

Factors Affecting the Quality of Life of Patients After Kidney Transplantation: A Cross-Sectional Study

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ABSTRACT

Background: Kidney transplantation is currently the best choice for renal replacement therapy, due to its effect in reducing mortality and improving the quality of life (QoL) of patients with end-stage renal disease. This study aimed to identify factors affecting QoL after kidney transplantation. **Methods:** We conducted a cross sectional study by recruiting patients who had kidney transplantation at Cipto Mangunkusumo General Hospital, Jakarta, Indonesia, from 2018 – 2020. QoL was assessed using the 36-item Short Form Health Survey (SF-36) questionnaire. We evaluated age, sex, body mass index, hemoglobin level, estimated glomerular filtration rate, duration of dialysis before transplantation, history of diabetes, depression, and performance status as factors associated with QoL score. **Results:** We involved 107 subjects in our study. Depression, hemoglobin level, ECOG performance status, and duration of dialysis were factors affecting the physical component score ($R^2=0.21$). Depression and hemoglobin level were factors affecting the mental component score ($R^2=0.34$). Depression, hemoglobin level, and ECOG performance status were factors contributed to the total QoL score ($R^2=0.41$). **Conclusion:** Factors that contributed to QoL status were depression, ECOG performance status, and hemoglobin levels. This study supported the need for assessment of QoL on regular basis, psychological aspects including depression, as well as other factors that can affect QoL such as performance status and hemoglobin level in patients before and after kidney transplantations.

Keywords: Kidney transplantation, mental aspect, physical aspect, quality of life, transplant recipient.

INTRODUCTION

Chronic kidney disease (CKD) is often associated with high morbidity and mortality rate. According to a Global Burden Disease (GBD) study (2019),¹ CKD ranked in the top ten leading causes of death in the age groups

50-74 and ≥ 75 . In the Indonesian Registry 2018, there were around 130,000 patients on hemodialysis therapy, with around 60,000 new patients compared to those in 2017.² Indeed, CKD could reduce the QoL and impose high cost burden for patients due to its progressive

course.^{3,4} Complications that arise from CKD, such as cardiovascular and pulmonary diseases, electrolyte imbalance, and bone diseases, may also limit physical activities and social interactions.^{5,6} Other factors, including age, hemoglobin, albumin, and duration of dialysis, were reported to be significantly associated to the QoL of patients with CKD.⁷ Even adding to the burden, about 5-9% women and 2-3% men with CKD tend to have depression.⁸⁻¹⁰

Kidney transplantation is currently the best choice for renal replacement therapy, especially for patients with end-stage renal disease. It has attracted increasing interest in recent decades as it aims to increase the quality of life (QoL) and reduce disease burden,¹¹⁻¹³ especially by improving physical health and psychosocial functions.^{12,14} A prospective study comparing the QoL status of patients with CKD before and after kidney transplantation using the Kidney Disease Quality of Life Short Form (KDQOL-SF) instrument found that QoL status was improving in 14 out of 19 (74%) dimensions. Meanwhile, by using a 36-item Short Form Health Survey (SF-36) questionnaire, a significant improvement was found in the domains of physical, emotional, and vitality limitations.¹⁴

QoL is currently attracting lots of attention due to its impact on morbidity and mortality rate.^{15,16} In this study we aimed to identify factors affecting QoL in patients after kidney transplantation.

METHODS

This study was a cross-sectional study, reported as part of a large retrospective cohort study entitled "Overview of recipient and donor characteristics of kidney transplantation at Dr. Cipto Mangunkusumo Hospital 2011-2020".¹⁷ Sample size was calculated using a numerical predictive multivariate formula.¹⁸ The research subjects were all patients aged ≥ 18 years with CKD who had kidney transplantation at Cipto Mangunkusumo General Hospital for more than 6 months in the last 3 years. Subjects who had a history of other organ transplantation or had undergone dialysis programs in acute condition and were unable to communicate were excluded from the study.

QoL was assessed using the SF-36 questionnaire,¹⁹ which consisted of 8 domains: physical functioning, physical role, body pain, general health, vitality, social functioning, emotional role, and mental health. Each domain scores 0-100, with higher scores indicating better QoL.

We also recorded factors affecting QoL, namely age, sex, body mass index (BMI), hemoglobin level, eGFR, duration of dialysis before transplantation, history of diabetes, depression (assessed by Hospital Anxiety and Depression Scale (HADS)²⁰), and performance status (assessed by Eastern Cooperative Oncology Group (ECOG) performance status²¹).

We classified the age groups as <60 years old and ≥ 60 years old based on the definition of elderly by the National Health Ministry of Indonesia.²² BMI was classified in accordance to the World Health Organization (WHO) BMI classification for Asian populations.²³ Depression score was classified as normal if the subject scored 0-7, borderline if the subject scored 8-10, and abnormal if the subject scored 11-21. ECOG performance status was classified as 0 if the subject had no limitation in their activity, 1 if the subject could not conduct heavy physical activity, 2 if the subject could do basic daily activity but not moderate physical activity, 3 if the subject could only move from bed to chair, 4 if the subject was bedridden, and 5 if the subject died.

Ethical Clearance

This study has been approved by the Ethical Committee Board, Faculty of Medicine, Universitas Indonesia (KET – 498/UN2.F1 / ETIK/ PPM.00.02/2021).

Statistical Analysis

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) software (version 26.0).²⁴ Descriptive data were reported as mean, median, or frequency. Comparisons of factors were performed using bivariate analysis. All factors with a p -value < 0.25 were included in the multivariate analysis using a linear regression model.

RESULTS

There were 187 patients who had kidney transplantation at Cipto Mangunkusumo General Hospital from January 2018 to December 2020. During the recruitment process, 8 subjects aged <18 years old, 7 subjects were on dialysis, and 65 subjects were not willing to be interviewed. Therefore, a total of 107 subjects were included in our study, are shown in **Figure 1**.

The subjects were mostly male (67.3%). Mean age was 43 ± 12.51 years. Most of our subjects were highly educated (75.7%) and were working (81.3%). The most common comorbidities were obesity and hypertension. Subjects' characteristics are shown in **Table 1**.

Using SF-36 the questionnaire (**Table 2**), we found out that among the 8 domains, emotional role had the highest score. When those 8 domains were classified to either physical or mental component, the physical component summary (PCS) score was higher than the mental component summary (MCS) score (93 vs 79, respectively).

Bivariate analysis showed that hemoglobin level (p=0.023), ECOG performance status (p<0.001), and depression (p=0.004) were significantly related to PCS score, whilst eGFR (p=0.042) and depression (p<0.001) were significantly related to MCS score. Overall, hemoglobin (p=0.014), ECOG performance

Table 1. The characteristics of post-transplant patients enrolled as participants in the study.

Characteristics	N = 107
Age < 60 years, n (%)	96 (89.7)
n Male, n (%)	72 (67.3)
Level of education, n (%)	
High school	26 (24.3)
Bachelor	81 (75.7)
Currently working, n (%)	87 (81.3)
BMI (kg/m ²), mean (SD)	24.68 (4.25)
BMI categories, n (%)	
Underweight (<18.5 kg/m ²)	8 (7.5)
Normal (18.5 – 22.9 kg/m ²)	30 (28.0)
Overweight (23.0 – 24.9 kg/m ²)	20 (18.7)
Obese (>25 kg/m ²)	40 (45.7)
Diabetes mellitus, n (%)	23 (21.5)
Hypertension, n (%)	66 (61.7)
Duration of dialysis (months), median (IQR)	12 (6-24)
Type of dialysis, n (%)	
CAPD	6 (5.6)
HD	95 (88.8)
HD and CAPD	4 (3.7)
No dialysis	2 (1.9)
Hemoglobin level (g/dL), mean (SD)	13.71 (2.31)
eGFR (ml/min/1.73 m ³), mean (SD)	61.55 (18.45)
Total depression score, median (IQR)	4 (3-5)
Depression categories, n (%)	
Normal	99 (92.5)
Borderline	7 (6.5)
Abnormal	1 (0.9)
ECOG performance status, n (%)	
0	62 (57.9)
1	44 (41.1)
2	1 (0.9)

CAPD: continuous ambulatory peritoneal dialysis, ECOG: Eastern Cooperative Oncology Group, eGFR: estimated glomerular

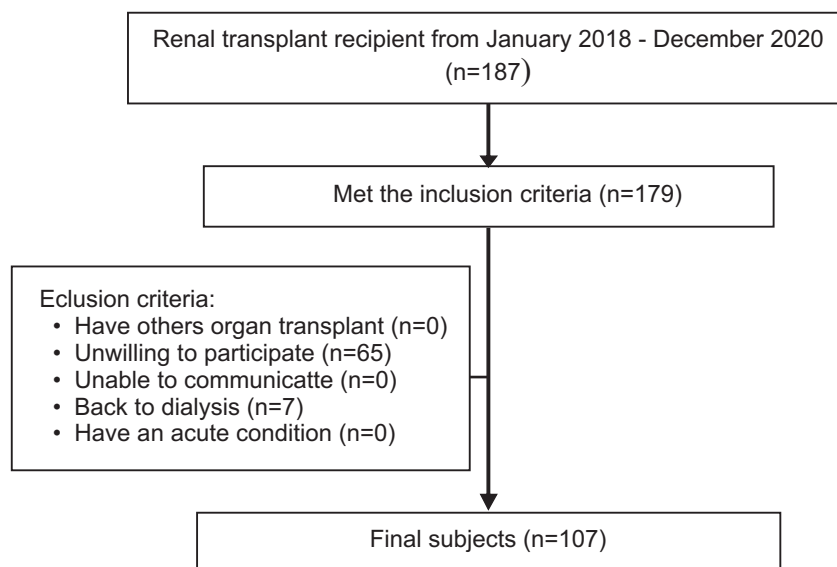


Figure 1. Flowchart for selecting research subjects.

Table 2. The scores of 36-items short form health survey scale inpatients after kidney transplantation.

SF-36	Median (IQR)
Physical function	90 (80-100)
Role of physical	100 (75-100)
Bodily pain	90 (78-100)
General health	74 (62-78)
Vitality	75 (65-85)
Social function	88 (88-100)
Role of emotional	100 (100-100)
Mental health	92 (80-96)
PCS	93 (79-97)
MCS	79 (72-84)
Total SF-36	83 (76-80)

IQR: inter quartil rank, MCS: mental component summary, PCS: physical component summary, SF-36: 36-item Short Form Health Survey

status ($p < 0.001$), and depression ($p = 0.001$) were significantly related to the total SF-36 score.

We continued to multivariate analysis by including hemoglobin level, duration of dialysis, ECOG performance status, and depression to linear regression against PCS score; hemoglobin level and depression against MCS score; and hemoglobin level, ECOG performance status, and depression against the total SF-36 score. Multivariate analysis showed that depression, hemoglobin level, ECOG performance status, and duration of dialysis were factors affecting the PCS score; depression and hemoglobin level were factors affecting the MCS score; while depression, hemoglobin level, and ECOG performance status were factors affecting the total SF-36 score (**Table 3**).

DISCUSSION

We identified factors affecting the QoL, which were depression, higher hemoglobin level, and lower ECOG performance status which had lower QoL.

Baseline characteristics showed that the most of subjects were male aged < 60 years. This finding was similar to that of other studies,^{16,25} probably because most patients eligible for receiving kidney transplant were < 65 years old.²⁶ The main comorbidities were hypertension (61.7%), obesity (45.7%), and diabetes (21.5%). This finding was in accordance with that of other studies,^{27,28} in which hypertension and diabetes are the two most common causes of end-stage renal disease. Previous studies suggest that those comorbidities are associated with greater functional impairment and weakness, affecting QoL after transplantation.²⁸

WHO defines health not merely as the absence of disease, but as a state of physical health, mental well-being, and social well-being.²⁹ Meanwhile, a good QoL is defined as having a good, high QoL by having aspects including physical, psychological, social, family, and environmental aspects.^{30,31} One important thing to pay attention to is that QoL covers a very broad multidimensional concept, which includes how individuals perceive their lives and their expected goals according to their society culture.^{30,31}

We found in this study that the total SF-36 score was generally much higher than that

Table 3. Final regression models for QoL of patients after kidney transplantation.

Dimensions	Variables	β coefficient (95%CI)	p-value
PCS N = 107 R ² = 0.21	Intercept	46.27 (22.44; 70.10)	<0.001
	Duration of dialysis	-0.11 (-0.22; -0.006)	0.038
	Hemoglobin level	1.40 (0.46; 2.36)	0.004
	ECOG PS	-5.90 (-10.39; -1.43)	0.01
	Depression	7.47 (2.81; 12.13)	0.002
MCS N = 107 R ² = 0.34	Intercept	28.11 (14.00; 42.27)	<0.001
	Hemoglobin level	1.04 (0.33; 1.76)	0.005
	Depression	12.07 (8.61; 15.53)	<0.001
Total SF-36 N = 107 R ² = 0.41	Intercept	42.79 (30.45; 55.13)	<0.001
	Hemoglobin level	1.12 (0.51; 1.66)	<0.001
	Depression	9.21 (6.197; 12.23)	<0.001
	ECOG PS	-5.30 (-8.20; -2.39)	<0.001

CI: confidence interval, ECOG PS: Eastern Cooperative Oncology Group performance status, MCS: mental component summary, PCS: physical component summary, SF-36: 36-item Short Form Health Survey

of other studies indicating that our subjects perceived their QoL much better than those in other studies.^{32,33} A recent study reported that Indonesian people's concept of health is mainly based on limitations to perform daily activities.³⁴ Hence, although our subjects had end-stage renal disease and comorbidities, as long as they still could conduct their routine activities, they tended to regard themselves as having good QoL.

According to the physical and mental component, we found that MCS score was much lower than PCS score. This result was different from the study by Gentile et al (2013) which reported that MCS score was higher than PCS score.³² Another study by Griva et al (2011) observed that MCS score was quite similar to PCS score.³³ This showed that our subjects perceived more psychological problems rather than physical ones. Similar to our previous hypothesis, we suspect that this is due to the fact that Indonesian people tend to neglect physical symptoms as long as they can still perform their work.³⁴ However, psychological distress tend to impose a greater force in reducing QoL,³⁵ that even slight psychological symptoms are enough to disturb daily routine.

According to our multivariate analysis, subjects with depression, higher hemoglobin level, lower ECOG performance status, and longer duration of dialysis had lower PCS score. A higher ECOG performance status reflected more limitations in conducting physical activities; therefore, logically, it reflected lower PCS score. Depression, on the other hand, proved that psychological distress might also affect physical capabilities,³⁵ although the hemoglobin level was higher in subjects with lower PCS score. Interestingly, ECOG performance status was not a significant factor affecting MCS score. This denoted that while psychological factor affected the physical performance in our subjects, the opposite did not apply.

Overall, subjects with depression and lower ECOG performance status had lower QoL. This finding was quite similar to the study by Hwang et al (2021) in which perceived health status is the most essential factor affecting QoL.²⁵ However, our study showed that socio-demographic factors, such as age and sex, and clinical

characteristics did not affect QoL as in other studies.¹⁶ This supports the fact that restricted daily routines play a more essential role in the QoL of Indonesian population.³⁴ Meanwhile, in previous studies, the role of mental health is not as powerful.^{25,32} We suspect that this is due to the high social support and awareness toward mental health in the Western-based population studies; whilst Indonesian population tend to neglect this aspect because psychological distress is often regarded as taboo.³⁴ Adherence to psychological assistance has also been reported low.³⁴ Depression in transplant recipients is associated with higher risk of mortality and graft failure.³⁶ There is no explanation about the R² of the variables in this study.

There were several factors which had significant impact on QoL (41%), which remained 59% were explained by another factors that has not studied, such as monthly income, infectious condition, use of immunosuppressant agent, and length of stay in the hospital,^{16,32} However, the end of the result of QoL in this study was good but it will be better if the significant factors get more attention.

CONCLUSION

Depression, hemoglobin level, and ECOG performance status are factors contributing to the QoL of patients receiving kidney transplantation. Based on the results of this study, we recommend the need for assessment of QoL on regular basis, psychological aspects including depression, as well as other factors that can affect QoL such as performance status and hemoglobin level in patients before and after kidney transplantations.

CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

AUTHOR CONTRIBUTION

MB, DS, HS, IR contributed to the development of the study concept and design. MB contributed to acquisition of data and responsible to patient treatment after kidney transplantation. All authors contributed to the article and approved the submitted version.

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