

## ORIGINAL ARTICLE

# Assessment of Health-Related Quality of Life in the Elderly on Maintenance Hemodialysis

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## ABSTRACT

**Introduction:** Health-related quality of life (HRQOL) is one of the main indicators of health and wellbeing among dialysis patients which has attracted mounting interest in recent years in the initiation of intervention measures. Thus, this study aimed to determine the correlations between socio-demographic factors and medical characteristics with HRQOL among elderly on maintenance hemodialysis (HD). **Methods:** A cross-sectional study was conducted in nine HD centers in Selangor. Socio-demographic data and HRQOL were assessed using structured questionnaire and Kidney Disease Quality of Life Instrument (KDQOL-36), respectively whilst medical profile and laboratory data were collected from subjects' medical record. **Results:** The mean age of subjects was  $67 \pm 6$  years where majority (57%) of the subjects was on maintenance HD for less than 5 years. The mean physical component summary and mental component summary scores were  $33.89 \pm 11.83$  and  $50.23 \pm 8.88$ , respectively. Symptoms/problems subscale, effects of kidney disease on daily life subscale and burden of kidney disease subscale scores were  $73.37 \pm 17.01$ ,  $72.63 \pm 19.74$  and  $54.62 \pm 30.42$ , respectively. There was a significant correlation between serum sodium with physical component summary ( $r=0.237$ ,  $p<0.01$ ) and symptoms/problems subscale ( $r=0.245$ ,  $p<0.01$ ). **Conclusion:** Subjects perceived their mental health better than physical health but felt burdened by kidney disease the most. Serum sodium was found to be positively associated with physical functioning and symptoms/problems subscales. There is a need for routine assessment on HRQOL and appropriate intervention to enhance the quality of life among elderly on HD.

**Keywords:** Quality of life, Hemodialysis, Elderly, Malaysia

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## INTRODUCTION

The figure of worldwide end-stage renal disease (ESRD) patients is increasing rapidly, fueled by pandemic of chronic non-communicable diseases and aging population (1). The elderly diagnosed with renal disease are commonly associated with limited life expectancy and remarkable symptom burden. These will eventually affect their health-related quality of life (HRQOL) which is acknowledged as a key to patient-centered outcome among this population (2). Hemodialysis (HD) treatment itself is extremely demanding and potentially restrictive, and requires lifestyles changes (3). Furthermore, individuals on HD are still exposed to multiple threats and stressors that may decrease their HRQOL despite of HD treatment being a factor for patients to have better

survival rate (4).

HRQOL is defined as an individual's perception of the effect of a medical condition or its treatment on their physical, psychological or social wellbeing (5). Multiple studies were done regarding both medical and non-medical factors associated with HRQOL among end stage renal disease (ESRD) patients undergoing renal replacement therapy (6). Clinical factors found to be related with poor HRQOL in previous studies include more co-morbidities and lower levels of albumin and hemoglobin (7-9). Demographic factors such as older age, female gender, lower socioeconomic status and higher educational level were also found to be correlated with lower HRQOL (10-12). Studies determining correlations between demographic and biochemical parameters with HRQOL were previously conducted in Chile and United States of America (13, 14), with such studies being limited in Malaysia. Therefore, the current study aimed to determine the associations between socio-demographic factors and medical characteristics

with HRQOL among elderly on maintenance HD.

**MATERIALS AND METHODS**

**Study design**

This cross-sectional study recruited nine private HD centres in Hulu Langat and Petaling districts, Selangor, Malaysia using multistage cluster sampling and simple random sampling method. The HD units were geographically divided into separate groups (clusters) by districts. From nine districts in Selangor, two districts were randomly selected by using the ‘lottery method’, which resulted in Petaling and Hulu Langat districts. All subjects in the HD centers were screened based on inclusion and exclusion criteria and those who fulfilled the criteria were invited to participate in this study.

**Subjects**

A total of 119 subjects were included in this study having fulfilled the following criteria: (1) elderly aged 60 years and above, (2) had been on maintenance HD phase for at least three months, (3) was in stable medical condition, (4) was able to be interviewed in Malay or English, and (5) was willing to give a written consent to participate. Subjects diagnosed with cognitive impairment or, hospitalized in the past one month or with terminal illness were excluded.

**Data collection procedure**

Pre-test was conducted among 30 elderly receiving maintenance HD in three private HD centres not included in actual study. Elderly who meet the inclusion and exclusion criteria was pre-tested with all questionnaires. Appropriate modification was made on the questionnaire prior to the actual data collection process. Data collection was conducted after obtaining approvals from the Ethics Committee for Research involving Human Subjects (JKEUPM) Universiti Putra Malaysia (Project reference number: FPSK [EXP17] P003) and the HD centers involved. Socio-demographic data were obtained via structured questionnaire while HRQOL were assessed using Kidney Disease Quality of Life Instrument (KDQOL-36). Medical profile and laboratory data were retrieved from subjects’ medical record. The interview content and procedure were explained to the subjects and an informed consent form with subjects’ signature was obtained before the start of the interview. The interview session was held during the subjects’ 4-hour treatment sessions.

**Instruments**

A socio-demographic questionnaire consisting of multiple choice questions was developed to obtain information on demographic and socio-economic profile of the subjects. Medical background questionnaire to collect clinical characteristics and laboratory data of the subjects was also developed by the researcher.

The KDQOL-36 which was developed by the Kidney

Disease Quality of Life Working group, is well-recognized in assessing specific self-reported health-related quality of life among patients undergoing dialysis treatment (15). The KDQOL-36 questionnaire was suggested by the National Kidney Foundation (16) for public use and is now available in different languages as provided in their website: <http://gim.med.ucla.edu/kdqol>. The English and Malay versions were used in this study. The internal consistency coefficients of KDQOL-36 were > 0.80 in most scales and hence its reliability is rest assured (17).

KDQOL-36 was originally comprised of 36 items with two main themes: (1) 12 items of Medical Outcomes Survey (MOS) SF-12 survey to assess subjects’ perceptions of their own mental and physical functioning and (2) 24 kidney-disease targeted items. However, only 35 items were included in this study, with the sexual aspect question (item number 35: Your sex life?) in effects of kidney disease on daily life subscale was excluded. This was because majority of the subjects refused to answer the question during pretest and actual data collection. Items in the KDQOL-36 were further classified into five subscales: 1) physical component summary (PCS); 2) mental component summary (MCS); 3) burden of kidney disease subscale; 4) symptoms and problems subscale; 5) effects of kidney disease on daily life subscale. Details on KDQOL-36 subscales were shown in Table 1. Item scores ranged from 0 to 100 while the five subscales had scores from 0 to 100 with higher scores indicating a better health-related quality of life. The scores were computed as the average of the responded items.

**Table 1: Details of the KDQOL-36 subscales and meaning**

Subscale	Description
SF-12 (Items 1-12): Physical composite score (PCS) and Mental composite score (MCS)	An overall measure of physical and mental functioning that assesses about general health, activity limitations, energy level, depression and anxiety, assesses desired tasks accomplishment and social activities.
Burden of kidney disease subscale (Items 13-16)	How much kidney disease impedes with daily life, takes up time, causes frustration, or makes the subjects feel like a burden.
Symptoms and problems subscale (Items 17-28)	How a subject feels bothered by sore muscles, chest pain, cramps, itchy or dry skin, shortness of breath, faintness/dizziness, lack of appetite, feeling washed out or drained, numbness in the hands or feet, nausea, or problems with dialysis access.
Effects of kidney disease on daily life subscale (Items 29-36)	How the subject feels bothered by fluid limits, diet restrictions, ability to work around the house or travel, feeling dependent on doctors and other medical staff, stress or worries, and personal appearance.

**Data analysis**

The subjects’ socio-demographic profile, medical background and HRQOL scores were presented in descriptive statistics (mean standard deviation and frequencies). Pearson correlation test was used to measure the associations between socio-demographic profile and medical background with HRQOL. Spearman rho test was used to analyse the correlation between dialysis vintage and serum potassium with

HRQOL as the variables were not normally distributed. Laboratory data comparison with normal range was done in reference to Medical Nutrition Therapy Guidelines for Chronic Kidney Disease (2005). Statistical analyses were performed using SPSS version 21.0 where  $p < 0.05$  was considered significant.

## RESULTS

A total of 119 subjects from nine HD centers were recruited for this study. Table II shows the socio-demographic profile of HD elderly subjects. The mean age was  $67 \pm 6$  years with majority of the subjects were in 'younger elderly' category (87.4%) and consisted of approximately equal number of male (50.4%) and female (49.6%). Majority of the subjects were Malay (60.5%), Islam (60.5%), married (79.8%), had a secondary level of education (53.8%) and were unemployed (98.3%). Besides that, 66.4% of them had no monthly income due to unemployment.

**Table II: Distribution of hemodialysis elderly subjects according to socio-demographic profile (N=119)**

Characteristics	n(%)
<b>Age (years)</b>	
60-74	104 (87.4)
$\geq 75$	15 (12.6)
<b>Gender</b>	
Male	60 (50.4)
Female	59 (49.6)
<b>Ethnicity</b>	
Malay	72 (60.5)
Chinese	34 (28.6)
Indian	12 (10.1)
Others	1 (0.8)
<b>Religion</b>	
Islam	72 (60.5)
Buddha	30 (25.2)
Hindu	9 (7.6)
Christian	6 (5)
Others	2 (1.7)
<b>Marital status</b>	
Married	95 (79.8)
Divorced/widowed	22 (18.5)
Single	2 (1.7)
<b>Educational level</b>	
No formal education	12 (10.1)
Primary education	28 (23.5)
Secondary education	64 (53.8)
Tertiary education	15 (12.6)
<b>Current working status</b>	
Unemployed	117 (98.3)
Employed	2 (1.7)
<b>Monthly income</b>	
No income	79 (66.4)
With income	40 (33.6)

Table III shows the clinical characteristics of the subjects. Majority of the subjects were hospitalized within the previous one year (50.4%), were on polypharmacy (88.2%) and had multi-morbidities (77.3%). Majority of the subjects in this study had hypertension (87.4%) while 71.4% had diabetes mellitus and 19.3% with cardiovascular disease. A small proportion of them (13.4%) were presented with all three major co-morbidities of hypertension, diabetes mellitus and cardiovascular disease. The dialysis vintage for most of the subjects were less than five years with arteriovenous fistula (AVF) as access site (57.1%).

**Table III: Distribution of hemodialysis elderly subjects according to clinical characteristics, (N=119)**

Characteristics	n (%)	Mean $\pm$ SD
<b>Number of hospital admission in past 1 year</b>		1.06 $\pm$ 1.50
0	59 (49.6)	
1	30 (25.2)	
$\geq 2$	30 (25.2)	
<b>Number of prescribed medications</b>		7.59 $\pm$ 2.54
<5	14 (11.8)	
$\geq 5$	105 (88.2)	
<b>Number of co-morbidities</b>		2.13 $\pm$ 1.00
0-1	27 (22.7)	
2	50 (42.0)	
3	33 (27.7)	
$\geq 4$	9 (7.6)	
<b>Dialysis vintage (years)</b>		5.66 $\pm$ 5.45
< 5 years	68 (57.1)	
5-10 years	36 (30.3)	
> 10 years	15 (12.6)	
<b>Type of vascular access</b>		
AVF	68 (57.1)	
BCF	40 (33.6)	
Catheter	11 (9.2)	

Table IV shows slightly more than half of the subjects had desirable level of albumin (50.4%) and normal level of serum potassium (73.9%) and corrected calcium (84.9%). However, majority of the subjects had high serum phosphate (58%) and low hemoglobin (61.3%) levels.

Table V displays the mean score of each of the KDQOL-36 subscales. Regarding the ESRD- targeted areas, the highest score was for the symptoms and problems scale (73.4 $\pm$ 17.0) and followed by the effects of kidney disease on daily life scale (72.6 $\pm$ 19.7), both indicating a better health status. However, the burden of kidney disease scale yielded the lowest score (54.6 $\pm$ 30.4).

A reference value of 50 points (scale from 0 to 100 points; with higher score indicated better quality of life) was used in this study. In terms of the symptoms/problems subscale score, 10.9% of the subjects scored less than 50 points while 8.4% and 40.3% of the subjects scored less than 50 points on the effects of kidney disease on

**Table IV: Distribution of hemodialysis elderly subjects according to biochemical data (N=119)**

Biochemical data	n (%)	Mean ± SD
<b>Serum albumin (g/L)<sup>a</sup></b>		39.4 ± 4.1
< 30	2 (1.7)	
30- 34	10 (8.4)	
35- 39	47 (39.5)	
≥40	60 (50.4)	
<b>Total protein (g/L)</b>		72.1 ± 5.8
<b>Serum creatinine (µmol/L)</b>		769.1 ± 200.3
<b>Serum urea (mmol/L)</b>		17 ± 7.7
<b>Serum sodium (mmol/L)</b>		137.3 ± 3.6
<b>Serum phosphate (mmol/L)<sup>b</sup></b>		1.7 ± 0.5
Low (< 0.8)	4 (3.4)	
Normal (0.8-1.6)	46 (38.7)	
High (>1.6)	69 (58.0)	
<b>Serum potassium (mmol/L)<sup>b</sup></b>		5.1 ± 0.9
Low (< 3.5)	1 (0.8)	
Normal (3.5-5.5)	88 (73.9)	
High (> 5.5)	30 (25.2)	
<b>Serum calcium (corrected) (mmol/L)<sup>b</sup></b>		2.3 ± 0.2
Low (< 2)	15 (12.6)	
Normal (2-2.6)	101 (84.9)	
High (>2.6)	3 (2.5)	
<b>Hemoglobin (g/L)<sup>b</sup></b>		10.4 ± 1.6
Low (≤ 11)	73 (61.3)	
Normal (> 11)	46 (38.7)	

Reference range from <sup>a</sup> 23<sup>rd</sup> Report of the Malaysian Dialysis & Transplant Registry (2015); <sup>b</sup>Medical Nutrition Therapy for Chronic Kidney Disease (2005); Total protein, serum creatinine, serum sodium (n=119) and serum urea (n=116) for subjects was expressed as mean±SD

daily life subscale and burden of kidney disease subscale score, respectively.

Table VI depicts the associations between KDQOL-36 subscales with socio-demographic profiles and medical

**Table V: Mean score of Kidney Disease Quality of Life-36 subscales for hemodialysis elderly subjects, (N=119)**

Subscales	Mean±SD	Range
SF-12 PCS	33.9±11.8	13-59
SF-12 MCS	50.2±8.9	29-66
Symptom/problem list	73.4±17.0	17-100
Effects of kidney disease	72.6±19.7	14-100
Burden of kidney disease	54.6±30.4	0-100

background. There was a significant positive correlation between serum sodium and physical functioning (PCS) (r=0.237, p<0.01). Serum sodium was also positively correlated with symptoms/problems subscale (r= 0.245, p<0.01).

**DISCUSSION**

A few other studies had used KDQOL-36 to evaluate the HRQOL among HD patients (13-14,18). To the best of authors’ knowledge, this present study is the only study conducted among Malaysian HD patients using KDQOL-36 instrument. Results from this study indicated that the subjects had poorer physical functioning than mental functioning. This finding is similar with Kamau et al (19), Guerra-Guerrero et al (14) and Yang et al (6). Studies conducted in Korea (20), Hong Kong (21) and United States (18) also presented comparable results. Therefore, the scores of physical functioning and mental functioning in the current study are in line with previous studies and support the belief that physical health is more affected than mental health among HD subjects.

The lower score of physical functioning compared to mental functioning among subjects was probably due to the alteration in body function and structure as the consequence of renal failure itself. In addition

**Table VI: Correlation between socio-demographic profile and medical background with KDQOL-36 subscales**

Variables	KDQOL-36 subscales				
	SF-12 PCS	SF-12 MCS	Symptoms and problems	Effects of the kidney disease	Burden of the kidney disease
	r	r	r	r	r
<b>Socio-demographic</b>					
Age	-0.112	0.039	-0.012	-0.070	-0.047
<b>Medical background</b>					
Number of medicines	0.121	-0.083	0.003	-0.054	0.063
Dialysis vintage*	0.029	-0.013	0.068	0.076	-0.011
<b>Biochemical data</b>					
Albumin	0.130	0.068	0.176	0.069	0.029
Total protein	0.072	0.073	0.071	0.069	0.032
Urea	-0.171	0.015	-0.057	-0.137	-0.028
Hemoglobin	0.103	0.007	0.152	-0.010	-0.079
Creatinine	0.133	-0.030	-0.074	0.075	-0.069
Phosphate	-0.071	-0.021	-0.157	-0.131	-0.020
Sodium	0.237**	0.092	0.245**	0.065	-0.018
Calcium	0.114	0.027	0.001	0.015	-0.015
Potassium*	-0.089	-0.122	-0.042	-0.066	-0.124

\*\* Correlation is significant at the 0.01 level (2-tailed); \* Spearman rho correlation; r= Pearson Correlation

to performance limitations such as mobility and performance of basic tasks impairment, HD individual's quality of life can be negatively affected by decrease in their physical ability to carry out activities of daily living (22). Besides that, the biggest contribution to the higher mental functioning score than physical functioning as seen in this study was due to the subjects' adaptation to their current HD condition. Preservation of mental health regardless of poor physical health over time among HD subjects was previously described by dynamic adaptations of patients' predictions towards their chronic diseases (23), ability to psychologically adapt to their situation over time (24) and a higher satisfaction level with being alive despite functional disabilities (25). Furthermore, it was predicted that such relatively good emotional health is due to the existence of social support and social interaction in HD subjects' lives (26).

The burden of kidney disease subscale had the lowest score which indicated that the subjects were extremely burdened by how much kidney disease impedes with their daily life, takes up time, causes frustration, or makes the subjects feel like a burden. There was not much difference in the scores between effects of kidney disease in daily life and symptom/problem subscales. Thus, this finding indicated that subjects did not feel bothered by the effects of kidney disease in their daily life (fluid limits, diet restrictions, stress or worries and others) and symptoms/problems of kidney disease (sore muscles, chest pain, cramps and others). These findings were to some extent consistent with several studies (14,18-21) who found that burden of kidney disease affected subjects the most. The subjects were burdened by kidney disease as they need to attend at least three times of HD sessions per week and had to deal with frustration of no hope to cure the disease or leading a good life despite the exhaustive treatment (19). Moreover, the subjects perceived their conditions burden their families due to the changes in social activity, sleeping pattern, health and even holiday plans faced by the caregivers (27). The fairly good scores in the effects of kidney disease on daily life and symptom/problem subscales were likely due to the subjects' familiarity over time with restrictions, pain, uremic symptoms and others while having their own way to overcome these problems.

Several studies had been conducted to investigate the association of laboratory profile with QOL among HD patients. Interestingly, the current study found that there was a positive significant association between serum sodium with physical functioning and symptom/problem subscales, showing that serum sodium may affect HRQOL, which failed to be demonstrated in other studies. Hyponatraemia is a factor of poor prognosis in HD patients with hyponatraemic patients often presented with malnutrition or volume overload (28). Thus, it is plausible to expect an association between

low serum sodium level and poor HRQOL (28). Previous study conducted among 354 HD subjects in Chile demonstrated a positive association between serum albumin level with mental health and burden of kidney disease subscales (14) while a positive association between serum creatinine levels with mental health subscale. On the other hand, Saad et al (13) in a retrospective chart review observed no association between albumin, calcium, phosphate or hemoglobin levels and dependent variables subscales score. Our finding whereby there was no significant association between age, number of medicine, dialysis vintage or all biochemical data except serum sodium, and all five of QOL subscales was consistent with Saad et al (13) who showed that age and years on dialysis were not significantly associated with the five subscales of QOL. However, Guerra-Guerrero et al (14) found that age was negatively associated with all subscales except effects of kidney disease in daily life. Possible explanation for all different results between present and past studies mentioned above was probably due to the varying level of adaptation and adjustment of each patient to their HD treatment. Nevertheless, the validity of the metabolic profile as surrogate markers of subject well-being, which is beyond the scope of present study should be investigated further in future studies (13).

## CONCLUSION

There is an increasing interest in assessing HRQOL among maintenance HD patients. Mental health among HD elderly subjects had a better score than physical health while burden of kidney disease subscale scored the least among kidney disease-targeted subscales. Serum sodium was found to be significantly associated with physical functioning and symptom/problem subscales. Findings from this study should be included in an action plan to enhance quality of life of HD elderly. The interpretation and use of the information gathered from HRQOL assessments will also pose specific challenges to the nephrology care team in order to provide better outcomes for both patients and caregivers. Further research on this matter should include on developing strategies and interventions of all components that build up the factors related to QOL among HD elderly patients.

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