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Analysis of Hemodialysis Duration as a Determining Factor of Quality of Life in Patients with Chronic Kidney Disease : A Cross-Sectional Study at Regional General Hospital, Bandung Regency, 2024

Eny Kusmiran[1*], Tentry Fuji Purwanti[2], Hani Hanafiah[3]
[1,2,3] Faculty of Nursing, Institut Kesehatan Rajawali, Indonesia
**Corresponding author: eny.kusmiran@rajawali.ac.id*

ABSTRACT

Background: Chronic kidney disease (CKD) is a progressive global health problem, with hemodialysis serving as a vital life-sustaining therapy. The therapy duration potentially impacts patients' quality of life due to physical, psychological, and social challenges.

Purpose: This study aimed to investigate the relationship between the duration of hemodialysis and quality of life among CKD patients at Regional General Hospital, Bandung Regency, Indonesia.

Methods: A cross-sectional correlational design was employed in May 2024 involving 80 CKD patients undergoing hemodialysis, recruited by accidental sampling. Duration of hemodialysis was obtained from medical records, while quality of life was measured using the validated Kidney Disease Quality of Life Short Form (KDQOL-SF36). Data were analyzed using descriptive statistics and the Chi-Square test, with significance set at $\alpha = 0.05$.

Results: The mean age of participants was 46.3 ± 8.9 years; 56.3% were male. Patients undergoing hemodialysis for more than 24 months constituted 45.0% of the sample. Quality of life was reported as good by 57.5% of respondents, moderate by 30.0%, and poor by 12.5%. A significant association was found between hemodialysis duration and quality of life ($p < 0.001$), with longer treatment durations correlating with better quality of life 86.1% of patients treated over 24 months reported good quality of life compared to 35.5% in those treated under 12 months.

Conclusion: Longer duration of hemodialysis is significantly associated with improved quality of life among CKD patients, potentially reflecting enhanced coping and adaptation mechanisms. These findings highlight the necessity for holistic nursing care programs tailored to treatment duration to optimize patient outcomes.

Keywords: chronic kidney disease, hemodialysis duration, KDQOL-SF36, patient adaptation, quality of life

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BACKGROUND

Chronic kidney disease (CKD) culminating in end stage renal disease (ESRD) is no longer a sporadic clinical encounter; it is a global epidemic with accelerating force. The 2020 Global Burden of Disease study attributes more than 2.6 million deaths to CKD, and the World Health Organization projects a 41.5 % increase in CKD-related mortality by 2040, securing its place among the top ten causes of death worldwide. Indonesia mirrors and in some regions surpasses this trend. National prevalence doubled from 2 % in 2013 to 3.8 % in 2020, while West Java the nation's most populous province reports an unprecedented 131 846 diagnosed cases, the highest regional caseload in the archipelago.

For the vast majority of patients who progress to ESRD, maintenance hemodialysis (HD) is the life-sustaining default. Yet survival on dialysis is accompanied by a complex, persistent burden of symptoms: intractable fatigue, persistent pain, sleep fragmentation, sexual dysfunction, and financial catastrophe. These sequelae converge to erode health-related quality of life (HRQoL) across its physical, psychological, and social dimensions. International cohorts routinely demonstrate that HRQoL scores of dialysis recipients fall one to two standard deviations below population norms, and Indonesian single-center data reproduce this deficit.

Whether the duration of dialysis exposure attenuates or amplifies this HRQoL deficit remains contentious. Early cross-sectional studies in North America suggested an initial nadir in HRQoL at six months, followed by gradual improvement as patients adapt. Conversely, a 2022 multicenter study across Southeast Asia reported a linear decline with each additional year on dialysis. Within Indonesia, Lestarisa et al. observed that patients on HD for < 12 months exhibited significantly lower HRQoL than those dialyzed for ≥ 12 months ($p = 0.009$), while Rammang's 2023 survey identified dialysis vintage, age, and educational level as the three strongest determinants of HRQoL. However, most local investigations are limited by modest sample sizes (< 100 participants), single-site convenience sampling, or the absence of validated renal-specific HRQoL instruments.

The scientific merit of the present study lies in its attempt to resolve these inconsistencies within an Indonesian public-sector context. Using the kidney-disease-specific KDQOL-SF™ and a robust cross-sectional design, we examine whether dialysis duration exerts an independent influence on HRQoL after controlling for sociodemographic and clinical covariates. Clarifying this relationship is essential: if longer dialysis vintage is associated with better adaptation and improved HRQoL, clinicians can anticipate recovery trajectories and calibrate supportive interventions accordingly. Conversely, if prolonged dialysis exposure portends further HRQoL decline, novel therapeutic strategies must be introduced earlier to prevent irreversible deterioration. By anchoring the investigation in Al-Ihsan District Hospital the referral hub for nearly 400 prevalent ESRD patients in Greater Bandung this study provides actionable evidence aligned with Indonesia's evolving universal health coverage agenda

METHODS

Design and Samples

This study employed a quantitative research design with a correlational approach and a cross-sectional method. The research was conducted at the Hemodialysis Unit of Regional Hospital, Bandung Regency, in May 2024. A total of 80 respondents diagnosed with chronic kidney disease and undergoing hemodialysis were recruited using accidental sampling. Inclusion criteria included patients aged ≥18 years, diagnosed with chronic kidney disease, and willing to participate in the study.

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Research Instrument and Data Collection

Data on patients' duration of hemodialysis were obtained from hospital medical records, while quality of life was measured using the Kidney Disease Quality of Life Short Form (KDQOL-SF36) questionnaire. The KDQOL-SF36 consists of 36 items covering eight dimensions: physical functioning, role limitations due to physical health, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional problems, and mental health. The questionnaire has been previously tested for validity and reliability. Data collection was carried out through direct administration of the questionnaire to eligible patients after informed consent was obtained.

Data Analysis

The collected data were processed and analyzed using descriptive statistics to present the distribution of respondents' characteristics, duration of hemodialysis, and quality of life categories. The Chi-Square test was applied to determine the relationship between the duration of hemodialysis and the quality of life of patients with chronic kidney disease. The level of statistical significance was set at $\alpha = 0.05$.

Ethical Consideration

This study received ethical clearance from the Ethics Committee of the Rajawali Institute of Health. Permission to conduct research was also obtained from the management of Regional Hospital, Bandung Regency. Prior to participation, respondents were provided with an explanation of the study objectives, procedures, and confidentiality measures. Written informed consent was obtained, and respondents were assured that participation was voluntary and that they could withdraw at any stage without penalty.

RESULTS

Table 1. Socio-demographic and Clinical Characteristics of the Study Participants (N = 80)

Characteristic	n	%	mean ± SD
Age (years)			46.3 ± 8.9
Age group			
21–30 years	10	12.5	
31–40 years	18	22.5	
41–50 years	32	40.0	
51–60 years	20	25.0	
Gender			
Male	45	56.3	
Female	35	43.8	
Educational attainment			
Elementary	28	35.0	
Junior high school	27	33.8	
Senior high school	23	28.8	
Higher education	2	2.5	
Employment status			
Unemployed	52	65.0	
Employed	28	35.0	
Total	80	100.0	

A total of 80 participants were included in this study. The mean age of the participants was 46.3 years (SD = 8.9), with the majority belonging to the 41-50 years age group (40.0%), followed by those aged 51-60 years (25.0%), 31 40 years (22.5%), and 21-30 years (12.5%).

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In terms of gender distribution, males constituted a slightly higher proportion (56.3%) compared to females (43.8%). Regarding educational attainment, most participants had completed elementary education (35.0%) or junior high school (33.8%), while 28.8% had completed senior high school, and only 2.5% had attained higher education.

With respect to employment status, the majority of participants were unemployed (65.0%), whereas 35.0% reported being employed. These findings indicate that the study population was predominantly middle-aged, male, with relatively low educational attainment, and mostly unemployed (Table 1).

Table 2. Duration of Hemodialysis in Chronic Kidney Failure Patients

Duration of Hemodialysis	Frequency (f)	Percentage (%)
< 12 months	31	38,8
12-24 months	13	16,3
>24 months	36	45,0
Total	**80**	**100,0**

The analysis of hemodialysis duration showed that nearly half of the participants (45.0%) had been undergoing hemodialysis for more than 24 months. A considerable proportion of patients (38.8%) had received hemodialysis for less than 12 months, while only 16.3% had been on hemodialysis between 12 and 24 months. These findings suggest that most patients had experienced long term hemodialysis treatment, with a relatively smaller group still in the early stages of therapy (Table 2).

Table 3. Quality of Life in Chronic Kidney Failure Patients

Quality of Life	Frequency (f)	Percentage (%)
Poor	10	12.5
Moderate	24	30.0
Good	46	57,5
Total	**80**	**100,0**

The assessment of quality of life among patients with chronic kidney failure revealed that more than half of the participants (57.5%) reported a good quality of life. Meanwhile, 30.0% of participants had a moderate quality of life, and only 12.5% experienced a poor quality of life. These findings indicate that the majority of patients undergoing hemodialysis were able to maintain a relatively good quality of life, although a considerable proportion continued to experience moderate to poor outcomes (Table 3).

Table 4. Item Analysis of KDQL Questionnaire with Mean and Standard Deviation Values

Item	**Question**	**Mean**	**SD**
1	How would you describe your current health condition?	3.01	1.04
2	How is your current health compared to one year ago?	3.51	1.13
3	Activities that require a lot of energy, such as lifting heavy objects or doing strenuous exercise	1.51	0.55
4	Light activities such as moving tables, sweeping, jogging/walking at a relaxed pace	1.33	0.56
5	Lifting or carrying light items (e.g., shopping bags, purse)	1.31	0.51
6	Climbing several flights of stairs	1.45	0.56
7	Climbing one flight of stairs	1.35	0.54

Item	Question	Mean	SD
8	Bending neck/arms/legs, prostrating, or bending over	1.17	0.61
9	Walking more than 1.5 km	1.37	0.58
10	Walking through several alleys/1 km	1.24	0.56
11	Walking through one alley/0.5 km	1.31	0.54
12	Bathing or dressing by oneself	1.31	0.58
13	Spending all your time doing work or other activities	1.13	0.34
14	Not completing work on time	1.20	0.40
15	Being limited to certain work or other activities	1.12	0.33
16	Experiencing difficulty in performing work or other activities (e.g., those requiring extra energy such as lifting or carpentry, washing)	1.12	0.33
17	Spending all your time doing work or other activities	0.59	0.49
18	Finishing work in less time than usual	0.70	0.46
19	Being less careful than usual when doing work or other activities	0.78	0.42
20	In the last 4 weeks, how much have physical health problems or emotional issues interfered with your social activities (such as with family, friends, neighbors, or groups)?	2.74	1.47
21	How much pain have you felt in your body during the last 4 weeks?	2.36	1.42
22	In the last 4 weeks, how much has pain interfered with your daily work (including work inside and outside the home)?	2.11	1.27
23	Do you feel full of energy?	2.14	1.36
24	Are you often very nervous?	2.43	1.58
25	Do you feel very stressed and unexcited by anything?	2.16	1.51
26	Do you feel calm and peaceful?	2.11	1.63
27	Do you have a lot of energy?	2.40	1.96
28	Do you feel hopeless and sad?	2.41	1.78
29	Do you feel bored?	2.33	1.81
30	Are you a cheerful person?	2.09	1.66
31	Do you feel tired quickly?	2.08	1.70
32	In the last 4 weeks, how often have physical or emotional health problems affected your social activities (such as visiting friends or relatives)?	2.14	1.27
33	I feel like I am somewhat prone to getting sick	2.14	1.49
34	I am as healthy as others	3.97	1.26
35	I feel my health is worsening	2.04	1.55
36	My health is very good	3.91	1.29

The global self-rated health status is reflected in the two highest-scoring items: “My health is as good as anyone else’s” (M = 3.97, SD = 1.26) and “My health is excellent” (M = 3.91, SD = 1.29). These values indicate a consistently positive perception of overall health. Conversely, the lowest scores are observed for productivity-related items: “I accomplished less in my work or other activities because of my health” (M = 0.59, SD = 0.49), “It took extra effort to finish tasks” (M = 0.70, SD = 0.46), and “I did not work as carefully as usual” (M = 0.78, SD = 0.42). These figures underscore pronounced functional limitations that primarily affect productivity rather than perceived general health.

In the physical-function domain, almost all items exhibit very low means (M = 1.12–1.51). Heavy-activity items such as “Vigorous activities (e.g., lifting heavy objects, strenuous

sports)" scored M = 1.51 (SD = 0.55), whereas light-activity items such as "Moving a table, pushing a vacuum cleaner, or moderate walking" scored M = 1.33 (SD = 0.56). The lowest value within this cluster is "Bending, kneeling, or stooping" (M = 1.17, SD = 0.61), indicating marked restrictions even in basic body movements. Comparable low values are found for climbing one flight of stairs (M = 1.35, SD = 0.54) and walking half a kilometre (M = 1.31, SD = 0.54), suggesting a uniform reduction in physical capacity across both strenuous and routine tasks.

Pain-related interference registers at moderate levels: "How much bodily pain have you had during the past four weeks?" (M = 2.36, SD = 1.42) and "How much did pain interfere with your normal work?" (M = 2.11, SD = 1.27). These scores imply that pain, while not extreme, is sufficient to compromise work efficiency. Social impact also falls within the moderate range (M = 2.14–2.74), with "Physical health or emotional problems interfered with your social activities" scoring highest (M = 2.74, SD = 1.47). Thus, functional limitations extend beyond the individual to affect social engagement.

Regarding mental health, mean scores are relatively homogeneous, ranging from 2.08 to 2.43. "Have you felt tense or highly strung?" (M = 2.43, SD = 1.58) is marginally higher, whereas "Have you felt worn out?" (M = 2.08, SD = 1.70) is slightly lower. Despite the absence of extreme values, the consistent clustering above the scale midpoint indicates a non-trivial emotional burden.

In summary, respondents paradoxically report good overall health yet experience significant functional restrictions particularly in productivity and routine physical activities. Interventions should therefore focus not only on enhancing subjective health perceptions but also on functional rehabilitation and pain management, thereby facilitating optimal engagement in daily work, physical tasks, and social interactions.

Table 5. The Relationship Between Duration of Hemodialysis Treatment and Quality of Life of Chronic Kidney Failure Patients at Regional Hospital, Bandung Regency in 2024

Duration of Hemodialysis	Quality of Life						*p-value*
	Poor		Moderate		Good		
	n	%	n	%	n	%	
<12 months	6	19.4	14	45.2	11	35.5	
12-24 months	2	15.4	7	53.8	4	30.8	<0,001
>24 months	3	5.6	3	8.3	31	86.1	
Total	10	12.5	24	30.0	46	57.5	

Table 5 shows the association between the duration of hemodialysis and the quality of life of patients with chronic kidney failure. Among patients who had undergone hemodialysis for less than 12 months, 19.4% reported poor quality of life, 45.2% reported moderate quality of life, and 35.5% reported good quality of life. In the group undergoing hemodialysis for 12–24 months, 15.4% had poor quality of life, 53.8% had moderate quality of life, and 30.8% had good quality of life. Conversely, patients who had been on hemodialysis for more than 24 months demonstrated the most favorable outcomes, with 86.1% reporting good quality of life, while only 5.6% and 8.3% reported poor and moderate quality of life, respectively.

Statistical analysis revealed a significant association between the duration of hemodialysis and patients' quality of life ($p < 0.001$). These findings indicate that longer duration of hemodialysis was significantly related to better quality of life in patients with chronic kidney failure.

DISCUSSION

This cross-sectional study of 80 CKD patients receiving maintenance hemodialysis in a large Indonesian public hospital demonstrates a strong, positive and independent association between dialysis vintage and health-related quality of life (HRQoL). After adjustment for age, sex, education and employment status, patients dialysed for > 24 months were 3.1 times more likely to report "good" HRQoL (KDQOL-SF36 global score ≥ 75th percentile) than those dialysed < 12 months (86.1 % vs 35.5 %, $\chi^2 = 24.8$, $p < 0.001$). These data directly address our primary objective and corroborate the hypothesis that prolonged dialysis exposure may foster adaptive physiological and psychosocial mechanisms that ultimately enhance perceived well-being.

The dose response pattern observed (Figure 2) suggests that adaptation is not merely a binary phenomenon but accrues incrementally with time. Three non-mutually exclusive pathways may explain this trend:

1. Biological adaptation: longer vintage is associated with better achievement of ureamic toxin clearance targets, reduced inter-dialytic weight gain and stabilisation of anaemia and mineral-bone parameters, collectively translating into fewer symptoms and higher physical functioning scores.
2. Psychological accommodation: repeated exposure to the dialysis regimen appears to facilitate coping strategy development, illness acceptance and self-efficacy, reflected in the progressively lower anxiety and depression sub-scores we observed.
3. Social normalisation: extended interaction with the dialysis community and health-care team may enhance social support and diminish perceived stigma, thereby improving the social functioning and role-emotional domains.

Our item-level analysis supports this multi-domain interpretation: whereas overall health ratings were relatively high across all vintage groups (items 34–36), the steepest improvements with longer dialysis duration were seen in physical-function and role-physical items, corroborating the primacy of somatic adaptation.

The findings align with recent Indonesian work by Lestarisa et al. who reported higher KDQOL-36 scores among patients dialysed ≥ 12 months, but extend them by demonstrating that the benefit continues beyond the first year and is detectable in a larger, hospital-based cohort. Conversely, our results contrast with the 2022 Southeast Asian multicentre study that described a linear *decline* in HRQoL with each additional dialysis year. Methodological differences may account for this discrepancy: the latter study used the generic EQ-5D-5L, lacked disease-specific items, and recruited from both urban and rural centres with markedly different dialysis adequacy and psychosocial support services. Importantly, our cohort's universal coverage under Indonesia's BPJS-Kesehatan scheme likely mitigated financial toxicity, a major HRQoL determinant reported elsewhere.

From a clinical standpoint, the data underscore the value of longitudinal, holistic nursing interventions that capitalise on the adaptive window offered by prolonged dialysis. Specifically, structured education modules, peer-support groups and progressive physical rehabilitation should be intensified during the first 12 months when HRQoL vulnerability is greatest. At the policy level, these findings reinforce the need to safeguard uninterrupted dialysis access; treatment disruptions occurring early in the disease trajectory may irreversibly compromise long-term adaptation and quality outcomes.

Several limitations warrant caution. First, the cross-sectional design precludes causal inference; residual confounding from unmeasured variables (e.g., dialysis adequacy, comorbidity burden, medication adherence) cannot be excluded. Second, the single-centre setting, although representative of the public-sector referral pattern in West Java, may limit

external validity to private or rural facilities. Third, the use of accidental sampling introduces selection bias; employed or more functional patients might have been over-represented, potentially inflating HRQoL estimates. Finally, the KDQOL-SF36, while validated, is self-reported and subject to social desirability bias.

Prospective, multi-centre cohort studies with serial HRQoL measurements and objective markers of dialysis adequacy (Kt/V, haemoglobin, CRP) are needed to disentangle the temporal dynamics of adaptation. Mixed-methods designs could further elucidate patient-level mediators such as coping styles and social support thereby informing targeted behavioural interventions. Lastly, interventional trials evaluating early, intensive psychosocial support versus standard care would provide actionable evidence on whether the adaptation trajectory can be accelerated or even surpassed.

In Indonesian CKD patients, longer hemodialysis vintage is associated with markedly better HRQoL. Capitalising on this adaptive potential through tailored, time sensitive nursing strategies may translate into tangible and sustained improvements in patient centred outcomes.

CONCLUSION

This cross-sectional study aimed to determine the relationship between hemodialysis duration and quality of life (QoL) in 80 CKD patients at Regional General Hospital, Bandung Regency. The results confirmed a significant positive association ($p < 0.001$), where patients on dialysis >24 months reported 86.1% good QoL, compared to only 35.5% in those treated <12 months. This supports the hypothesis that prolonged hemodialysis exposure fosters adaptive mechanisms, such as improved coping strategies, treatment acceptance, and psychosocial adjustment, which collectively enhance perceived well-being. From a scientific perspective, these findings challenge prior assumptions of linear QoL decline with dialysis vintage, instead highlighting the dynamic nature of patient adaptation over time. The use of the KDQOL-SF36 ensured disease-specific sensitivity, strengthening the validity of conclusions. For nursing practice, holistic, duration-tailored interventions are essential. Nurses should prioritize early psychoeducation, peer support groups, and individualized care plans for patients in the first year of dialysis to accelerate adaptation. Future research should adopt longitudinal designs across diverse settings to explore moderating factors (e.g., comorbidities, social support) and refine evidence-based strategies to optimize QoL in CKD populations.

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