ORIGINAL ARTICLE

Factors associated with quality of life among patients undergoing hemodialysis in Indonesia

Wiwit Dwi Nurbadriyah[1,3]*[ID], Nursalam Nursalam[1][ID], Ika Yuni Widyawati[1][ID], and Ardhiles Wahyu Kurniawan[3][ID]

[1] Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia

[2] Nursing Study Program, Institute of Science and Health Technology RS dr. Soepraoen, Malang, Indonesia

[3] Nursing Program, STIKes Kepanjen, Malang, Indonesia

*Correspondence: Wiwit Dwi Nurbadriyah. Address: Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia and Nursing Program, STIKes Kepanjen, Malang, Indonesia. Email: wiwit.dn@gmail.com

ABSTRACT

Introduction: Chronic kidney disease patients will suffer a variety of health issues throughout their lifetimes, particularly with regard to their quality of life, whether they are receiving treatment or undergoing hemodialysis (HD). HD not only affects the patient's physical condition but also psychosocial conditions and their mental health. This study aimed to determine factors associated with QOL among patients undergoing HD in Indonesia.

Methods: A cross-sectional study was conducted in Malang, Indonesia during August to December of 2020. The inclusion criteria were patients undergoing HD two times a week and aged over 18 years old. QOL was measured using the World Health Organization Quality of Life Brief Version (WHOQOL-BREF). Linear regression was used to determine factors associated with QOL.

Results: About 150 participants agreed to join in this study (response rate: 84.4%) with their mean age 52.76 (SD=13.45). The total mean of the QOL in patients undergoing HD was 74.4 ± 27.7 with a range from 10 to 100. The highest mean score was reported for physical health (78.3 ± 24.8) and the lowest score was reported for environmental (72.6 ± 24.3). Linear regression showed that long duration of HD, hemoglobin concentration and blood urea with R2 was 34.6%.

Conclusions: Longer duration of HD, low hemoglobin concentration and high blood urea were factors associated with lower QOL in patients undergoing HD. The results of the above study recommend to nurses and health workers to improve critical thinking skills, including measuring levels of urea and hemoglobin, which have an impact on the QOL of patients undergoing HD.

Keywords: chronic kidney disease, hemoglobin, urea level, hemodialysis, quality of life

Introduction

The World Health Organization reports that chronic kidney disease affects up to 10% of the global population, but that only 10% of those need dialysis or a kidney transplantation (Mills et al., 2015). Chronic kidney disease (CKD) prevalence was 14.3% in the general population and 36.1% in high-risk populations in developing countries (Ene-Iordasche et al., 2016). It is estimated that at least 2.9 million people in Asia require dialysis, representing a 66% deficit in the provision of dialysis (Bikbov et al., 2020). For instance, the number of hemodialysis patients rose from 77.892 in 2017 to 132.142 in 2018 (Kemenkes RI, 2018).

CKD is progressive and irreversible kidney damage or kidney function below 60% of normal (Black and Hawks, 2009). Patients whose glomerulus filtration rate (GFR) is less than 60 ml/min/1.73 m2 begin to experience nocturia, weakness, nausea, decreased appetite, and

weight loss. This symptom is caused by the accumulation of toxic waste materials in the blood, particularly urea (Suwitra, 2009). Blood urea levels offer a more precise indication of dangerous urea production in people with renal failure than creatinine levels do. Prior to hemodialysis, the urea levels of CKD patients remained abnormal, and they were generally hyper uremic (Martini, 2010). Anemia, which results in diminished tissue perfusion and weakening, also contributes to the clinical manifestations of CKD. Kidney damage prevents the production of erythropoietin, which stimulates the bone marrow to create red blood cells (KDIGO, 2013).

Hemodialysis (HD) is the most common renal replacement therapy procedure that improves symptoms and preserves life for patients with CKD. HD is a burden that lowers quality of life compared to diabetes or cancer (Liu et al., 2006; Kitagawa et al., 2017; Dąbrowska-Bender et al., 2018; Kim, Kang and Woo, 2018; Bonenkamp et al., 2020). The WHO defines quality of life (QOL) as the subjective assessment of the effects of disease and treatment on physical, psychological, and social functioning and well-being (Ju and Tong, 2017). QOL has been recognized in the field of nephrology as a significant patient-reported outcome measure (PROM). The quality of life of patients undergoing dialysis is influenced by physical, biological, psychological, social and cultural factors (Zamanian and Kharameh, 2015; Ganu et al., 2018). Low QOL independently predicts hospitalization and death (Bonenkamp et al., 2020). CKD patients will suffer a variety of health issues throughout their lifetimes, particularly with regard to their QOL, whether they are receiving treatment or undergoing hemodialysis (HD). Therefore, improving QOL in patients undergoing HD is a crucial issue.

People with advanced stages of CKD have a worse QOL than those with normal or healthy kidneys (Nguyen et al., 2018). A study of 155 patients with CKD stages 1-5 found that the quality of life of these patients declined with the progression of their disease (Cruz et al., 2011). It has been found that the utility index drops by 0.011, 0.018, and 0.28% in those with stage 1-4 CKD compared to those with normal renal function (Nguyen et al., 2018). However, patients undergoing HD with anemia who get corrective therapy until Hb levels reach 11-12 g/dl had improved quality of life (Brunelli et al., 2010). Moreover, body mass index (BMI), cholesterol, serum albumin, hemoglobin and dietary intakes may influence QOL (Tong et al., 2009). Other study reported no association between household income and QOL (Alencar et al., 2020) while others demonstrated an improved QOL with higher income in terms of physical functioning, pain and social aspects (Shirazian et al., 2016). Patients undergoing HD who are dependent on health workers and unproductive may have a lower quality of life (Tome, Nurhayani and Darmawansyah, 2019). This study aimed to determine factors associated with QOL among patients undergoing HD in Indonesia. This study is rarely found in the literature and will be a novelty in the measuring levels of urea and hemoglobin, which have an impact on the QOL patients undergoing HD.

Materials and Methods

Study design

The research variables were duration of HD, levels of urea, hemoglobin and QOL patients undergoing HD. This was a cross-sectional study.

Sample

Respondents were patients undergoing HD in the HD center at one of the public hospitals in Malang, Indonesia, during August to December of 2022. The population were 170 patients. Sampling process used was purposive sampling. The inclusion criteria were patients who agreed to participate in this study, undergoing HD two times a week, aged over 18 years old, able to write and read in Bahasa, and willing to participate in this study. G-Power Software Version 3.1.6 was utilized to calculate the sample size utilizing the t-test under the assumptions of $\alpha = 0.05$ (Lemeshow et al., 1990) and power level= 0.80. The projected sample size needed for recruitment was therefore 150.

Instrument

Demographic data are sex, age, marital status, education, income level, occupation, and length of HD treatment. Data were obtained from medical records including hemoglobin, urea, creatinine concentration and interdialytic weight gain (IDWG). IDWG is an increase in fluid volume which is manifested by an increase in body weight as an indicator to determine the amount of fluid entered during the interdialytic period and patient compliance with fluid management in patients receiving hemodialysis therapy. IDWG was obtained from the previous hemodialysis session by measuring the difference between pre and post-dialysis weight during the interdialytic period.

QOL was measured using the World Health Organization Quality of Life Brief Version (WHOQOL-BREF) (WHO, 2012). The WHOQOL-BREF, which has been translated into Indonesian, is assigned a score based on four domains: i) physical, which consists of

Table 1. Demographic data of participants (n=150)

Demographic Data	n	%
Age		
45-59 years (Middle-Aged)	79	52.7
60-74 years (Elderly)	71	47.3
Type Sex		
Man	80	53.3
Woman	70	46.7
Education		
Under/Senior High School	86	57.3
University	64	42.7
Marital Status		
Marry	112	74.7
Not yet Married	38	25.3
Job		
Government Employees	15	10
Private Employee	47	31.3
No Work	88	58.7

Table 2. Bivariate analysis length of HD, hemoglobin concentration, urea with QOL

Variables	Mean ± SD	p-value
Length of HD	7.86±3.32	0.025
Hb concentration	9.34±2.57	0.04
Urea level	12.31±6.72	0.048
QOL	74.4±27.7	

seven questions, ii) psychological, which consists of six questions, iii) social relations, which consists of three questions, and iv) environment, which consists of eight questions. Each question is scored on a scale of 1 to 5, with a higher score indicating a higher quality of life. The domain score is calculated by multiplying the average of each facet by four. In the current study, Cronbach's alpha was 0.82.

Procedure

Ethical permission was obtained prior data collection from institutional board of STIKes Kepanjen (0.075/ETIK/IV/2022). The research permission was given by the studied hospitals and HD clinics. The researchers approached the manager and head nurse and explained the study purpose, eligibility criteria, procedure, and ethical issues. The manager and the head nurse shared information about potential participants with researchers. The researchers then approached the participants and described the study's objective and procedure. All who agreed to participate were provided with a signed and dated written informed consent form. The process of collecting data through filling out questionnaires is as follows: Distribution of questionnaires to participants is given at the hospital according to the hemodialysis schedule. Respondents were assisted in filling out the questionnaire, but still met the research protocol. The filling in process was carried out during the hemodialysis session but adjusted to the patient's condition. Then the obtained questionnaire data were then recapitulated and analyzed.

Data analysis

The Statistical Package for Social Science (SPSS) 20.0 software was used to analyze the data. Normality was tested using the Kolmogorov-Smirnov test. Because the data were normally distributed, parametric tests were employed. The demographic data of participants were described using descriptive statistics. Continuous variables were treated using mean and standard deviation, whereas categorical data were reported using percentages and frequencies. The independent t test and Pearson correlation were used in this study to examine the relationship between demographic and clinical factors and depression. Linear regression was used to determine factors associated with QOL. A two-tailed p-value ≤ 0.05 was considered statistically significant.

Results

As many as 150 participants joined in this study with those middle-aged being 52.7%. The majority of the patients (53.3%) were male, 57.3% had education below senior high school,74.7% were married, and 58.7% unemployed (Table 1).

Descriptive analysis of QOL and each dimension in patients undergoing HD was performed. The total mean of the QOL in patients undergoing HD was 74.4 ± 27.7 with a range from 10 to 100. The highest mean score was reported for physical health (78.3 ± 24.8), followed by social relationship (75.1 ± 26.2), then psychological domain (73.4 ± 23.7), and the lowest score was reported for environmental domain (72.6 ± 24.3).

In bivariate analysis length of HD was significantly associated with QOL in patients undergoing HD (p=0.025), hemoglobin concentration was significantly associated with QOL in patients undergoing HD (p=0.04), urea was significantly associated with QOL in patients undergoing HD (p=0.048) (Table 2).

Discussions

The data show that high blood urea predicts lower QOL in patients undergoing HD. High levels of urea in patients undergoing HD cause various organ disorders, such as anorexia and nausea in digestion, metabolic acidosis in the blood leading to cardiac arrhythmias, skin damage, and decreased consciousness. With increasing levels of urea, it will increase the symptoms and complications of HD. Increased levels of urea are the same as accumulation of toxins in the blood which reduces physical abilities, increases dependence on others, reduces self-confidence and affects the socio-psychological dimension. With this condition, patients

feel their quality of life is greatly reduced (Ghahfarokhi and Abbaszadeh, 2012). Patients undergoing HD need to control urea levels regularly by performing hemodialysis according to the program. In addition, CKD patients adopt a low-urea diet, which is to limit foods high in protein.

Low hemoglobin concentration was a factor associated with lower QOL in patients undergoing HD. The results of the study stated that an increase in hemoglobin levels in patients undergoing HD had an effect on increasing four domains of QOL, namely physical, psychological, social and environmental relationships. These findings have implications for the treatment of patients undergoing HD in the context of initiation and targeting of hemoglobin levels. The signs and symptoms experienced by patients with anemia are tired quickly and run out of energy, increased heart rate, fast breathing, dizziness, headache, paleness and insomnia (Finkelstein et al., 2009). In adaptation to hemodialysis, the threat of death due to complications of the disease will make the patient vulnerable to emotional problems which can lead to depression because they feel hopeless (Cruz et al., 2011). This will cause the patient to have a negative perception of himself thus affecting physical and mental health. Various clinical symptoms and psychological problems that appear have the potential to cause a decreased QOL.

Hemoglobin levels reaching normal levels have an impact on how well patients undergoing HD are able to live their lives. Aerobic metabolism in the body is controlled by hemoglobin, which carries oxygen in the blood. A healthy body metabolism also contributes to a high quality of life.

The result showed that longer duration of HD could decrease QOL. The longer a patient undergoes hemodialysis therapy is inversely proportional to the quality of life of patients with terminal kidney disease (Anees et al., 2011). This is because the patient's level of worry and stress is increasing because they think hemodialysis should be able to cure them. Three months after suffering from CKD and hemodialysis therapy, patients generally feel that their quality of life continues to decline (Ghahfarokhi and Abbaszadeh, 2012). This is due to the patient's physical, social and psychological abilities tend to decrease. Moreover, longer years under dialysis could be attributed to increased economic burden and dialysis complications.

The strength of the study is that such research was rarely found in the literature and will be a novelty in the measuring levels of urea and hemoglobin which have an impact on QOL patients undergoing HD. Limitation of this study was data collection could not be done simultaneously due to adjusting the patient's hemodialysis schedule and laboratory results.

Conclusions

There is longer duration of HD associated with lower QOL in patients undergoing HD; low hemoglobin concentration and high blood urea were factors associated with lower QOL in patients undergoing HD. The results of the above study recommend to nurses and health workers to improve critical thinking skills, including measuring and educating participants that the levels of urea and hemoglobin have an impact on the QOL undergoing HD. To future researchers, recommendations are in the form of observation of factors that affect the QOL of patients undergoing HD.

References

Alencar, S. B. V. et al. (2020) 'Quality of life may be a more valuable prognostic factor than depression in older hemodialysis patients', Quality of Life Research, 29(7), pp. 1829–1838. doi: 10.1007/s11136-020-02445-1.

Anees, M. et al. (2011) 'Dialysis-related factors affecting quality of life in patients on hemodialysis'. Iranian journal of kidney diseases. 5(1), 9–14.

Bikbov, B. et al. (2020) 'Global, regional, and national burden of chronic kidney disease, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017', The Lancet, 395(10225), pp. 709–733. doi: 10.1016/S0140-6736(20)30045-3.

Black, J. M. and Hawks, J. H. (2009) 'Working together to grow libraries in developing countries', Medical Surgical Nursing: Clinical Management for Positive Outcomes. 8th ed. USA: Saunders.

Bonenkamp, A. A. et al. (2020) 'Health-related quality of life in home dialysis patients compared to in-center hemodialysis patients: a systematic review and meta-analysis', Kidney medicine, 2(2), pp. 139–154. https://doi.org/10.1016/j.xkme.2019.11.005.

Brunelli, S. M. et al. (2010) 'Shorter dialysis times are associated with higher mortality among incident hemodialysis patients', Kidney international, 77(7), pp. 630–636. doi: 10.1038/ki.2009.523

Cruz, M. C. et al. (2011) 'Quality of life in patients with chronic kidney disease', Clinics, 66(6), pp. 991–995. doi: 10.1590/s1807-59322011000600012

Dąbrowska-Bender, M. et al. (2018) 'The impact on quality of life of dialysis patients with renal insufficiency', Patient Preference and Adherence, 12, pp. 577–583. doi: 10.2147/PPA.S156356.

Ene-Iordache, B. et al. (2016) 'Chronic kidney disease and cardiovascular risk in six regions of the world (ISN-KDDC): A cross-sectional study', The Lancet Global Health, 4(5), pp. e307–e319. doi: 10.1016/S2214-109X(16)00071-1.

Finkelstein, F. O. et al. (2009) 'Health-related quality of life and hemoglobin levels in chronic kidney disease patients', Clinical Journal of the American Society of Nephrology, 4(1), pp. 33–38. doi: 10.2215/CJN.00630208

Ganu, V. J. et al. (2018) 'Depression and quality of life in patients on long term hemodialysis at a nationalhospital in Ghana: a cross-sectional study', Ghana medical journal, 52(1), pp. 22–28. doi: 10.4314/gmj.v52i1.5.

Ghahfarokhi, J. and Abbaszadeh, A. (2012) 'The relationship between quality of life and demographic variables in hemodialysis patients', Journal of Jahrom University of Medical Sciences, 10(3). doi:10.29252/JMJ.10.3.1

Ju, A. and Tong, A. (2017) 'Considerations and challenges in selecting patient-reported outcome measures for clinical trials in

nephrology', *Clinical Journal of the American Society of Nephrology*, 12(11), pp. 1882–1884. doi: 10.2215/CJN.06300617.

KDIGO, W. (2013) 'Clinical practice guideline for the evaluation and management of chronic kidney disease', *Kidney Int Suppl*, 3, p. 4.

Kementrian Kesehatan Republik Indonesia (Kemenkes RI) (2010) 'Hipertensi penyebab kematian nomor tiga', *Pusat Komunikasi Publik, Sekretariat Jenderal Kementerian Kesehatan.*, pp. 2–3.

Kim, K., Kang, G. W. and Woo, J. (2018) 'The quality of life of hemodialysis patients is affected not only by medical but also psychosocial factors: A canonical correlation study', *Journal of Korean Medical Science*, 33(14), pp. 1–11. doi: 10.3346/jkms.2018.33.e111.

Kitagawa, M. *et al.* (2017) 'Shorter dialysis session length was not associated with lower mental health and physical functioning in elderly hemodialysis patients: Results from the Japan Dialysis Outcome and Practice Patterns Study (JDOPPS)', *PLoS ONE*, 12(9), pp. 1–11. doi: 10.1371/journal.pone.0184019.

Lemeshow, S. *et al.* (1990) *Adequacy of Sample Size in Health Studies*, *Technometrics*. doi: 10.1080/00401706.1994.10485796.

Liu, W. J. *et al.* (2006) 'Quality of life of dialysis patients in Malaysia.', *The Medical Journal of Malaysia*, 61(5), pp. 540–546.

Martini, M. (2010) 'Hubungan Tingkat Asupan Protein Dengan Kadar Ureum Dan Kreatinin Darah Pada Penderita Gagal Ginjal Kronik Di Rsud Dr. Moewardi Surakarta'. Universitas Muhammadiyah Surakarta. http://hdl.handle.net/11617/2308

Mills, P. J. *et al.* (2015) 'Depressive symptoms and spiritual wellbeing in asymptomatic heart failure patients', *Journal of Behavioral Medicine*, 38(3), pp. 407–415. doi: 10.1007/s10865-014-9615-0.

Nguyen, N. T. Q. *et al.* (2018) 'Chronic kidney disease, health-related quality of life and their associated economic burden among a nationally representative sample of community dwelling adults in England', *PLoS One*, 13(11), p. e0207960.

Ogston, S. A. *et al.* (1991) 'Adequacy of Sample Size in Health Studies.', *Biometrics*, 47(1), p. 347. doi: 10.2307/2532527.

Shirazian, S. *et al.* (2016) 'Depression in Chronic Kidney Disease and End Stage Renal Disease: Similarities and Differences in Diagnosis, Epidemiology, and Management', *Kidney International Reports*. doi: 10.1016/j.ekir.2016.09.005.

Suwitra, K. (2009) 'Buku ajar ilmu penyakit dalam', *Jakarta: Interna Publishing*.

Tamaura, Y. *et al.* (2018) 'Dietary and Fluid Behaviors Based on Body', *Journal of Renal Nutrition*, pp. 1–14. doi: 10.1053/j.jrn.2018.04.009.

Tome, P. L., Nurhayani and Darmawansyah (2019) 'Analysis of health service quality on patient satisfaction in Malimongan', *Indian Journal of Public Health Research and Development*, 10(7), pp. 1125–1129. doi: 10.5958/0976-5506.2019.01734.0.

Tong, A. *et al.* (2009) 'Patients' Experiences and Perspectives of Living With CKD', 53(4), pp. 689–700. doi: 10.1053/j.ajkd.2008.10.050.

WHO (2012) *WHOQOL - Measuring Quality of Life | The World Health Organization*. Available at: https://www.who.int/tools/whoqol

Zamanian, H. and Kharameh, Z. T. (2015) 'Translation and Psychometric Properties of the Persian Version of the Dialysis Symptom Index in Hemodialysis Patients', 7(1), pp. 1–5. doi: 10.5812/numonthly.23152.