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Handgrip Strength as an Indicator of Quality of Life in Chronic Kidney Disease Patients Undergoing Hemodialysis

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ABSTRACT

Handgrip strength has been associated with various chronic diseases, length of hospitalization, cognitive decline, and even mortality. Hemodialysis administered to patients with chronic kidney disease affects their physical functioning, manifested as fatigue, mobility limitations, and a decline in the ability to perform daily activities. The goal of this study was to look at how hemodialysis patients at Rasyida Kidney Specialty Hospital Medan felt about their quality of life in relation to their grip strength. The research team used a cross-sectional analytical observational design to compile their findings. At Rasyida renal Hospital Medan, 52 patients with chronic renal disease who were receiving hemodialysis were included in the study. All participants had to meet the inclusion and exclusion criteria that were previously established. The research team used a handgrip dynamometer to measure grip strength, and the WHOQOL-BREF to assess quality of life. Processing of the data involved both bivariate and univariate analyses. Findings: There was a statistically significant correlation between age (p = 0.001) and both sex and quality of life (p = 0.003). Nevertheless, neither handgrip strength (p = 0.156), comorbidities (p = 0.618), nor the length of time on hemodialysis (p = 0.746) were significantly associated with quality of life. Conclusion: Physical strength as measured by handgrip, comorbid diabetes mellitus, and length of dialysis treatment do not seem to have a significant impact on quality of life among hemodialysis patients with chronic kidney disease. However, demographic characteristics, such as age and sex, do affect quality of life. Physical capacity as measured by handgrip strength is less important than demographic determinants in determining quality of life, according to these studies. Therefore, interventions aimed at improving quality of life are required, including social support and a care approach that focuses particularly on elderly patient groups rather than solely on physical aspects.

Keywords: handgrip strength, quality of life, chronic kidney disease, hemodialysis, WHOQOL-Bref

INTRODUCTION

The kidneys can be injured by various sources, including tumors, infections, congenital problems, metabolic diseases, and degenerative diseases [1]. Anatomical or functional disorders of the kidneys that cause symptoms for more than three months constitute chronic kidney disease (CKD) [2]. Chronic kidney disease, or CKD, is one of the most urgent public health problems today. Approximately 850 million people worldwide currently suffer from CKD. Although CKD affects about 10% of the global population, the exact number of cases and prevalence varies widely across countries and regions. The already heavy global CKD burden continues to increase, and there is a significant shortage of resources to provide adequate medical care and treatment. In Indonesia, 3.8 out of every 1000 people experience CKD, which is 0.38% of the population [3]. Among the population of North Sumatra, 0.33 percent of individuals aged 15 years and older suffer from CKD. This condition is more common in males, 0.42%, compared to 0.35% in females [1].

The aim of hemodialysis, a form of renal replacement therapy, is to improve quality of life and extend patient survival by addressing the symptoms and signs caused by decreased glomerular filtration rate using specialized equipment (Bina et al., 2008). In Indonesia, 19.33% of patients undergo hemodialysis. North Sumatra has a slightly lower prevalence of hemodialysis patients aged 15 years and older (11.57%). The prevalence among males is 17.08% and among females is 21.98% [1].

A person's quality of life is the extent to which their aspirations, expectations, concerns, cultural background, and values shape their understanding of their place in the world and the meaning of life. Quality of life encompasses various factors, such as an individual's physical and mental health, level of

autonomy, social networks, religious and philosophical beliefs, and relationship with the environment [4].

Due to the long-term cumulative effects of chronic kidney disease, dialysis frequency, and complications, patients undergoing hemodialysis therapy for chronic kidney disease have a low quality of life. This implies a high physical, psychological, economic, and social burden [5]. Physical and mental health problems, functional limitations, and the burden of chronic illness contribute to the poor quality of life among hemodialysis patients [6].

Handgrip strength is associated with several chronic diseases, length of hospital stays, cognitive decline, and mortality. Handgrip strength is one of the diagnostic criteria for sarcopenia [7]. In older adults, handgrip strength is an indicator of overall physical health and can be linked to an increased risk of disease [8]. Handgrip strength has been recognized as an important measure of an individual's health status and can predict clinical outcomes [9].

RESEARCH METHODS

This study aimed to examine the relationship between the independent and dependent variables using a cross-sectional (cross-cut) design, which is classified as an analytic observational study. The study population consisted of patients with chronic kidney disease undergoing hemodialysis at Rasyida Kidney Hospital Medan. After applying the inclusion and exclusion criteria, a sequential sampling technique was used to obtain a total sample of 52 participants.

The inclusion criteria required patients to be 18 years of age or older, willing to participate in the study, and able to communicate effectively in Indonesian or English. The exclusion criteria included patients under the age of 18, those with a history of or currently experiencing sarcopenia, and those unwilling to participate. Data collection was carried out through direct interviews and a review of medical records to verify patients' identities and clinical information. Handgrip strength was measured using a dynamometer, while quality of life was assessed using the WHOQOL-Bref instrument. Data analysis was conducted in two stages. First, univariate analysis was used to describe the distribution of respondent characteristics. Second, bivariate analysis was applied to examine the relationship between the independent and dependent variables according to the study objectives.

RESULT AND DISCUSSION

At Rasyida Kidney Hospital Medan, the quality of life of patients with chronic kidney disease undergoing hemodialysis was evaluated using the WHOQOL-BREF (World Health Organization Quality of Life – Brief). This instrument was used to assess patients' perceptions of their overall quality of life across four main domains: physical, psychological, social, and environmental. The evaluation aimed to identify factors that influence the patients' quality of life so that the resulting information can serve as a basis for designing more holistic, effective, and patient-centered interventions and healthcare services for individuals undergoing hemodialysis. The distribution of patients is presented in the following table.

Table 1. Distribution of Patients by Quality of Life Category

Quality of Life	Amount	Percentage (%)
Excellent	9	17.3
Good	35	67.3
Fair	8	15.4
Total	52	100.0

Based on the table above, the majority of hemodialysis patients at Rasyida Kidney Hospital Medan rated their quality of life in the "Good" category, totaling 35 individuals (67.3%). Meanwhile, 9 patients (17.3%) rated their quality of life as "Very Good," and 8 patients (15.4%) were in the "Fair" category. Overall, out of the 52 patients assessed, almost all placed their quality of life within the fair to very good categories, indicating that most patients have a positive perception of their quality of life despite undergoing hemodialysis.

Table 2. Distribution of Patients by Gender Category

Gender	Amount	Percentage (%)
Male	22	42.3
Female	30	57.7
Total	52	100.0

Based on the table above, out of a total of 52 hemodialysis patients at Rasyida Kidney Hospital Medan, 30 patients (57.7%) were female and 22 patients (42.3%) were male. This indicates that the number of female patients was slightly higher than that of male patients in this study population.

Table 3. Distribution of Patients by Age Category

Age	Amount	Percentage (%)
Adults (18–59 Years)	32	61.5
Older Adults (≥60 Years)	20	38.5
Total	52	100.0

Table 3 shows that of the total number of patients, 32 (or 61.5% of the total) are adults (18–59

years), while 20 (or 38.5% of the total) fall into the older adult age group (≥ 60 years).

Table 4. Distribution of Patients by Duration of Hemodialysis

Duration of Hemodialysis	Amount	Percentage (%)
≤ 3 Months	2	3.8
4 Months – 2 Years	20	38.5
> 2 Years	30	57.7
Total	52	100.0

Table 4 shows that thirty patients (57.7% of the total) had undergone hemodialysis treatment for more than two years. Two patients (3.8%) had undergone hemodialysis for three months or less, while the remaining twenty patients (38.5%) had been on hemodialysis for a duration ranging from four months to two years.

Table 5. Distribution of Patients by Comorbidity Category

Comorbidity	Amount	Percentage (%)
Diabetes Mellitus	3	5.8
Without Diabetes Mellitus	49	94.2
Total	52	100.0

The majority of patients did not have Diabetes Mellitus (49 out of 52, or 94.2% of the total), while 3 patients (5.8%) were diagnosed with the condition.

Table 6. Distribution of Patients by Handgrip Strength (HGS) Category

HGS	Amount	Percentage (%)
Low	44	84.6.3
High	8	15.4
Total	52	100.0

Table 6 shows that most patients had low HGS (44 or 84.6%), while a smaller number had high HGS (8 or 15.4%).

Table 7. Relationship Between HGS and Patients' Quality of Life

HGS	Quality of Life (Number of Patients)				Exact Sig. (2-sided)
	Very Good	Good	Enough	Total	
Low	6 (11.5)	30 (57.7%)	8 (15.4%)	44 (84.6%)	0.156
High	3 (5.7%)	5 (9.6%)	0	8 (15.4%)	
Total	9 (17.2%)	35 (67.3%)	8 (15.4%)	52 (100%)	

Based on the table above, the relationship between HGS (Handgrip Strength) and the quality of life of hemodialysis patients at Rasyida Kidney Hospital Medan shows a certain pattern, although it is not statistically significant (p = 0.156). Among the 44 patients with low HGS, the majority rated their quality of life as Good (30 patients or 57.7%), followed by Fair (8 patients or 15.4%) and Very Good (6 patients or 11.5%). Meanwhile, among the 8 patients with high HGS, most rated their quality of life as Good (5 patients or 9.6%) and Very Good (3 patients or 5.7%), with no patients rating their quality of life as Fair. Overall, the data indicate that patients with high HGS tend to perceive their quality of life more positively than those with low HGS; however, this difference did not reach statistical significance.

Table 8. Relationship Between Gender and Patients' Quality of Life

Gender	Quality of Life (Number of Patients)				Exact Sig. (2-sided)
	Very Good	Good	Enough	Total	
Male	4 (7.7%)	15 (28.8%)	3 (5.8%)	22 (42.3%)	0.003
Female	5 (9.6%)	20 (38.5%)	5 (9.6%)	30 (57.7%)	
Total	9 (17.2%)	35 (67.3%)	8 (15.4%)	52 (100%)	

Based on the table, there is a statistically significant relationship between gender and the quality of life of hemodialysis patients at Rasyida Kidney Hospital Medan (p = 0.003). Among the 22 male patients, the majority rated their quality of life as Good (15 patients or 28.8%), followed by Very Good (4 patients or 7.7%) and Fair (3 patients or 5.8%). Meanwhile, among the 30 female patients, most also rated their quality of life as Good (20 patients or 38.5%), followed by Very Good (5 patients or 9.6%) and Fair (5 patients or 9.6%). These results indicate that female patients tend to have a slightly higher quality of life compared to male patients, and this difference is statistically significant.

Table 9. Relationship Between Age and Patients' Quality of Life

Age	Quality of Life (Number of Patients)				Exact Sig. (2-sided)
	Very Good	Good	Enough	Total	
Adult	6 (11.5%)	22 (42.3%)	4 (7.7%)	32 (61.5%)	0.001
Elderly	3 (5.8%)	13 (25.0%)	4 (7.7%)	20 (38.5%)	
Total	9 (17.2%)	35 (67.3%)	8 (15.4%)	52 (100%)	

Based on the table, there is a statistically significant relationship between age and quality of life in hemodialysis patients at Rasyida Kidney Hospital, Medan (p = 0.001). In the adult group (32 patients), the majority rated their quality of life as Good (22 patients or 42.3%), followed by Very Good (6 patients or 11.5%), and Fair (4 patients or 7.7%). Meanwhile, in the elderly group (20 patients), the majority also rated their quality of life as Good (13 patients or 25.0%), followed by Very Good (3 patients or 5.8%), and Fair (4 patients or 7.7%). These results indicate that adult patients tend to have a better quality of life than elderly patients, and this difference is statistically significant.

Table 10. Relationship Between Comorbidities and Patient Quality of Life

Comorbidities	Quality of Life (Number of Patients)				Exact Sig. (2-sided)
	Very Good	Good	Enough	Total	
DM	1 (1.9%)	2 (3.8%)	0	3 (5.7%)	0.618
Without DM	8 (15.4%)	33 (63.5%)	8 (15.4%)	49 (94.3%)	
Total	9 (17.2%)	35 (67.3%)	8 (15.4%)	52 (100%)	

Based on the table, there was no significant relationship between comorbid diabetes mellitus (DM) and the quality of life of hemodialysis patients (p = 0.618). Of the three patients with DM, most had a quality of life in the good category (2 patients or 3.8%), and one patient (1.9%) was in the Very Good category, with none in the Fair category. Meanwhile, in the group of patients without DM (49 patients), the majority rated their quality of life as Good (33 patients or 63.5%), followed by Very Good (8 patients or 15.4%) and Fair (8 patients or 15.4%). These results indicate that the presence of comorbid DM does not significantly impact the quality of life of patients undergoing hemodialysis.

There was no correlation between handgrip strength and quality of life (QoL), according to the study. Low grip strength is not a life-threatening condition for most people. According to interviews, patients' lack of exercise in strengthening their grip muscles is the root cause of their weak grip strength. According to [10], chronic kidney disease (CKD) patients undergoing long-term hemodialysis therapy may experience a natural decline in functional capacity, which can be caused by frailty. Good coping skills, family support, and adequate access to healthcare services explain why most patients exhibit low HGS and a relatively good quality of life. Due to the significant role played by psychological, social, and environmental factors in the development of perceived quality of life in CKD patients, decreased physical functional capacity is not always associated with a decreased perceived quality of life [11]. Consistent with previous research, this study found no correlation between handgrip strength and quality of life [12]. According to [13], additional factors that may influence quality of life include adaptation, patients' subjective impressions, and the social support they receive. Based on their research, [14] demonstrated varying results, particularly the correlation between quality of life and handgrip strength. Handgrip weakness is an indicator of weak muscles and poor nutrition, which in turn causes physical weakness and limits a person's ability to be active, which in turn reduces a person's quality of life.

There is a statistically significant correlation between gender and life satisfaction. The survey found that women were mostly satisfied with their lives. Women had a higher quality of life, particularly in terms of emotional health and physical function, which made them better suited to adapting to hemodialysis [15]. Consistent with these findings, [16] found that after hemodialysis treatment, women were more likely to seek healthcare services and were more adherent, both of which improved their quality of life. Indirectly contributing to a better quality of life, women typically have a larger social support network and more effective psychological coping mechanisms than men. Patients undergoing long-term dialysis treatment report different perceptions of quality of life due to psychosocial variables, including gender. When it comes to adapting to chronic illness, women typically fare better because they have more access to formal healthcare services and social support networks [17]. On the other hand, male patients are more likely to engage in unhealthy habits such as smoking and drinking, which can exacerbate health problems [18], [19], and an over-reliance on male-oriented psychotherapy can lead to lower mortality rates [20]. Although some studies have shown a correlation between gender and patient quality of life, others have found no such association [11], [12], [21]. This suggests that cultural and social factors, in addition to gender, play a role in determining quality of life.

There is a strong correlation between patient age and their quality of life. The majority of adult patients in this study reported a satisfactory quality of life. According to [18], older adults have a superior quality of life due to optimal physical function, a low risk of comorbidities, and greater adaptation to hemodialysis therapy. In contrast, older adults often experience a lower quality of life due to issues such as impaired physical function, more comorbidities, difficulty adjusting to hemodialysis treatment, and reduced capacity to perform daily tasks [21], [22], [23]. Reduced social connections and increased dependence on family can influence psychological factors, which in turn affect quality of life assessments. Medical variables are not the only factors influencing decreased quality of life in older adults. Social and emotional factors also play a role [24]. Patients aged 55 to 64 years have a high quality of life, according to another study. Increasing patient tolerance towards

their medical problems is the reason behind this trend [16].

This study found no correlation between patient quality of life and the presence of comorbid conditions related to diabetes mellitus (DM). Although diabetes mellitus (DM) is commonly cited as a major risk factor for developing end-stage renal disease (ED) in the general epidemiology of chronic kidney disease, the proportion of respondents in this study with DM was relatively low at 5.8%. The most common cause of end-stage renal disease (ED) in the United States is diabetes, which, according to [25], affects over 40% of dialysis patients. It is possible that demographic and etiological factors specific to the local population contribute to the low prevalence of DM in this group. Other, more important variables, such as the length of time patients spend on hemodialysis, the strength of their social support system, and their education level, are known to have a greater impact on patient quality of life than comorbid diabetes [12]. Clinically, DM increases the risk of metabolic problems and dietary restrictions, which can impact quality of life [23]. However, this risk was not statistically significant.

Patients' quality of life was not related to the duration of their hemodialysis treatment. Patients undergoing hemodialysis for more than two years typically reported a high standard of living. Patients' quality of life was not related to the length of time they spent on hemodialysis [21]. However, they found that patients undergoing treatment for longer periods tended to adapt, leading to better physical and mental health. [18] found that patients' quality of life was low in the early phase of hemodialysis as they adapted to dietary restrictions, treatment routines, and lifestyle modifications. Conversely, [23] found that patients' quality of life declined with the length of hemodialysis treatment. This was due to the cumulative effects of treatment over time, including fatigue, emotional stress, and social isolation.

CONCLUSION

This study shows that in patients with chronic kidney disease undergoing hemodialysis, age and gender are factors that influence quality of life, while handgrip strength (HGS) was not shown to be a significant indicator. Furthermore, comorbid diabetes mellitus and duration of hemodialysis also showed no association with quality of life.

These findings indicate that demographic factors contribute more significantly to quality of life than physical parameters such as HGS. Therefore, efforts to improve quality of life should emphasize a needs-based approach for age groups, increased social support, and more patient-centered services. Future research should assess other variables such as dietary patterns, physical activity, psychological well-being, and social support, as well as utilize a larger sample size. Longitudinal studies are also needed to understand changes in quality of life over time and the factors that influence them.

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