMIs were calculated by dividing weight (in kilograms) by height (in metres) squared (kg/m^2). The participants were categorised into four groups according to the World Health Organisation's (WHO [17]; 2016 BMI classification system, which are 'underweight' (≤18.5 kg/m^2), 'normal weight' (18.5–24.9 kg/m^2), 'overweight' (25.0–29.9 kg/m^2) and 'obese' (≥30.0 kg/m^2). The CKD stage, as defined by the Kidney Disease Outcomes Quality Initiative (KDOQI), represents the severity of the disease [18].

Research Instrument: The KDQoL-36 is a shorter version of the KDQoL questionnaire, consisting of 36 items with both generic and disease-specific components. The generic section has two subscales measuring physical and mental health, while the disease-specific section has 3 subscales (12 items for the symptoms and problems of CKD, 8 items for the effects of CKD, and 4 items for the burdens of CKD). The scores of each section were calculated by summing the relevant item scores and grading them on a scale of 0–100, with higher scores indicating better HRQoL. The researchers used Version 2.0 of the KDQoL-36, created by the RAND Corporation, to survey the participants and a standalone Excel scoring tool, developed by the KDQoL Working Group, to assist with scoring the participants' responses [19].

Translation of the KDQoL-36: The researchers translated the KDQoL-36 from its original English into Vietnamese. Two nephrologists, who are native speakers of Vietnamese and fluent in English, translated the Vietnamese version back into English and merged the KDQoL-36 translations. A professional English translator reviewed the original and back-translated versions. During a panel meeting, the researchers discussed any ambiguous terms and decided on the final Vietnamese version. Five CKD patients completed a draft of the questionnaire and offered their suggestions, which were integrated into the final version.

Validity and Reliability of the KDQoL-36: The Vietnamese version of the KDQoL-36 was tested for reliability and validity using Cronbach's alpha, scoring 0.8 on PCS, 0.7 on MCS, 0.6 on BoD, 0.6 on SoD, and 0.7 on EoD.

Data Collection: After the subjects agreed to participate, they were asked to sign a consent form. The researcher recorded the demographic data and health information from the patients' medical records and interview responses. Using the Vietnamese version of the KDQoL-36 questionnaire, each patient was interviewed for 10–20 minutes.

STATISTICAL ANALYSIS

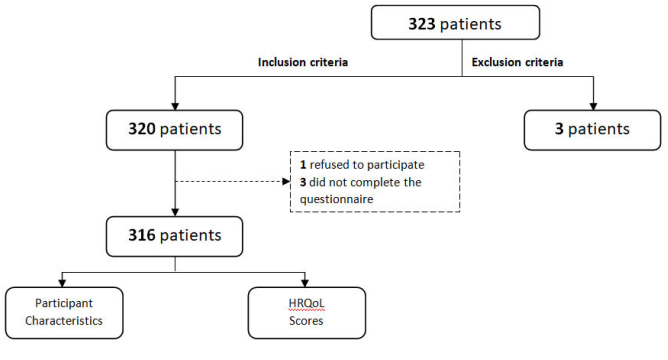
All statistical analyses were conducted according to a pre-established procedure. The participants' demographic and health data was analysed using descriptive statistics, including frequency, percentage, mean, median, standard deviation, first Quartile (Q1), third Quartile (Q3) and Interquartile range (IQR=Q1-Q3). Statistical differences in HRQoL across demographics were determined using either Student's t-test or the one-way analysis of variance (ANOVA). To determine the factors associated with HRQoL, adjusted analyses of the five HRQoL subscales were performed using multiple linear regressions. The HRQoL subscales served as dependent variables, while the socio-demographic variables operated as independent variables. All significance tests were two-tailed, and those resulting in a p-value of less than 0.05 were considered statistically significant. The analysis was performed using IBM SPSS Statistics 23.0 (IBM Corporation, Armonk, NY, USA).

Ethical Considerations: The research protocol was followed in accordance with the Helsinki Declaration of 1975, revised in 2000, and was approved by the hospital under study. Written, informed consent was obtained from all participants.

RESULTS

As shown in [Table/Fig-2], 316 participants were recruited from a general hospital in Kien Giang province, including 122 patients with Stage 1–4 CKD (38.6%) and 194 patients with Stage 5 CKD (61.4%). Overall, 51.6% were female and 62.3% were younger than 60 years. Most of the participants had completed elementary school or above (88.6%), were unemployed (58.5 %), were living in a rural area (74.1%), were married (82.0%) and were non-religious (66.1%). The participants were also quite healthy, as 72.2% had a normal BMI, only 16.1% smoked, only 7.6% drank alcohol, and 52.8% engaged in regular exercise.

[Table/Fig-3] displays the HRQoL scores of the study population based on their responses to the KDQoL-36 questionnaire. The mean score in each of the five subscales are as follows: PCS=32.1±8.1; MCS=40.6±11.1; SoD=68.5±19.2; EoD=52.2±18.1; and BoD=21.2±17.3.



[Table/Fig-1]: Flowchart for participant recruitment.

Characteristics	N (%)	Characteristics	N (%)
Age		**BMI[3] range**	
Mean±SD[1]	54.2±15.8	<18.5	41 (13.0)
Range (Min-Max)	19-92	18.5 - <25	228 (72.2)
Median [Q1-Q3][2]	55.0 [41.3-66.0]	25 - <30	39 (12.3)
≤ 60	197 (62.3)	≥30	8 (2.5)
>60	119 (37.7)	**Religion**	
Gender		None	209 (66.1)
Male	153 (48.4)	Buddhism	78 (24.7)
Female	163 (51.6)	Catholicism	12 (3.8)
Educational level		Protestant	3 (1.0)
Illiteracy	36 (11.4)	Other[4]	14 (4.4)
Elementary	110 (34.8)	**Smoking**	
Secondary	96 (30.4)	Yes	51 (16.1)
Highschool	61 (19.3)	No	265 (83.9)
College	6 (1.9)	**Alcoholic drinking**	
University/Postgraduate	7 (2.2)	Yes	24 (7.6)
Occupation		No	292 (92.4)
Employment	107 (33.9)	Exercise	
Unemployment	185 (58.5)	Yes	167 (52.8)
Retirement	24 (7.6)	No	149 (47.2)
Location		**Family history**	
Urban	82 (25.9)	Yes	27 (8.5)
Rural	234 (74.1)	No	289 (91.5)
Marital status		**CKD[5] stage**	
Single	33 (10.4)	1-4	122 (38.6)
Married	259 (82.0)	5	194 (61.4)
Divorced	6 (1.9)		
Widowed	18 (5.7)		

[Table/Fig-2]: Socio-demographic characteristics of the CKD patients (N=316).
[1]SD: Standard Deviation, [2]Q1-Q3: 25th - 75th quartile, [3]BMI: Body Mass Index, [4]Other: Caodaism, Hoahaoism, [5]CKD: Chronic kidney disease

Variable	Mean ± SD[1]	Range (Min-Max)	MD[2] [Q1-Q3][3]
Symptom/Problem list (SoD)	68.5 ± 19.2	4.2-100.0	72.4 [56.3 - 83.9]
Effect of Disease (EoD)	52.2 ± 18.1	3.1-100.0	52.6 [37.5 - 65.3]
Burden of Disease (BoD)	21.2 ± 17.3	0.0-87.5	18.8 [6.3 - 31.3]
Physical Component Summary (PCS)	32.1 ± 8.1	14.5-58.3	31.3 [25.9 - 37.5]
Mental Component Summary (MCS)	40.6 ± 11.1	14.0-67.2	39.3 [33 - 49.1]
Average score	42.9 ± 9.7	14.6-71.8	44.2 [35.9 – 50.4]

[Table/Fig-3]: HRQoL subscale scores and averages, based on the patients' responses to the KDQoL-36 questionnaire.
[1]SD: Standard Deviation; [2]MD: Median; [3]Q1-Q3: 25th and 75th quartile

[Table/Fig-4] lists the participants' HRQoL scores according to their socio-demographic characteristics. Uneducated, rural, non-religious, and sedentary patients achieved significantly lower HRQoL scores on the PCS than their counterparts (p<0.05). Regarding marital status, widowed patients had the lowest MCS scores (34.6±8.2). Sedentary participants had significantly lower scores in all five subscales of the KDQoL-36 (for EoD, BoD and MCS, p<0.05; for SoD and PCS, p<0.01). In the SoD subscale, female gender, younger age, rural residence, protestant beliefs and unemployment were found to be associated with lower scores (p<0.05). The results also indicate that Stage 5 CKD is associated with decreased SoD and BoD scores (p<0.01). Patients with Stage 1–4 CKD scored better than those with Stage 5 CKD in all subscales

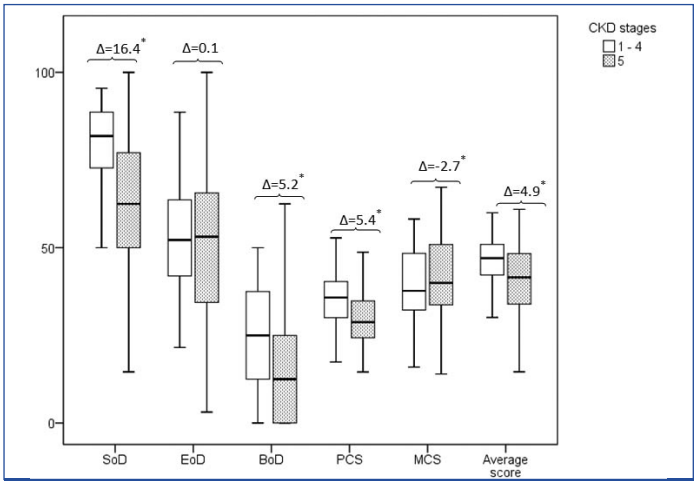
Characteristics	SoD	p-value	EoD	p-value	BoD	p-value	PCS	p-value	MCS	p-value	Average score	p-value
Age												
≤ 60	65.7±19.7	0.001*	53.0±19.6	0.305	20.8±18.1	0.599	32.4±8.3	0.461	41.3±11.7	0.165	42.6±10.3	0.010*
> 60	73.0±17.4		50.8±15.2		21.9±15.8		31.7±7.6		39.5±10.1		43.4±8.6	
Gender												
Male	70.8±18.0	0.040*	53.4±17.5	0.262	22.6±18.3	0.179	32.1±8.0	0.919	41.8±11.3	0.074	44.1±9.5	0.508
Female	66.3±20.1		51.1±18.6		20.0±16.1		32.1±8.2		39.5±10.8		41.8±9.8	
Educational level												
Illiteracy	65.3±17.4	0.308	45.4±17.3	0.159	18.4±19.3	0.783	28.5±5.3	0.031*	35.6±11.9	0.056	38.6±9.4	0.055
Elementary	68.1±18.0		52.7±20.3		21.2±17.8		31.8±8.6		41.0±10.8		42.9±10.1	
Secondary school	67.5±20.2		51.5±16.4		21.6±16.5		33.0±7.9		40.7±11.7		42.9±9.4	
High school	71.5±19.5		55.3±16.4		21.8±16.0		32.5±7.1		43.0±9.2		44.8±8.6	
College	82.2±9.0		57.8±17.4		18.8±7.9		36.5±12.2		37.4±8.5		46.5±5.2	
University/Postgraduate	66.4±30.8		55.8±16.9		28.6±25.7		36.3±11.2		40.8±15.9		45.6±15.1	
Occupation												
Employed	72.3±16.6	0.002*	54.7±16.6	0.197	24.1±16.1	0.112	35.0±8.6	0.000*	42.0±11.0	0.228	45.6±8.8	0.001*
Unemployed	65.4±20.5		50.7±19.3		19.9±17.9		30.7±7.2		39.7±11.2		41.3±10.0	
Retired	75.1±15.0		51.9±12.3		19.0±16.5		30.2±8.5		41.2±10.5		43.5±8.3	
Location												
Urban	72.4±18.9	0.033*	52.5±17.0	0.850	22.4±15.7	0.478	33.8±8.6	0.030*	41.6±11.2	0.333	36.2±9.7	0.306
Rural	67.1±19.1		52.1±18.4		20.8±17.8		31.5±7.8		40.3±11.1		34.3±9.6	
Marital status												
Single	68.6±20.0	0.579	61.8±21.5	0.011*	23.9±20.0	0.724	32.6±9.3	0.227	45.6±13.1	0.006*	46.5±11.6	0.070
Married	68.9±19.3		50.8±17.2		21.1±17.2		32.3±8.0		40.4±10.8		42.7±9.4	
Divorced	66.2±17.2		55.0±15.3		22.9±14.6		32.5±6.8		38.2±13.0		43.0±8.7	
Widowed	62.5±15.8		53.3±19.3		18.4±13.3		28.3±6.1		34.6±8.2		39.4±9.1	
BMI range												
< 18.5	64.6±21.8	0.165	54.4±18.3	0.504	19.8±17.0	0.949	32.7±9.7	0.516	41.9±13.6	0.291	42.7±11.3	0.598
18.5 - < 25	69.8±18.4		51.7±18.2		21.5±17.2		32.3±7.8		40.5±10.4		43.2±9.4	
25 - <30	66.3±19.7		53.8±17.7		21.3±18.7		30.8±7.9		40.4±12.7		42.5±9.7	
≥ 30	59.4±21.5		45.0±16.0		20.3±15.2		29.3±6.0		38.6±9.2		38.5±9.0	
Religion												
None	73.1±18.0	0.000*	53.3±17.1	0.469	22.0±16.0	0.177	33.4±8.2	0.001*	40.7±10.5	0.510	44.5±8.9	0.000*
Buddhism	61.0±17.5		50.4±17.4		21.1±20.4		29.7±7.7		41.3±12.5		40.7±10.3	
Catholicism	57.4±22.1		49.2±24.1		22.4±19.3		28.1±5.2		41.8±12.1		39.8±12.1	
Protestant	55.6±2.4		57.3±39.1		4.2±7.2		27.9±2.0		35.2±8.8		36.0±7.4	
Other	53.2±21.0		46.5±24.8		13.4±14.3		29.6±6.8		36.2±11.5		35.8±9.7	
Smoking												
Yes	71.6±14.3	0.211	54.9±15.4	0.232	20.1±17.9	0.606	32.2±8.5	0.906	41.0±11.2	0.789	44.0±8.1	0.165
No	67.9±19.9		51.6±18.5		21.5±17.2		32.1±8.0		40.5±11.1		42.7±10	
Alcoholic drinking												
Yes	70.6±15.9	0.577	60.7±16.3	0.016*	16.3±20.5	0.181	35.5±10.3	0.032*	40.2±11.1	0.853	46.6±9.7	0.666
No	68.3±19.4		51.5±18.0		18.0±17.0		31.8±7.8		40.6±11.1		42.6±9.6	
Exercise												

Characteristics	SoD	p-value	EoD	p-value	BoD	p-value	PCS	p-value	MCS	p-value	Average score	p-value
Yes	72.4±18.9	0.000*	54.2±17.5	0.033*	23.4±16.3	0.021*	34.3±8.1	0.000*	42.1±10.7	0.013*	45.3±8.6	0.021*
No	64.1±18.6		49.9±18.4		18.9±18.1		29.7±7.3		39.0±11.4		40.3±10.2	
Family history												
Yes	70.4±14.2	0.586	50.1±16.8	0.541	19.9±15.3	0.675	32.4±7.2	0.835	40.2±12.5	0.845	42.6±8.4	0.427
No	68.3±19.6		52.4±18.2		21.4±17.5		32.1±8.1		40.7±11.0		42.9±9.8	
CKD stage												
1-4	78.6±13.8	0.000*	52.2±14.6	0.970	24.4±14.5	0.009*	35.5±7.5	0.000*	39.0±9.0	0.036*	45.9±7.8	0.000*
5	62.1±19.4		52.1±20.0		19.2±18.6		30.0±7.6		41.7±12.2		41.0±10.3	

[Table/Fig-4]: HRQoL scores categorised by socio-demographic characteristics, based on the patients' responses to the KDQoL-36 questionnaire.
Mean±SD, *p-value <0.05. In order to identify the statistically significant differences in the SoD, EoD, BoD, PCS, MCS and average score between categorical variables. Student's t-test is utilized for Age, Gender, Location, Smoke, Alcoholic drinking, Exercise, Family history and CKD stage. One-way ANOVA is utilized for the rest of variables including Educational level, Occupation, Marital status, BMI range and Religion

Items	Variable	Beta	p-value	95%CI
SoD	Gender	0.138	0.007	1.446 – 9.125
	Religion	0.160	0.004	1.058 – 5.356
	Exercise	0.116	0.026	0.546 – 8.370
	CKD stage	0.312	0.000	7.631 – 16.933
EoD	Alcoholic drinking	0.154	0.006	3.003 – 17.943
	Exercise	0.130	0.020	0.731 – 8.686
BoD	CKD stage	0.123	0.033	0.355 – 8.343
PCS	Occupation	0.158	0.003	0.145 – 0.730
	Alcoholic drinking	0.137	0.008	1.093 – 7.232
	Exercise	0.205	0.000	1.568 – 5.049
	CKD stage	0.223	0.000	1.783 – 5.591
MCS	Marital status	0.162	0.004	0.989 – 5.071
	Exercise	0.158	0.006	1.041 – 6.001
	CKD stage	-0.139	0.015	-5.716 – -0.624
Average score	Religion	0.161	0.005	0.489 – 2.765
	Exercise	0.195	0.000	1.694 – 5.859
	CKD stage	0.125	0.045	0.058 – 4.921

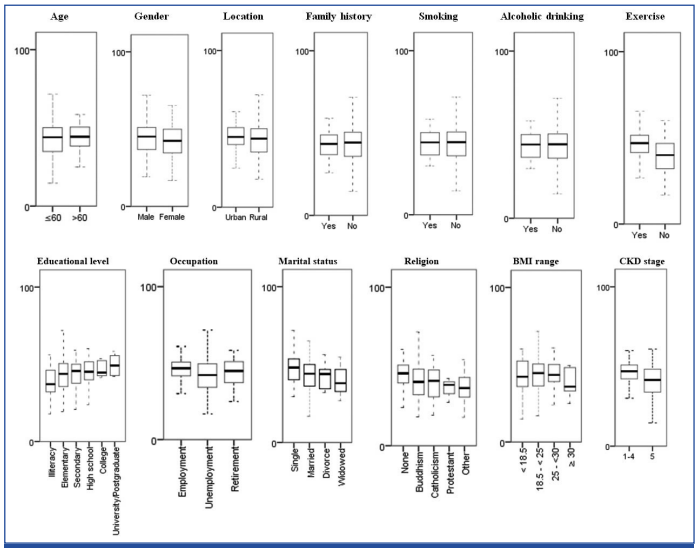
[Table/Fig-5]: Linear regression analyses of the patients' HRQoL subscale scores and socio-demographic factors.
The predictors of HRQoL score's items (SoD, EoD, BoD, PCS, MCS and average score) were identified by using multiple linear regression and p-value <0.05 is statistically significant



[Table/Fig-6]: Associations between the patients' HRQoL subscale scores and averages, according to CKD stage.
Note: Δ= the difference of mean of SoD, EoD, BoD, PCS, MCS and Average score according to CKD stage, *: p-value <0.05 is statistically significant

(p<0.05), except for EoD and MCS.

[Table/Fig-5] shows the multivariable regression analysis results in each HRQoL subscales. Exercise and CKD stage were found to be significantly associated with most of the HRQoL indicators in each subscale. The SoD predictors include gender (p=0.007), religion (p=0.004), exercise (p=0.026) and CKD stage (p<0.001);



[Table/Fig-7]: Average scores according to the patients' socio-demographic characteristics.

the EoD predicators include drinking habits (p=0.006) and exercise (p=0.020); and the BoD predictor is CKD stage (p=0.033). CKD stage was the only variable found to have a negative correlation with the MCS (β=-0.139; p=0.015).

[Table/Fig-6] lists the HRQoL scores according to CKD stage and categorised into two subgroups. The first group combines patients with Stage 1–4 CKD, while the second group includes individuals with Stage 5 CKD. The mean HRQoL scores in the SoD, BoD and PCS subscales, as well as the overall average, were significantly higher among patients with Stage 1–4 CKD (p<0.05). However, patients with Stage 5 CKD reported better scores in the MCS subscale (p<0.05).

[Table/Fig-7] displays a boxplot analysis of the participants' average scores according to their socio-demographic characteristics.

DISCUSSION

Although use of the KDQoL-36 for evaluating HRQoL in patients with ESRD is well documented [15,16,20-22], there is little research on HRQoL in patients with Stage 1–4 CKD [23-25]. In the present study, the mean scores of the CKD patients are below average (42.9±9.7), which is similar to Tien, Thosingha and Puwarawuttipanit's [16] finding in Hanoi, Vietnam (45.53±13.20). This result indicates that Vietnamese CKD patients experience deterioration in HRQoL regardless of CKD stage. A multicentre study by Chiang CK et al., also found low HRQoL scores among Taiwanese CKD patients [26].

In the present study, the participants scored higher in the MCS (40.6±11.1) than the PCS (32.1±8.1). This pattern was also identified in Van KN et al.'s study in Hanoi, Vietnam, Yang F et al.'s study of Singaporean patients, Kim JY et al.'s study of Korean patients,

Chiang CK et al.'s study in Taiwan, and many nations outside of Asia [15,20,21,23,26-31]. This suggests that, despite the worsening physical conditions of CKD patients, their mental health is relatively preserved. Previous studies explained that this may result from patients adapting their expectations in response to their chronic illness [14,20,21,23,29-41].

The present study also found that HRQoL is significantly influenced by the severity of the disease, particularly in patients with Stage 1–4 CKD. This relationship has been reported in other studies as well [42-44]. Mapes DL et al., revealed that HRQoL scores are already impaired in patients with moderate CKD, and the deterioration of HRQoL over time has been observed in patients on dialysis [7,45,46] as well as those in the earlier stages of CKD [47,48]. The present study explored this phenomenon in greater detail, finding that Stage 1–4 CKD patients achieved higher HRQoL scores than those in Stage 5 (45.9±7.8 and 41.0±10.3, respectively; $p<0.001$); that is, patients in earlier stages have a better HRQoL than those with ESRD. Interestingly, this pattern is reversed for the MCS subscale, indicating that the mental health of Stage 5 CKD patients is better than that of the Stage 1–4 patients. A possible explanation for this is that CKD patients are more likely to adapt to the disease as time passes [34]. Differences in HRQoL according to CKD stage were also found in a study in North America on Stage 3–5 patients [49].

The present study identified several socio-demographic factors that may have an impact on HRQoL in CKD patients, which has been the subject of previous research as well [26-28, 50]. This study found that gender, occupation, religion, exercise and CKD stage act as independent predictors of HRQoL score, and these factors should be closely observed while providing care to CKD patients. Regarding gender, female participants achieved lower scores in the SoD subscale (66.3±20.1) than their male counterparts ($p<0.05$), which is similar to the associations between gender and HRQoL found in previous studies [25,28,43-45,50]. The present study also confirmed that having an occupation results in a positive impact on HRQoL in CKD patients, as unemployed patients have been found to achieve significantly lower HRQoL scores than those who are employed or retired [28,51]. Exercise emerged as a powerful predictor of HRQoL scores as well. Participants who exercised regularly achieved higher scores in the SoD, EoD, BoD, PCS and MCS subscales, as well as in overall HRQoL. Regular exercise is generally associated with positive health outcomes in patients with CKD, as it has been shown to improve their physical function and quality of life [52,53]. Plenty of studies have demonstrated that age is strongly and inversely associated with HRQoL [25-28,50,51,54]; however, no associations were found between age and the HRQoL subscales in the present study. There were also no differences identified between patients with varying levels of education, although previous studies have found that patients with higher educational attainment achieved higher HRQoL scores [25,27,28,50].

While the present study offers new insights concerning HRQoL in Vietnamese patients with CKD, there are several limitations that must be addressed. First, the participants were comprised of outpatients recruited from only one hospital and therefore differed from general CKD patients, especially in their socio-economic characteristics and disease severity, which may have affected their perceptions concerning HRQoL. As such, the present results must be applied to general patients with caution. Second, the KDQoL-36 questionnaire administered in this study was checked the internal consistency reliability through Cronbach's alpha, so other tests of reliability and validity, should be performed.

CONCLUSION

This study is the first in Vietnam to identify the associations between socio-demographic factors and HRQoL in CKD patients using the KDQoL-36 questionnaire. The findings illustrate that HRQoL in Vietnamese patients with CKD is below average, especially the burden of disease. To improve HRQoL in this population, several socio-demographic characteristics should be considered by medical researchers and practitioners, including gender, occupation, religion, marital status, exercise and CKD stage.

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