Int J Adv Life Sci Res. Volume 7(3) 176-185
https://doi.org/10.31632/ijalsr.2024.v07i03.016

International Journal of Advancement in Life Sciences Research

Online ISSN: 2581-4877

Journal homepage http://ijalsr.org

Original Article

Association of Socio-demographic Factors Affecting the Quality of Life in Patients with Chronic Kidney Disease on Hemodialysis: A Cross-Sectional Study

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Abstract

Introduction: Chronic kidney disease (CKD) poses a substantial global health challenge, affecting 8% to 16% of the population. The quality of life (QOL) for CKD patients, especially those undergoing hemodialysis (HD), is influenced by socio-demographic factors. Objective: This observational study aimed to evaluate QOL among CKD patients undergoing HD at Surabaya Islamic Hospital and explore potential influencing factors. Methods: Using purposive sampling, 178 CKD patients aged 18 years and above participated. Socio-demographic data and QOL were evaluated using the WHOQOL-BREF scale. Results: Majority were elderly (39.9%), female (65.2%), Muslim (87.6%), with 43.8% earning Rp. 4,500,000 or more, and 52.8% having less than high school education. The study unveiled varied QOL patterns across domains. Physical QOL was high for 46.1%, while 47.2% reported low psychological QOL. Social QOL was balanced, but environmental QOL was low for 43.8%. Overall, 57.3% reported high QOL. Statistical analysis revealed significant associations between QOL and age, income, religion, and education ($p < 0.05$). Gender showed no significant relationship ($p = 0.138 > 0.05$). In conclusion, age, income, religion, and education significantly influenced QOL among CKD patients undergoing HD, highlighting the importance of tailored interventions to enhance patient outcomes. Gender, however, did not play a significant role in QOL disparities among this population.

Keywords: *Chronic Kidney Disease, Hemodialysis*, *Quality of Life*

Introduction

Chronic kidney disease (CKD) is characterized by a range of pathways leading to irreversible kidney damage over time. Diagnosis hinges on a persistent decrease in kidney function and structural impairment, typically defined as a Glomerular Filtration Rate (GFR) below 60 mL/min per 1·73 m² or the presence of kidney damage markers for at least three months (Liu *et al*., 2022;Mullens *et al*., 2020). CKD represents a significant global public health challenge, with escalating prevalence rates and substantial healthcare expenditures(Apel *et al*., 2021). It affects an estimated 8% to 16% of the world's population, often remaining undetected by both individuals and healthcare providers (Chen *et al*., 2019).

Received on :14th May 2024; Revised version received on :25thJune 2024; Accepted: 30th June 2024

In the United States and Korea, millions are affected, with substantial medical expenses ranging from $1,700 to $12,700 per person annually depending on the stage of the disease (Park *et al*., 2021). In Indonesia, CKD prevalence has surged to 13.4%, becoming a leading cause of national mortality (Belinda & Dewi, 2021), with a notable increase from 0.2% to 0.38% between 2013 and 2018 (Ministry of Health of Indonesia, 2018). In East Java alone, CKD affects around 2% of the population, with a significant portion requiring hemodialysis (HD) therapy (Ministry of Health of Indonesia, 2018).

Patients undergoing dialysis face numerous challenges that significantly impact their lives, both psychologically and physically. These challenges include pain, fluid intake restrictions, itching, discomfort, limited physical activity, fatigue, financial burdens, feelings of inadequacy, sexual dysfunction, and negative emotions (El-Habashi *et al*., 2020). Evaluating QOL of these patients is crucial in understanding their healthcare experience and outcomes. While there is no universal definition of QOL, it's generally agreed that in CKD patients, particularly those on dialysis, physical aspects such as physical abilities and vitality are most affected, while mental and social aspects are less impacted (El-Habashi *et al*., 2020).

Age, gender, religion, education level, income, and other factors affect the QOL of dialysis patients (Mousa *et al*., 2018; Al Salmi *et al*., 2021). Numerous prior studies have investigated the factors affecting QOL of HD patients with CKD, particularly focusing on socio-demographic factors such as age, gender, educational attainment, socioeconomic status, employment status, and marital status. These studies have yielded varied findings. Some studies reported no relationship between one or more of these demographic factors, but other studies showed a significant negative or positive relationship with QOL (Mousa *et al*., 2018; El-Habashi *et al*., 2020; El Kass *et al*., 2020; Mahato *et al*., 2020).

Surabaya Islamic Hospital in Surabaya Regency caters to a considerable number of CKD patients, with over 5,000 HD visits annually from 2015 to 2023, indicative of the prevalent CKD in the area (Medical Record Surabaya Islamic Hospital, 2023). However, merely tracking patient visits doesn't provide a comprehensive picture of their quality of life during treatment. This was obtained from the preliminary interview with the Head of the Hemodialysis Room. In addition, an in-depth understanding ofsocio-demographic factors potentially impacting patients' quality of life. Considering variables such as age, gender, marital status, education, employment, and economic status, Surabaya Islamic Hospital can devise customized care strategies to improve the overall well-being of CKD patients undergoing HD. Implementing such initiatives has the potential to greatly support these patients'QOL at the hospital, promoting a holistic care approach. Hence, this study aims to evaluate QOL of CKD patients undergoing HD and the factors influencing it, particularly within Surabaya Islamic Hospital.

Material and Methods

Study design

This cross-sectional observational study aimed to evaluate the QOL of CKD patients undergoing HD at Surabaya Islamic Hospital. Additionally, it sought to identify the factors linked with favorable QOL among these patients.

Population and sample

The study population comprised all stages of CKD patients aged 18 years and over who received treatment at Surabaya Islamic Hospital, totaling 320 patients during the last 3 months. The sample calculation uses the Slovin formula with assuming an accuracy rate of 95%, then an error of 5%(0.05) as follows (Ismail *et al*., 2022): n = N/(1 + Ne^2)

n = Number of samples

N = Total population (total number of members of the population)

e = Error tolerance (tolerance of error; degree of significance: 0.05) –> (^2 = rank two).

So, n = N/(1 + Ne^2) = 320/(1 + 0.05 x 0.05) = 178 patients.

Purposive sampling was employed in this study, adhering to predefined inclusion and exclusion criteria. The inclusion criteria in this study were: a) patients undergoing hemodialysis at Surabaya Islamic Hospital, b) 18 years old and above, c) CKD treatment with HD for ≥ 3 months, d) agreed to be respondents. And the exclusion criteria included: a) HD due to acute renal failure, b) current hospitalization, c) current ongoing chemotherapy or radiotherapy, d) kidney transplantation planned within a few months, e) cognitive dysfunction or mental retardation, f) history of myocardial ischemia in the last 6 months, g) uncontrolled diabetes mellitus and hypertension, h) symptomatic cardiovascular disease with functional disability, i) unstable medical condition due to acute or chronic illness.

Research instrument

Data for this study were collected using a questionnaire consisting of two sections: one focused on socio-demographic information and the other on the validated World Health Organization Quality of Life Brief Version (WHOQOL-BREF). The socio-demographic section included details like age, income, gender, religion, and education level. QOL was evaluated using the WHOQOL-BREF, a tool translated into Indonesian and validated by WHO (2012), a validated tool translated into Indonesian. This instrument assesses four domains: physical (seven questions), psychological (six questions), social relations (three questions), and environment (eight questions). Each question is rated on a scale from 1 to 5, with higher scores indicating better QOL. Domain scores were calculated by multiplying the average score of each facet by four. The study found a Cronbach's alpha value of 0.82, indicating strong internal consistency reliability (Nurbadriyah *et al*., 2023).

Procedure

Approval to access the hospitals was granted by the directors, after which the chiefs of hemodialysis units were briefed on the study protocols. Subsequently, the manager and head nurse were approached to provide detailed explanations about the study's purpose, eligibility criteria, procedures, and ethical considerations. Upon receiving information about potential participants, researchers directly approached them, explaining the study's objectives and procedures. Those who consented were provided with written informed consent forms, signed and dated. Questionnaires were distributed to participants during their hemodialysis sessions at the hospital, with assistance provided as needed while adhering to research protocols and adjusting to the patients' conditions. The completed questionnaires were then compiled and analyzed.

Data analysis

The information was entered into an Excel spreadsheet and coded twice before being transferred to SPSS 26.0 for analysis. Univariate analysis was conducted to identify patient characteristics, while bivariate analysis was employed to examine differences within each variable group. Univariate analysis involved percentages and frequency distribution to analyze respondent attributes, including socio-demographics and quality of life (QOL). Bivariate analysis utilized Chi-Square tests to assess the relationship between patient characteristics and QOL, employing a statistical significance level of 95%.

Ethical consideration

Ethical consideration in this study involves Informed consent, Beneficence and Confidentiality/Anonymity. The research study has been approved by Research Ethics Committee, Ganesha Husada Kediri College of Health Sciences, Indonesia vide reference number 024/SGH/KEPK/VI/2024.

Results

Univariate Analysis

Socio-demographic characteristics

A total of 178 participants were included in the study, with nearly 40% falling into the category of late elderly. The majority of the participants, constituting 65.2%, were female. In terms of income, 43.8%

reported having an income of Rp. 4,500,000/month or higher. Additionally, 87.6% of the participants identified as Muslim, and 52.8% had received education below the secondary level (senior high school). (Table 1).

Table 1. Socio-demographic characteristics of the study sample

Variable	N (178)	%
Age		
Late Adults (36 - 45 Years)	39	21.9
Early Elderly (46 - 55 Years)	68	38.2
Late Elderly (56 - 65 Years)	71	39.9
Income		
< Rp. 1.000.000/month	30	16.9
1.000.000 - 4.400.000/month	70	39.3
≥ Rp. 4.500.000/month	78	43.8
Gender		
Male	62	34.8
Female	116	65.2
Religion		
Islam	156	87.6
Christian	15	8.4
Other	7	3.9
Educational		
Primary Education (elementary, junior high school)	41	23.0
Secondary Education (senior high school)	94	52.8
Higher Education (D3/S1/S2/S3)	43	24.2

Quality of Life Domains

Table 2. Summary of QOL of participants in different domains

Domains	N (178)	%
Physical Domain		
Very Low (0 - 8)	18	10.1
Low (7 - 12)	72	40.4
High (13 - 18)	82	46.1
Very High (19 - 24)	6	3.4
Psychological Domain		
Very Low (0 - 8)	19	10.7
Low (7 - 12)	84	47.2
High (13 - 18)	71	39.9
Very High (19 - 24)	4	2.2
Social Domain		
Very Low (0 - 8)	22	12.4
Low (7 - 12)	68	38.2
High (13 - 18)	84	47.2
Very High (19 - 24)	4	2.2
Environmental Domain		
Very Low (0 - 8)	24	13.5
Low (7 - 12)	78	43.8
High (13 - 18)	73	41.0
Very High (19 - 24)	3	1.7
QOL		
Very Low (0 - 8)	8	4.5
Low (7 - 12)	65	36.5
High (13 - 18)	102	57.3
Very High (19 - 24)	3	7.5

Participants' QOL levels in various domains showed different patterns. In the physical domain, most participants (46.1%) had a high quality of life, followed by 40.4% with a moderate level. Meanwhile, in the psychological domain, most participants (47.2%) showed a low level of quality of life, followed by 39.9% who had a moderate level. The social domain showed a more even distribution, with 47.2% of participants having a high quality of life and 38.2% at a moderate level. While in the environmental domain, the majority of participants (43.8%) showed a low level of quality of life, followed by 41.0% at a moderate level. Overall, the majority of participants (57.3%) showed a high quality of life, while only 4.5% had a low level. (Table 2.)

Bivariate Analysis

The study revealed a notable association between age and quality of life (QOL). Specifically, the late adult age group (36 - 45 years), which was the youngest group studied, exhibited significantly lower quality of life compared to other age groups. This finding suggest that individuals in the early stages of adulthood face certain challenges or stressors that impact their overall well-being, which may be related to career development, financial stabilityor family responsibilities.Conversely, there was a trend of increasing quality of life as age increased. The early elderly (46 - 55 years) and late elderly (56 - 65 years) groups reported higher quality of life. This pattern indicates a possible improvement in well-being as individuals move into later stages of adulthood, possibly due to increased maturity, accumulated life experiences, and established social networks.The statistical significance of these differences (p-value < 0.05, > 0.000) underscores the robustness of these findings. This suggests that age plays a critical role in shaping quality of life outcomes, highlighting the need for age-specific interventions or support systems to address the unique challenges and opportunities faced by different age groups.

Table 3. Relationship between socio-demographiccharacteristics and quality of life

Variable	QOL			p-value
	Very Low	Low	High	
Age				
Late Adults (36 - 45 Years)	4	22	11	0.000
Early Elderly (46 - 55 Years)	3	27	38	
Late Elderly (56 - 65 Years)	1	16	53	
Income				
< Rp. 1.000.000	4	21	4	0.000
1.000.000 - 4.400.000	3	30	36	
≥ Rp. 4.500.000	1	14	62	
Gender				
Male	5	25	31	0.138
Female	3	40	71	
Religion				
Islam	8	52	95	0.020
Christian	0	11	3	
Other	0	2	4	
Educational				
Primary Education (elementary, junior high school)	5	23	12	0.000
Secondary Education (senior high school)	3	30	60	
Higher Education (D3/S1/S2/S3)	0	12	30	

Respondents earning less than Rp. 1,000,000/month exhibited significantly lower quality of life compared to those earning above Rp. 4,500,000/month. This suggests that higher income levels are significantly associated with better quality of life. Possible reasons behind this include better access to healthcare services, adequate nutrition, and greater economic stability.

Although not statistically significant (p = 0.138 > 0.05), there is a tendency for men to report higher quality of life compared to women. While not statistically significant, this finding reflect differences in life experiences and varying social or economic responsibilities between men and women in the studied context.

Muslims tend to have superior quality of life compared to individuals of other religions. This finding is statistically significant (p = 0.000 < 0.05). Factors such as religious practices, social support from religious communities, and spiritual values contribute to this difference.

Respondents with higher educational attainment (Diploma, Bachelor's, Master's, Doctorate) show a trend towards higher quality of life compared to those with only elementary or junior high school education. This difference is highly statistically significant (p = 0.000 < 0.05). Higher education provides better job opportunities, higher income potential, and access to knowledge and information that support overall well-being.

Discussion

This research conducted a thorough examination of QOL among CKD patients undergoing HD at Surabaya Islamic Hospital. A total of 178 participants were involved, with a significant portion being late elderly individuals, accounting for 39.9% of the sample. The majority of participants were female (65.2%), had an income of ≥ Rp. 4,500,000 (43.8%), identified as Muslim (87.6%), and had less than a high school education (52.8%). Previous studies have also highlighted that a majority of CKD patients undergoing HD are over 50 years old, particularly in the 51-70 age group (42.05%) (Mahato *et al*., 2020). Generally, as individuals age, their glomerular filtration rate (GFR) tends to decrease, a phenomenon termed as “normal aging” of the kidney, characterized by the inability to regenerate nephron cells. Typically, the decline in GFR begins around the ages of 18-29, with a yearly decrease of 0.82 mL/minute/1.73 m2 in both women and men (van der Burgh *et al*., 2021). Additionally, kidney function undergoes changes with age, leading to a reduced ability to respond to fluctuations in fluid and electrolytes (Chang-Panesso, 2021).

Furthermore, gender is identified as a risk factor for kidney disease. This finding contrasts with the research byYuliawati *et al*. (2023), which reported a majority of male patients (66.0%) with CKD. Men often engage in unhealthy habits such as smoking, excessive coffee and alcohol consumption, as well as the use of supplements, all of which can contribute to systemic diseases and a decline in kidney function, consequently affecting QOL. Females typically exhibit higher levels of estrogen compared to males. Estrogen can impact kidney function by inhibiting angiotensin II (AT II), decreasing oxidative stress, regulating the renin-angiotensin system (RAS), and maintaining calcium balance to prevent oxalate absorption, a factor implicated in kidney stone formation and chronic kidney disease (Ma *et al*., 2021; Medina *et al*., 2020). Previous research has corroborated these findings, with a significant portion of respondents attaining secondary education levels (>34.0%) (Dewi *et al*., 2020). Education level plays a critical role in an individual’s capacity to navigate changes in their health status. Patients with lower levels of education may necessitate additional support in comprehending diseases affecting their QOL (Akbari *et al*., 2019).

Our findings indicate a correlation between advancing age and diminished QOL. Anees *et al*. (2018) emphasized age as a pivotal factor for predicting the QOL among HD patients. With age progression, there tends to be a decline in physical function and an increased susceptibility to other comorbid conditions, thereby potentially reducing patients' quality of life. These results echo those of Mahato *et al*. (2020), who found that younger CKD patients generally exhibited better QOL compared to their older counterparts in terms of Physical Component Summary (PCS). Similar trends were observed in a study conducted in Australia, where younger CKD patients demonstrated significantly higher QOL than older individuals (Brown *et al*., 2015). Consistently, research conducted in the State of Palestine (Mousa *et al*., 2018) also highlighted older age as a predictor of poor Health-Related Quality of Life (HRQOL). Moreover, a previous study in Nepal emphasized that being younger was associated with a higher likelihood of experiencing a good quality of life compared to older individuals (Anu *et al*., 2013). Another study in Nepal corroborated these findings, linking older age with diminished HRQOL (Ghimire & Lopchan, 2017).

QOL of patients is closely tied to their income level, with higher-income individuals generally experiencing better quality of life. Low income is often linked to depression, which can further diminish quality of life. Research on patients with CKD have indicated that the severity of depressive symptoms can be influenced by their monthly income (Lemos *et al*., 2015). Various research on renal patients has underscored the impact of socioeconomic status on QOL (Tannor *et al*., 2019; Kefale *et al*., 2019). For instance, one study demonstrated that family income significantly predicted favorable QOL among individuals with CKD (Lemos *et al*., 2015). Furthermore, research conducted in Thailand revealed that financial strain on families constituted a significant contributor to diminished QOL among CKD patients (Waleekhachonloet *et al*., 2018).

The study found that while gender itself didn't show a direct correlation with QOL, there was a tendency for men to report higher QOL compared to women. This aligns with research conducted by Zyoud *et al*. (2016), which found that women tended to have lower mean EQ-5D scores than men. One suggested

explanation for this trend is that factors like limited social interactions and lower levels of physical activity among women in developing countries may contribute to their lower QOL scores (Javanbakht *et al*., 2012). This observation is supported by Merom *et al*. (2012), who identified Palestinian women as being particularly at risk of physical inactivity. Moreover, studies have shown that men are less prone to experiencing anxiety or depression compared to women (Saffari *et al*., 2013). Since symptoms of depression and anxiety are linked to lower QOL (Hemati *et al*., 2013;García-Llana *et al*., 2013), this could further explain why women may tend to report lower QOL levels compared to men.

This study identified a significant relationship between religion andQOL, which is consistent with findings from other research. For instance, El-Habashi *et al*. (2020) suggested a positive correlation between spiritual beliefs and overall QOL measures, as well as life satisfaction. It's proposed that religious beliefs can positively impact hemodialysis (HD) patients, aiding them in coping with life's challenges.Similarly, in elderly individuals with chronic kidney disease (CKD) undergoing dialysis Pilger *et al*. (2017) found that spiritual, religious, and existential well-being correlated positively with various domains of QOL, including physical, psychological, and social relationships. Moreover, the study observed that Evangelicals demonstrated a notable enhancement in the quality of their social interactions compared to Catholics. Generally, individuals who practice a religion often engage in active communities and tend to report greater social support compared to those who do not identify with a religious affiliation (Bravin *et al*., 2019).

This study revealed a correlation between education level and QOL, particularly concerning physical health. It discovered that individuals with higher levels of education tend to report better QOL regarding physical well-being. These findings are consistent with previous research by Yuliawati *et al*. (2023) and Manavalan *et al*. (2017), which also identified a significant association between education level and QOL, particularly concerning physical health dimensions. One potential explanation for this connection is that individuals with higher educational attainment possess a more profound understanding of their illness and its implications. They often have access to more extensive information about their condition and its treatment. Furthermore, individuals with higher education levels are inclined to take a proactive approach in making lifestyle adjustments that can positively influence their QOL (Ravindran *et al*., 2020; Zyoud *et al*., 2016).

Using purposive sampling in this study helped mitigate biases related to uneven population characteristics. By selecting participants that represent diverse age groups, educational backgrounds, genders, and religious affiliations proportionately, the study aimed to enhance the sample's representativeness. This approach facilitated a more comprehensive exploration of how socio-demographic factors influence quality of life outcomes. However, while this method improves internal validity by reducing sampling biases, it may limit the generalizability of findings beyond the specific groups studied. Future research could benefit from mixed-methods approaches to deepen understanding and expand geographic and demographic coverage, ensuring broader applicability of findings for policy makers and practitioners aiming to enhance quality of life across diverse populations.

Conclusion

Age, income, religion, and education level were found to have a notable association with QOL, with a p-value indicating statistical significance ($p < 0.05$). This suggests that these factors play a significant role in determining individuals' QOL. However, gender did not show a significant relationship with QOL, as indicated by a p-value greater than 0.05 ($p = 0.138$). This implies that gender may not be a significant determinant of QOL in this context.

For future research, enhancing this area can be achieved by adopting a stratified sampling approach to ensure representation across diverse socio-demographic variables. Longitudinal studies can deepen understanding of how these factors interact with life events over time. Integrating qualitative methods alongside quantitative surveys will provide richer insights, while cross-cultural comparisons will reveal universal patterns and cultural influences. Emphasizing collaboration with stakeholders to translate findings into actionable policies will effectively improve quality of life across diverse populations.

Acknowledgement

Thank you to all parties who contributed to this study, including faculty members of the Faculty of Nursing Sciences of Sekolah Tinggi IImu Kesehatan Rajekwesi Bojonegoro, East Java, Indonesia, and Lincoln University College, Malaysia.

Conflict of Interest:

The author declares that they have no conflict of interest.

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