



Relationship between hypertension with quality of life of hemodialysis patients[☆]



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Quality of life;
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Abstract

Objective: This study aimed to examine the association between hypertension, hemoglobin level, and nutrition status with quality of life of hemodialysis patients in Indonesia.

Method: This study designed was an analytic correlational study of 119 Indonesian hemodialysis patients.

Result: The average age was 54.95 years and mean length of hemodialysis of 32.67 months. The mean score for QoL was 62.51, and the mean score of the hemoglobin level was 7.58 g/dl. The results revealed a significant relationship between hypertension and quality of life ($p=0.005$). There was no a significant relationship between quality of life and hemoglobin level ($p=0.336$) and nutrition status ($p=0.099$).

Conclusion: Based on the findings of this study, good controlling of hypertension in hemodialysis patients is important to improve the quality of life.

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Introduction

Chronic Renal Failure (CRF) is a very complex disease which is associated with morbidity and mortality and increase healthcare costs.¹ The mortality rate of patients with CRF in the U.S. in 2014 was 111.2 per 1000 patients, double that

of patients without CRF.¹ The mortality rate increased in accordance with the CRF stage.¹ The prevalence of CRF is estimated to be 8–16% worldwide.² In Indonesia, the number of deaths among CRF patients who received hemodialysis in 2014 was 2221.³

Hemodialysis is a common treatment for end-stage kidney failure patients. More than 2 million people worldwide currently receive dialysis therapy or kidney transplants to survive.² In 2013, the prevalence of chronic renal failure in Indonesia was 0.2%, of whom 60% of patients had hemodialysis.⁴ In 2014, 87.9% of patients, started renal replacement therapy with hemodialysis therapy in America.¹ The long-term dependence of CRF patients on dialysis machines can cause changes in the lives of patients, so it

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is necessary to assess the patient's quality of life (QoL) as an evaluation of therapy.⁵

Anemia has a high prevalence in CRF patients; approximately 80–90% of patients experience anemia with low hemoglobin (Hb) levels.⁶ Based on research conducted by Finkelstein (2009) it was found that an increase in Hb levels from <11 to ≥ 13 g/dl, showed a significant improvement in the quality of life seen in all 4 physical domains using the SF-36 quality of life questionnaire.⁷ Management of anemia using Erythropoietin-Stimulating Agents (ESAs) influences the quality of life. The use of ESA is a routine for CRF patients as an effort to improve anemia and improve quality of life. The influence of anemia on quality of life is still being studied. Drueke et al. (2006) showed a significant increase in HRQOL in patients with high hemoglobin values⁸ while the other study states that there is no difference in HRQOL in patients with low or high hemoglobin values after EPO administration.⁹

Assessment of nutritional status is often overlooked by hemodialysis units, although periodic studies using simple methods can provide great benefits. In patients who undergo hemodialysis routinely and periodically the risk of protein-energy malnutrition is around 18–75%.¹⁰ Based on the National Kidney Foundation (2002), the assessment of nutritional status in patients with chronic renal failure undergoing hemodialysis can be done by integrating clinical parameters, biochemistry, and anthropometry.¹¹ Research conducted by Venderly et al. regarding the administration of low protein diet which measures Body Mass Index (BMI) as a reference for nutritional adequacy obtained a significant relationship between BMI and nutritional status.¹² The other study reported that markers of malnutrition such as BMI affect the physical domain of quality of life of CRF patients undergoing hemodialysis.¹³

Hypertension is one of the clinical manifestations that often accompanies CRF patients who undergo hemodialysis and also a risk factor for the occurrence of cardiovascular disease which can increase mortality in hemodialysis patients.¹¹ Hypertensive patients experience a decrease in quality of life compared to patients with normal tension. Both CRF and hypertension are risk factors for heart disease. The effect of blood pressure on the quality of life has been investigated in hypertension optimal treatment (HOT) which results in low diastolic blood pressure associated with increased quality of life tested using the Psychological General Well-Being index.¹⁴ Another study conducted by the African American Study of Kidney Disease and Hypertension (AASK) showed that there were no differences in quality of life at different blood pressure.¹⁵

Anemia, nutrition status and hypertension are the factors recommended by the National Kidney Foundation (NKF) in assessing the quality of life of CRF patients undergoing HD.¹¹ The purpose of this study was to explore the relationship of QoL with hemoglobin level, nutritional status, and hypertension.

Method

This study was a cross-sectional design with consecutive sampling which consisted of 119 CRF Indonesian patients.

Population and study setting

The study was conducted at hemodialysis unit in East Jakarta, Indonesia in May 2017. The population was composed of the man and woman over to eighteen years old. The inclusion criteria were outpatients who had received hemodialysis for at least 3 months and were able to communicate verbally using Bahasa Indonesia. The exclusion criterion was heart failure.

Variables

There were four variables analyzed in this study: hemoglobin level, blood pressure, nutrition status, and QoL. Hemoglobin levels defined as hemoglobin owned by hemodialysis patients that were examined before undergoing hemodialysis within at least 1 month before the study. Hypertension defined as blood pressure more than 140/90 mmHg that is owned by CRF patients and is also obtained through the patient's medical record. Nutrition status is seen from the Basal Mass Index (BMI) value, the measurement results are stated in less if BMI < 18.5 , normal if BMI is 18.5–22.9 and over if BMI ≥ 23 . QoL defined as the response of hemodialysis patients to disease symptoms and activity ability during. Measurements used a quality of life questionnaire for CRF patients, Kidney Disease Quality of Life (KDQOL), which was translated into Indonesian.

Data collection

The data collection instruments were as follows: respondents characteristic questionnaire and the Kidney Disease Quality of Life Short-Form36 (KDQOL-SF36) questionnaire was used to measuring QoL.¹⁶ This questionnaire consists of 36 questions. Measurement results are expressed with a cumulative score ranging from 0 to 100, a higher value indicating good quality of life.

Data analysis

The data were analyzed using bivariate and multivariate analyses. Normality test of continuous variables was carried using Kolmogorov–Smirnov criterion. The numerical data were presented with mean values, with \pm standard deviations when they followed a normal distribution and median (interquartile range) when they did not follow normal curve. Independent *t*-test was used in order to control the correlation between continuous quantitative variables which followed the normal curve and a qualitative variable with 2 categories. One-way ANOVA was used in order to control the correlation between continuous quantitative variables which followed the normal curve and a qualitative variable with more than 2 categories. Spearman correlation was used in order to control the correlation between two quantitative numerical variables which both continuous variables did not follow the normal curve. A *p*-value lower than 0.05 were considered as statistically significant. To perform the statistical analysis the IBM SPSS Statistic version 13 (SPSS Inc., 2003, Chicago, USA) software was used.

Table 1 Characteristics of respondents and hemodialysis information (N=119).

Characteristic	N	%
Age (M = 54.95, SD = 11.61, Min-Max = 27–81 years)		
Gender		
Female	59	49.6
Male	60	50.4
Education		
Elementary	16	13.4
Junior High	19	16.0
Senior High	49	41.2
University	35	29.4
Occupation		
Unemployed	88	73.6
employed	31	26.4
Frequency of HD		
2 times a week	109	91.6
3 times a week	10	8.4
Hypertension		
Do not have	36	30.3
Have	83	69.7
Time undergoing Hemodialysis (M = 32.67, SD = 32.28, Min-Max = 3–192 months)		
Hemoglobin level (M = 7.58, SD = 1.49, Min-Max = 5.2–13.1mg/dl)		
Nutrition status		
Deficient	20	16.8
Normal	54	45.4
Over	45	37.8
Quality of life (M = 62.51, SD = 1.72, Min-Max = 20.97–96.53)		

Note: M = Mean, SD = Standard deviation, n = frequency, % = percentage.

Ethical aspects

This study was approved by the research ethics committee of the Faculty of Nursing, University of Indonesia and the head of the hemodialysis unit in East Jakarta. The goals and procedures of the study were explained to the respondents, and all the participants provided written informed consent.

Results

The characteristics of the respondents and hemodialysis schedule are presented in Table 1. The majority of the respondents were males, senior high-school graduates,

Table 3 Relationship between nutrition status and quality of life.

Variable	N	Mean	SD	SE	F	p-Value
Nutrition status						
Deficient	20	57.48	16.85	3.77	2.355	0.099
Normal	54	60.99	17.81	2.42		
Over	45	66.56	16.17	2.41		

*significant: <0.05.

Table 4 Relationship between hemoglobin level and quality of life.

Variable	r	p
Hemoglobin level	0.089	0.336

*significant: <0.05.

unemployed, undergoing hemodialysis twice a week, had hypertension, normal nutrition status (Table 1). The mean age of the respondents was 54.95 years, the mean of the duration of hemodialysis was 32.67 months (SD = 32.28), the hemoglobin level was 7.58 g/dl (SD: 1.49 g/dl), and the mean score for QoL was 62.51 (SD = 1.72) (Table 1).

As shown in Table 2, there was a significant relationship between hypertension and QoL ($p = 0.005$), with respondents who had hypertension having a lower mean QoL score than respondent without hypertension. Based on the results of the bivariate analysis in Table 3, it can be concluded that there was no significant relationship between QoL and nutrition status ($p = 0.099$), with QoL score of respondents with deficient nutrition status is 57.48. This score was lower than the QoL score in respondents with normal nutrition status (60.99). As shown in the results of the bivariate analysis in Table 4, there was no significant relationship between QoL and hemoglobin level ($p = 0.336$).

Discussion

The relationship between hypertension and QoL

Hypertension can be caused by various kidney diseases including CRF. Conversely severe hypertension uncontrolled can cause wall changes arteriolar blood vessels and will worsen kidney function. The mechanism the occurrence of hypertension that occurs due to CRF is a decrease in flow blood to the kidneys and reduced Glomerular Filtration Rate (GFR) can increase the activity of the Renin

Table 2 Relationship between hypertension with quality of life.

Variable	N	Mean	SD	SE	t	p-Value
Do not have hypertension	36	69.24	15.13	2.52	2891	0.005*
Have hypertension	83	59.59	17.37	1.91		

* $p < 0.05$.

Angiotensin Aldosterone (RAA) system. Cell the juksta-glomerulus apparatus secretes the renin enzyme which can change angiotensinogen from the liver to angiotensin I. Then angiotensin I am converted to angiotensin II by Angiotensin Converting Enzymes (ACE) angiotensin II can cause vasoconstriction of vessels peripheral blood and cause blood pressure to increase. Other than that angiotensin II also stimulates the adrenal cortex to secrete aldosterone which can increase water and sodium (Na) retention in kidney tubules and cause blood pressure to rise. CRF patients' hypervolemia due to water and Na retention, as a result, increased reabsorption of Na in colonic ducts. This increase possible because of the resistance relative to hormones natriuretic peptide and increased activity of the Na-K-ATPase pump at Collective ducts which can cause increased cardiac output resulting in hypertension. Increased aldosterone activity can aggravate hypervolemia that has occurred.¹⁷

In this study, there was a significant relationship between hypertension and quality of life. This is in line with previous research conducted by Sony et al., who reported there is a relationship between hypertension and low quality of life, in the domain of the physical function.¹⁸ Another study conducted by Lash et al., in 1094 respondents with controlled hypertension showed that there was a relationship between blood pressure and quality of life in aspects of physical and mental health.¹⁹ It is important to do blood pressure monitoring in hemodialysis patients and education for patients to avoid causes that can increase blood pressure. NKF-KDOQI recommends that blood pressure target in patients with CRF is $\leq 130/80$ mmHg which aims to slow the progression of kidney disease and reduces the risk of cardiovascular disease with ACE or *angiotensin receptor blocker*.²⁰

The relationship between nutrition status and quality of life

Adequate food intake in hemodialysis patients can meet the nutritional needs of patients. Improving the quality of life of hemodialysis patients can be achieved by the body's ability to carry out daily activities, where it requires energy sourced from nutrition. Research conducted by Afshar et al.²¹ showed that poor nutritional status could cause symptoms such as malaise, fatigue, headaches, muscle weakness, weight loss, recurrent infections, bone disorders, and slow the healing process of wounds. Where these things can cause a decrease in quality of life in hemodialysis patients. According to Jadeja and Vijay, the diagnosis for energy protein malnutrition in HD patients one of them is BMI < 23. In this study, 74 respondents (62.18%) had a BMI < 23, which means that most patients were malnourished.¹⁰ Hemodialysis patients with BMI > 23 have better survival than patients with a BMI < 23. Based on research conducted in the United States, in HD patients with more BMI until obesity has more nutrient reserves so that it can reduce the risk of premature death.²²

In this study, there was no significant relationship between nutritional status and quality of life. Different from previous research conducted by Parman where there was a significant relationship between nutritional status and

quality of life.²³ Afshar et al., reported that malnutrition could cause sufferers to experience symptoms such as fatigue and malaise, headaches, weight loss, muscle weakness, recurrent infections, slow wound healing, and bone disorders, this can lead to a decrease in QoL in hemodialysis patients.²¹ The absence of a relationship between nutritional status and QoL in this study according to researchers because researchers only use one nutrition status parameter, the body mass index to assess the nutritional status of patients, so the actual nutritional status of the patient cannot be obtained.

The relationship between Hb level and quality of life

Low level of hemoglobin (Hb) in this study can be caused by decreasing patients' appetite due to complaints of nausea and vomiting. The decrease in appetite reduces the intake of folic acid and iron. Besides, kidney failure also causes erythropoietin production to be disrupted. As a result, the production of red blood cells decreases. Another cause of causing a low level of Hb is a hemodialysis process carried out by patients. It can cause red blood cell damage. This is in line with the study conducted by Finkelstein et al., in which it found that the number of respondents with stage 5 chronic renal failure had an average hemoglobin level at 11.4 g/dl.⁷

Anemia occurs because of shortening lifespan of red blood cells or decreasing in erythropoietin production. Besides, patients who are taking long-term hemodialysis will lose blood to the dialyzer. Consequently, patients will experience iron deficiency. Furthermore, wasting vitamin into dialysate causes patients to experience folic acid deficiency.²⁴ Various symptoms due to anemia and a decrease in activity ability cause a decrease in productivity. This is proved by the research conducted by Zadeh et al., which states that anemia causes a decrease in quality of life for hemodialysis patients.²⁵

Hemodialysis therapy only maintains the function of renal excretion, while the non-excretory function, one of which is the production of the hormone erythropoietin, cannot be replaced.²⁶ Based on this mechanism, hemodialysis patients require erythropoietin therapy to maintain the level of blood hemoglobin. Erythropoietin therapy is a *hormonal replacement therapy* that can maintain the process of erythropoiesis in the bone marrow. For the right therapeutic response, this therapy can maintain a hemoglobin level to prevent severe anemia in patients with kidney failure.²⁷ By maintaining a hemoglobin level at 10–12 g/dl, there are several benefits, such as reducing the use of blood transfusion, improving quality of life, increasing exercise capacity, and improving cognitive function.²⁷ Research conducted by Snyder et al. revealed that by maintaining Hb > 11 g/dl, physiological responses to anemia, such as vasodilation, an increase of venous return, enlarging of heart and decrease of cardiac output could be prevented.²⁸ Thus, this condition allows patients to maintain their physical health within the optimal limits in order to maintain their quality of life.

The result of this study showed that there was no significant relationship between hemoglobin level and the

quality of respondents' life ($p=0.273$). The result contradicts with some theories and researches, such as the research conducted by Finkelstein et al. which showed that there is a significant relationship between hemoglobin level and quality of life.⁷ Anemia can cause a decrease in quality of life and increase mortality, this is because anemia can cause fatigue, reduced exercise capacity due to lack of oxygen carried to the body's tissues, impaired immunity, reduced cognitive ability, and can increase the workload of the heart which can cause ventricular hypertrophy left so as to increase the occurrence of complications such as heart failure or ischemic heart disease.²⁹

For conclusion, factors that affect QoL is hypertension. This study suggested that hemodialysis patient with hypertension had a lower score of QoL. Regular follow-ups of hemodialysis patients are needed to diagnose hypertension and related factors and provide efficient and effective nursing interventions to controlled hypertension and improve QoL.

Conflict of interests

The authors declare no conflict of interest.

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