Prevalence and Related Psychological Aspects of Frailty in Hemodialysis Patients

Dhea Natashia [1], Diana Irawati [1], Nyimas Heny Purwati [1], Upik Rahmi [2], Asri Narawangsa [3],

Roswati Handayani [3], Ronny Heriadi [3]

[1] *Fakultas Ilmu Keperawatan, Universitas Muhammadiyah Jakarta*
[2] *Fakultas Ilmu Keperawatan, Universitas Pendidikan Indonesia*
[3] *Unit Hemodialysis, Rumah Sakit Islam Jakarta Cempaka Putih*

INFORMASI	ABSTRACT
Korespondensi: natashia_dhea@umj.ac.id **Keywords:** Frailty, Psychological Aspects, Depression, Anxiety, Hemodialysis, Chronic Kidney Disease	*Objective:* This study aimed to ascertain the prevalence of frailty and associated psychological factors among hemodialysis patients. *Methods:* A cross-sectional study was conducted employing a convenience sample of CKD patients undergoing hemodialysis at a Jakarta hospital. A total of 151 participants were included in this study. Instruments included demographic and clinical characteristics. The Tilburg Frailty Indicator (TFI) assessed frailty, while the Self-Rating Depression Scale (SDS) and Self-Rating Anxiety Scale (SAS) evaluated psychological status. Data analysis encompassed univariate descriptive statistics, t-test, and Pearson correlation to identify the relationship among variables. A multivariate regression analysis studied frailty index associations with demographic, clinical, and psychological factors. *Results:* Results: This study indicates that the prevalence of frailty, assessed by the Tilburg Frailty Index (TFI), is 53.6%, primarily evident in the physical aspect. Positive correlations are found between frailty and age, unemployment, higher CCI, and a history of diabetes. Anxiety is correlated with female gender and a history of diabetes, while depression correlates with age, female gender, higher CCI, and a history of diabetes. *Conclusion:* The study highlights the complexity of frailty among hemodialysis patients. Significant correlations emerged, associating frailty with factors such as age, unemployment, comorbidity, and a history of diabetes. Frailty was linked to psychological aspects, specifically anxiety and depression. Tailored interventions are recommended, focusing on early identification, psychological support, and a holistic care approach. Educational initiatives for healthcare providers are crucial to enhance awareness and improve the quality of care for this vulnerable population, leading to better health outcomes.

INTRODUCTION

Frailty is a multifaceted condition with adverse health consequences, particularly impacting vulnerable populations such as the elderly, surgical patients, and those with chronic diseases, including chronic kidney disease (CKD) (Fried et al., 2001; Hoogendijk et al., 2019). While the link between CKD and frailty remains not fully elucidated (Nixon et al., 2018), a limited number of studies indicate an increased prevalence of frailty in CKD patients (Lee et al., 2017; Lv & Zhang, 2019; Zazzara et al., 2019). Factors such as metabolic acidosis, chronic inflammation, and a sedentary lifestyle may contribute to frailty in individuals with chronic renal disease (Ballew et al., 2017).

Existing research suggests that the connection between CKD and frailty may stem from elevated levels of pro-inflammatory cytokines, specifically IL-6 and TNF-alpha, in CKD patients (Shlipak et al, 2003). Additionally, uremic toxins in CKD patients can result in decreased appetite and anorexia, impacting appetite regulation and cognitive function in the hypothalamus. Conversely, frailty, characterized by weakness and shrinkage, can exacerbate renal function decline by accelerating caloric and protein consumption (Nixon et al., 2018; Carrero et al., 2013).

The prevalence of frailty among patients with chronic kidney disease (CKD) exceeds that observed in the general elderly population and tends to worsen as renal function declines (Delgado et al., 2015; Clegg et al., 2013). This heightened vulnerability to frailty poses significant risks for individuals undergoing hemodialysis, potentially exacerbating the progression of CKD, increasing the likelihood of hospitalization, and raising mortality rates. However, evaluating frailty among this patient population often presents challenges as assessments tend to focus on isolated aspects, lacking comprehensive tools that encompass its physical, psychological, and social dimensions. Addressing this gap becomes imperative, highlighting the need for more inclusive evaluation methods. Multidimensional tools, such as the Tilburg Frailty Index (TFI), offer a promising approach by enabling a more comprehensive assessment that considers various domains including comorbidity, functional limitations, cognitive function, mood, and social support (Gobbens et al., 2017). While prior studies indicate a 67% frailty prevalence in end-stage renal disease patients (Kojima., 2017), limited information exists on frailty among CKD patients in Indonesia. Understanding and improving frailty could potentially mitigate complications, hospitalizations, and mortality in CKD patients, especially those undergoing hemodialysis. Therefore, exploring the psychological aspects among CKD patients undergoing hemodialysis is essential.

Patients with chronic renal failure often experience psychological disturbances, particularly those on hemodialysis due to the unpredictable nature of their condition and dependence on the dialysis machine (Ravaghi et al., 2017). Depression is a prevalent psychosocial disorder among hemodialysis patients, with anxiety, though less understood, also negatively impacting health and quality of life (Kimmel & Cukor, 2019). The association between psychological factors and frailty in CKD patients undergoing hemodialysis is an emerging area of interest.

Research suggests a potential link between anxiety and frailty, with anxiety correlated with physiological changes, including elevated cortisol levels and inflammation, possibly hastening frailty emergence (Kivimäki et al., 2023). Depression is another explored psychological factor, affecting 20-60% of hemodialysis patients and increasing the risk of physical limitations, weakness, and fatigue—symptoms associated with frailty (Santos et al, 2022).

The evolving body of evidence underlines the importance of addressing not only the physical but also the psychological well-being of CKD patients. The relationship between psychological factors and frailty emphasizes the need for a comprehensive approach in evaluating and treating CKD patients, potentially improving their quality of life and reducing the risk of adverse health outcomes.

METHODS

This project was a one-year study aimed at evaluating the prevalence of frailty and its associated psychological factors among patients undergoing hemodialysis.

Design: This study employed a cross-sectional design to assess the prevalence of frailty and its associated psychological factors among patients undergoing hemodialysis.

Participants

The research was conducted at a hemodialysis unit in central Jakarta. Participants were recruited based on predetermined inclusion criteria: they were required to be patients undergoing routine hemodialysis (HD) two or three times a week for a minimum of 3 months, aged over 20 years, literate, and capable of verbal communication. Patients with mental disorders were excluded from the study. In total, 151 patients participated in this study. G Power analysis was conducted to identify the power with F test, Regression Analysis, Medium Effect size 0.15, with 8 predictors, revealing that a sample size of 151 has a power of 0.89. This indicates a high likelihood of detecting

statistically significant effects or relationships in the study, bolstering the confidence in the reliability of the findings.

Instruments:

A study questionnaire was administered by researchers during the HD period. The research instrument consisted of four parts, including Demographic and Clinical characteristics, Tilburg Frailty Indicator (TFI), Charlson Comorbidity Index, Self-Rating Depression Scale, and Self-Rating Anxiety Scale.

The original TFI Frailty Indicator, developed by Gobbens et al. (2010), consisted of fifteen self-reported questions covering three domains. The physical domain included eight items, the psychological domain included four items, and three items were in the social domain. Participants with an overall score of 5 or higher were included in the frailty group. (The cut-off scores for physical, psychological, and social frailties were 3, 2, and 3, respectively).

The Self-Rating Depression Scale (SDS) and the Self-Rating Anxiety Scale (SAS) were used to evaluate the psychological status of the respondents. SDS is a short-self-administered survey with 20 items. Scores range from 25-100 and are classified as Normal Range (25-49), Mild Depressed (50-59), Moderately Depressed (60-69), and Severely Depressed (70 and above). SAS consists of 20 questions on a Likert scale from 1 (never) to 4 (always). The threshold values for SAS were 20, with 20-44 indicating mild anxiety, 45-59 moderate anxiety, and ≥ 70 severe anxiety.

Data Collection

After obtaining IRB approval from Faculty of Nursing, Universitas Muhammadiyah Jakarta, invitations to join the study were sent to directors of education and practice departments of Jakarta Islamic Hospital. After receiving permission from hospital directors, the researcher visited the head nurses in the HD wards to identify potential subjects meeting the inclusion criteria. The head nurses then assisted in gathering potential respondents. The data collection process was conducted by a research assistant. Patients were given explanations regarding the research purpose and procedure, as well as their rights and confidentiality.

Data Analysis

All data analysis was conducted using SPSS for Windows. Univariate descriptive analysis was utilized for demographic data, disease-related factors, Tilburg Frailty Indicators, Self-Rating Depression Scale (SDS), and the Self-Rating Anxiety Scale (SAS). A test of normality was then performed to assess the distribution of the data. Independent t-tests and Pearson correlation were employed to analyze the relationship among demographic factors, disease characteristics, frailty, anxiety, and depression. Subsequently, multivariate regression was carried out to identify predictors associated with demographic, disease characteristics, and psychological factors in relation to frailty.

RESULTS

Demographic and Disease Characteristics of Respondent

The participants, on average, are 53 years old with a standard deviation of 12.95. Their hemodialysis duration averages 28 months, with a standard deviation of 32.57. Over half are male (54.3%), a significant majority are unemployed (72.2%), and a considerable portion has hypertension (62.3%). The average Charlson Comorbidity Index (CCI) score is approximately 3.74, indicating a moderate level of comorbidity.

In the context of frailty determinants, the descriptive statistics reveal significant insights into various aspects of participants' lives. A majority of participants, accounting for 58.9%, perceive themselves as leading a healthy life, indicating a positive self-perception regarding their overall health status. Additionally, a majority of participants, comprising 90.7%, express satisfaction with their home lives, suggesting a conducive and supportive environment.

Furthermore, the average emotional life experiences and stressors score of 0.97, with a standard deviation of 0.86, indicates that participants encountered relatively few unpleasant experiences. This suggests that the emotional well-being of participants, as reflected by their stressors score, tends to be relatively stable.

However, a notable finding is that only 38.4% (n = 58) of participants are aware that they have more than one disease. This indicates a potential lack of awareness regarding their health conditions, which could have implications for their overall health management and risk of developing frailty.

Prevalence of Frailty and its Dimension

Frailty levels were assessed using the Tilburg Frailty Index (TFI), where higher scores (0 – 15) indicate greater frailty. Table 1 reveals an average TFI score of 5.50 (3.17). Beyond the cutoff point, the prevalence of frailty in hemodialysis patients is 53.6% (n=81). The mean frailty values across the three domains show that the physical aspect has the highest score, followed by psychological and social aspects. These findings suggest that physical frailty was the most prominent dimension among hemodialysis patients, followed by

psychological and social frailty dimensions.

Tabel 1. *Frailty and Dimension of Frailty among Patients undergoing Hemodialysis (n=151)*

Variables	n	%	Mean	SD	Min – Max
Frailty			5.50	3.17	1 – 12
Non-Frail	70	46.4			
Frail	81	53.6			
Dimension of Frailty:					
Physical			3.30	2.34	0 – 8
Psychological			1.19	1.20	0 – 4
Social			1.00	0.32	0 – 2

Anxiety and Depression Status among patients undergoing Hemodialysis

Based on the data provided in Table 2, which illustrates the depression and anxiety status among patients undergoing hemodialysis (HD), it's evident that the emotional well-being of this population varies significantly. The average anxiety level among HD patients is recorded at 32.11 (SD = 8.01, range = 20 - 62), indicating a diverse range of anxiety experiences within this cohort. A vast majority of patients (92.7%) are classified as experiencing "Low Level" anxiety, suggesting mild anxiety symptoms, while a smaller proportion (6.6%) fall into the category of "Moderate Level" anxiety. Interestingly, only a small number of patients (0.7%) exhibit "Higher Level" anxiety, signifying severe anxiety symptoms.

The mean depression score for HD patients is noted at 38.79 (SD = 9.27, range = 20 - 70). Here, the majority of patients (88.1%) demonstrate "Normal" levels of depression, indicating the absence of clinically significant depressive symptoms. However, a notable percentage of patients (9.9%) are categorized as experiencing "Mild Depression," reflecting mild depressive symptoms. Additionally, a smaller portion of patients (1.3%) exhibit "Moderate" depression, while a very small percentage (0.7%) are classified as experiencing "Severe" depression. These categorical breakdowns offer detailed insights into the prevalence and severity of anxiety and depression among HD patients. While the majority experience mild emotional distress, a subset does exhibit moderate to severe symptoms, highlighting the need for tailored interventions to address their mental health needs effectively.

Tabel 2. *Depression and Anxiety Status among patients undergoing HD (n=151)*

Variables	n	%	Mean	SD	Min – Max
Anxiety			32.11	8.01	20 – 62
Low Level	140	92.7			
Moderate Level	10	6.6			
Higher Level	1	0.7			
Depression			38.79	9.27	20 – 70
Normal	133	88.1			
Mild Depression	15	9.9			
Moderate	2	1.3			
Severe	1	0.7			

Relationship between Demographic and Disease Characteristic, Psychological Factors and Frailty

The results, as presented in Table 3 and Table 4, illustrate the relationship between demographic and disease characteristics, psychological factors, and frailty among participants. Gender-related differences in anxiety and depression levels were observed, with female respondents exhibiting significantly higher levels compared to males. Specifically, the t-values for anxiety and depression were -3.060 (p=0.003) and -3.109 (p=0.002), respectively, emphasizing the importance of considering gender-specific factors in understanding the psychological well-being of individuals undergoing hemodialysis.

Employment status emerged as a significant factor affecting frailty levels, with unemployed individuals demonstrating higher levels compared to their employed counterparts. The t-value for this comparison was -2.094 (p=0.039), underscoring the potential impact of employment status on frailty manifestation and the importance of socio-economic factors in addressing frailty.

The presence of a history of diabetes was found to influence both frailty anxiety, and depression levels significantly. Respondents with a history of diabetes exhibited higher levels of frailty (t=3.342, p=0.001), anxiety (t=2.041, p=0.045), and depression (t=2.376, p=0.019) suggesting a potential connection between diabetes and adverse health outcomes, necessitating targeted interventions and management strategies. Moreover, respondents with more than one history disease were found positively correlated with their frailty (t=3.563, p=0.0001) and anxiety (t=3.208, p=0.002) levels.

Respondents' performance of a healthy lifestyle led by positive perception was found to be correlated with frailty (t=-4.425, p=0.0001), anxiety (t=-2.763, p=0.006), and depression (t=-3.517, p=0.001) levels. The assumption of having a healthy lifestyle affected

individual disease management, which impacted frailty and psychological outcomes.

Table 3. *The Correlation between Gender, Occupation, Diabetes Mellitus, Hypertension, and their Association with Frailty and Psychological Status among Participants (n=151)*

Characteristics	Categories	Frailty		Anxiety		Depression	
		Mean (SD)	t - value	Mean (SD)	t - value	Mean (SD)	t - value
Gender	Male	30.29 (6.78)	-1.692	30.29 (0.74)	-3.060**	36.70 (9.07)	-3.109**
	Female	34.28 (8.43)		34.28 (1.06)		41.28 (8.95)	
Job	Employed	4.47 (2.49)	-2.094*	31.48 (7.20)	-0.604	38.24 (7.73)	-0.451
	Unemployed	5.79 (3.37)		32.36 (8.32)		39.00 (9.83)	
Diabetes Mellitus	Yes	6.76 (3.32)	3.342**	34.37 (9.76)	2.041*	41.46 (9.83)	2.376*
	No	4.94 (2.96)		31.12 (6.94)		37.62 (8.81)	
Hypertension	Yes	5.47 (3.18)	-0.219	32.32 (8.04)	0.575	38.71 (9.60)	-0.195
	No	5.60 (3.21)		31.43 (8.00)		39.06 (8.23)	
Performance of Healthy Lifestyle	Yes	4.60 (3.81)	-4.425***	30.64 (7.26)	-2.763**	36.65 (8.34)	-3.517**
	No	6.79 (3.26)		34.23 (8.61)		41.85 (9.74)	
Have > 1 Disease	Yes	6.62 (3.19)	3.563***	34.90 (9.44)	3.208**	40.34 (10.41)	1.638
	No	4.80 (2.98)		30.38 (6.44)		37.82 (8.40)	
Satisfied With Home Living Environment	Yes	5.46 (3.19)	-0.444	31.88 (8.00)	-1.136	38.82 (9.32)	0.152
	No	5.86 (3.21)		34.43 (8.06)		38.43 (9.16)	

*Note: *p < 0.05 **p < 0.01 ***p < 0.001*

The analysis revealed a positive correlation between age and frailty (r=0.303, p= 0.0001), suggesting that as individuals age, their susceptibility to frailty tends to increase. This finding underscores a potential link between the aging process and frailty within the studied population.

The Charlson Comorbidity Index (CCI) also played a role in determining depression and frailty levels, as higher CCI scores were associated with increased depression (r=0.296, p=0.0001) and frailty (r=0.276, p=0.003). This implies that individuals with a greater number of comorbid conditions tend to experience higher levels of depression and frailty, emphasizing the importance of comprehensive health assessments.

In addition, the study identified that increasing age was associated with higher levels of depression (r=0.259, p=

0.001), indicating a potential link between the aging process and depressive symptoms. This underscores the need for tailored mental health interventions for elderly individuals receiving hemodialysis.

Respondents' responses to emotional events were associated with anxiety (r=0.307, p=0.0001), depression (r=0.223, p=0.006), and frailty (r=0.330, p=0.0001) levels. Life experiences, especially emotional moments, trigger individuals' stress, which has an effect on physiology and psychological well-being.

Table 4. *Correlation among Age, Duration of HD, Comorbidities, Emotional Life Experiences and Stressor, Frailty, Anxiety, and Depression (n=151)*

	Age	Duration of HD	CCI	Life Stressor	Anxiety	Depression	Frailty
Age	-	0.036	0.626***	0.069	0.114	0.259**	0.303***
Length of HD	0.036	-	-0.105	-0.294***	-0.082	-0.058	-0.117
CCI	0.626***	-0.105	-	0.115	0.102	0.296***	0.276**
Life Stressor	0.069	-0.294***	0.115	-	0.307***	0.223**	0.330***
Anxiety	0.114	-0.082	0.102	0.307***	-	0.697***	0.688***
Depression	0.259**	-0.058	0.296***	0.223**	0.697***	-	0.621***
Frailty	0.303***	-0.117	0.276**	0.330***	0.688***	0.621***	-

Note: *p < 0.05 **p < 0.01 ***p < 0.001

The results also indicate a correlation between anxiety levels and an escalation in the respondents' depression levels (r=0.697, p=0.0001). Additionally, both anxiety levels (r=0.688, p=0.0001) and depression levels (r=0.621, p=0.0001) are associated with the respondents' frailty levels.

These findings suggest a strong positive relationship between anxiety and depression among the respondents. The robust correlation coefficient of 0.697 signifies a substantial association, indicating that individuals experiencing heightened anxiety are more likely to exhibit elevated depressive symptoms. This underlines the interconnected nature of these psychological factors, emphasizing the need for comprehensive mental health interventions that address both anxiety and depression in individuals undergoing hemodialysis.

Moreover, the associations between anxiety, depression, and frailty levels highlight the complexity of their interrelationships. The correlation coefficients of 0.688 and 0.621 suggest significant connections, signifying that individuals with higher anxiety and depression levels are more prone to experiencing increased frailty. This underscores the importance of considering the psychological well-being of hemodialysis patients in tandem with their frailty status, as these factors may mutually influence and exacerbate each other. The findings underscore the

need for holistic care approaches that address the psychological and physical aspects of frailty among individuals receiving hemodialysis.

Multivariate Regression Analysis of Predictors Associated with Frailty

The multivariate regression analysis was conducted to identify predictors associated with frailty among the study participants (n=151). The model included demographic factors, disease characteristics, and psychological factors such as anxiety and depression. The analysis revealed several significant findings (Table 5).

Age was found to have a significant positive association with frailty (B = 0.041, β = 0.165, p < 0.05), indicating that frailty increases with age. This suggests that as individuals grow older, their likelihood of experiencing frailty rises. Additionally, engaging in a healthy lifestyle was also significantly associated with increased frailty (B = 0.886, β = 0.138, p < 0.05). This finding might reflect the complex interactions between chronic illness management and the efforts to maintain a healthy lifestyle, potentially indicating that those already experiencing frailty may be more motivated to adopt healthier habits.

Psychological factors showed strong associations with frailty. Anxiety had a robust positive association with frailty (B = 0.189, β = 0.476, p < 0.001), indicating that higher levels of anxiety are linked to greater frailty. Similarly, depression was significantly associated with increased frailty (B = 0.066, β = 0.192, p < 0.05), suggesting that individuals with higher levels of depression are more likely to experience frailty. Overall, the model explained 59.1% of the variance in frailty (R^2 = 0.591), with a significant F value (F = 20.224, p < 0.001), indicating a good fit for the model.

Table 5. *Linear Regression among Demographic, Disease Characteristics, Anxiety, Depression on **Frailty (n=151)***

Variables	B	SE	β
Intercept	-5.569	1.182	
Age (Years)	0.041	0.018	0.165*
Gender (Male/Female)	-0.308	0.386	-0.048
Job Status (Employed/ Unemployed)	0.563	0.418	0.080
Diabetes Mellitus (Yes/No)	-0.722	0.437	-0.105
CCI	-0.076	0.141	-0.042
Performance of Healthy Lifestyle (Yes/No)	0.886	0.381	0.138*
Have >1 Disease (Yes/No)	0.200	0.448	0.031
Life Stressor	0.367	0.215	0.100
Anxiety	0.189	0.033	0.476***
Depression	0.066	0.029	0.192*
R^2	0.591		
Δ R^2	0.562		
F	20.224		

Note: *$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

DISCUSSION

The exploration of the interaction between demographic and disease-related factors with psychological aspects and frailty among individuals undergoing hemodialysis has yielded significant findings, providing valuable insights into the complex nature of frailty within this population.

Demographic & Disease Characteristics

According to the research findings, the average age of patients undergoing HD is 53 years. This result aligns with data from PERNEFRI in 2018, where the majority were aged 45-54 years (Indonesian Renal Registry, 2018). Progressive kidney function decline occurs with increasing age (Ignatavicius et al., 2017). Glomerular filtration rate decreases progressively from the age of 40 to 70, with GFR function reaching only 50% of normal levels (Hinkle & Cheever, 2018). In this study, patients as young as 19 years old were found to undergo HD, consistent with PERNEFRI's findings that 2.57% of patients under 25 years old have undergone HD (Indonesian Renal Registry, 2018).

Males constitute the majority of patients undergoing HD in this study (54.3%). Males tend to have risk factors such as obesity, hypertension, and smoking compared to females (International Society of Nephroogy., 2017). Additionally, estrogen hormones in females help prevent kidney stone formation, which can lead to CKD (Sari et al., 2020).

CKD is generally caused by multifactorial factors (Harmilah., 2020). This is evidenced by the average Charlson Comorbidity Index (CCI) reaching 3.74, indicating a moderate level of comorbidity. In this study, the average patient had hypertension comorbidity (62.3%). Hypertension causes increased capillary hydrostatic pressure, accelerating glomerular atherosclerosis leading to progressive kidney function decline (Black & Hawks., 2014).

CKD patients generally undergo HD for about 28 months (SD=32.57). The duration of HD impacts patients' perceptions of their condition. One of the impacts observed in this study is that the majority of patients reported being unemployed (72.2%). Patients who have undergone HD for more than six months generally experience both physical and psychological challenges as a result of functional status decline (Salmi et al., 2021). Routine and repetitive HD causes changes in patients' social interactions, social roles, and daily activity schedules (Dziubek et al., 2016).

The perception of patients who reported having a healthy lifestyle (58.9%) contributes to disease management. A study in Saudi Arabia found that nearly 64% of patients were unaware of having CKD (Al Rahbi & Al Salmi., 2020). This is because patients generally feel healthy and therefore are less vigilant about the risk of CKD. Despite perceiving themselves as leading a healthy life, patients may overestimate their efforts to manage chronic diseases. This could be attributed to their adaptation to living with the condition over time, leading them to underestimate the importance of ongoing disease management and regular medical monitoring.

Frailty among Patients Undergoing Hemodialysis

Frailty is a significant concern among individuals undergoing hemodialysis (HD), as it can have profound implications for their overall health and quality of life. In this study, a considerable proportion of HD patients (53.6%) were found to experience frailty, indicating a substantial burden within this population. This prevalence aligns with previous research and underscores the pressing need to address frailty in HD patients. Similar studies by Ozturk et al. (2022) have reported that HD patients are at a higher risk of being non-robust (frail or prefrail) compared to those with earlier stages of CKD.

Further analysis of frailty dimensions revealed that the physical aspect was the most prominent, followed by psychological and social aspects. This hierarchy suggests that physical health and functional limitations play a central role in shaping frailty among HD patients. Factors such as disease progression, treatment side effects, and comorbidities likely contribute to the heightened physical frailty observed in this population.

Interestingly, psychological and social dimensions also emerged as significant contributors to frailty. HD patients may experience psychological distress due to the chronic nature of their condition, treatment-related stressors, and uncertainties about the future (Irawati et al., 2023). Social factors, including social support networks, socioeconomic status, and access to healthcare resources, can also influence frailty outcomes.

These findings underscore the multifaceted nature of frailty in HD patients and highlight the importance of adopting a holistic approach to frailty management. Interventions aimed at improving physical function, addressing psychological well-being, and enhancing social support networks are essential for mitigating frailty and improving overall health outcomes in HD patients.

Anxiety and Depression among Patients undergoing HD in Indonesia

The investigation into anxiety and depression levels among patients undergoing hemodialysis (HD) in Indonesia revealed a spectrum ranging from mild to moderate. In this study, the majority of patients did not experience depression, with only 10% experiencing mild depression and 1.3% reporting moderate depression. Previous research comparing HD patients with depression has provided insights into patients' ability to accept their illness and adapt to the disease process.

According to the study by Işık Ulusoy and Kal (2020), the most commonly used coping strategy among HD patients was problem-focused coping. This strategy involves taking direct action to address the stressor or problem causing distress. Other coping strategies, such as emotion-focused coping, avoidant coping, and religious or spiritual coping, were also explored in the study, but problem-focused coping emerged as the most frequently used strategy among HD patients.

These findings underscore the variability in emotional states among HD patients, with some grappling with higher levels of anxiety and depression, while others fall within lower ranges (Alkhaqani, 2022). Further analysis is necessary to delve into the factors driving these anxiety and depression levels and their

implications for the emotional well-being of HD patients. Moreover, gender disparities were observed in anxiety and depression levels, with females displaying higher levels.

Female hemodialysis (HD) patients may be at a heightened risk of experiencing anxiety and depression, influenced by several factors including sociodemographic variables such as age, gender, and level of education. Result from this study indicates that among HD patients, females tend to exhibit a significantly higher level of anxiety compared to males, a finding consistent with studies in chronic kidney disease (CKD) populations (Mosleh et al. 2020; Theofilou., 2011) have shown that females are more prone to anxiety symptoms, while males may be more likely to display depressive symptoms. Globally, women have consistently been shown to have a higher risk of depression than men, with a ratio of approximately 2:1 (Salk et al., 2017). This may be attributed to various factors including societal roles and stressors, differences in coping mechanisms. Understanding these gender disparities is crucial for developing targeted interventions and support systems tailored to the specific needs of female HD patients.

Furthermore, in this study, patients with a history of diabetes exhibited elevated levels of anxiety and depression, suggesting a possible link between diabetes and adverse psychological outcomes. Chronic kidney disease (CKD) is associated with poor outcomes, perhaps due to a high burden of comorbidity. Most studies of CKD populations focus on concordant comorbidities causing CKD, such as hypertension and diabetes. Concordant comorbidities were associated with an excess risk of hospitalization, as were discordant comorbidities and mental health conditions. Thus, both discordant comorbidities and mental health conditions, as well as concordant comorbidities, are important independent drivers of adverse outcomes associated with CKD (Tonelli et al., 2011). This underscores the importance of comprehensive care that considers both physical and mental health aspects, particularly in patients with diabetes.

Additionally, correlation analysis revealed a strong positive correlation between heightened anxiety and depression levels, indicating a co-occurrence of these psychological symptoms. This suggests that individuals undergoing hemodialysis may experience overlapping symptoms of anxiety and depression, emphasizing the need for comprehensive mental health assessments and interventions targeting both conditions. Previous research has shown that anxiety and depression often coexist in patients with chronic kidney disease, including those undergoing hemodialysis (Natashia et

al., 2018; Goh & Griva, 2018), impacting their ability to self-manage their disease. Therefore, addressing both anxiety and depression concurrently is essential for improving patients' ability and thus the holistic well-being of patients receiving hemodialysis.

Relationship between Demographic and Disease Characteristic, Psychological Factors and Frailty

This study revealed a positive correlation between age and frailty, indicating that as individuals advance in age, their susceptibility to frailty tends to increase. This aligns with existing literature that underscores the impact of the aging process on physiological systems, contributing to the development or progression of frailty. As people age, they experience a decline in muscle mass, bone density, and overall physical strength, which are key components of frailty. Additionally, aging is often associated with the onset of chronic conditions which further exacerbate frailty. Cognitive decline, another aspect of aging, also plays a significant role in increasing frailty, as it affects an individual's ability to perform daily activities and maintain independence (Verghese et al., 2021). These findings highlight the importance of early interventions and preventive measures aimed at mitigating the effects of aging on frailty, especially among patients with chronic kidney disease (CKD) undergoing hemodialysis.

In this study, higher levels of frailty were observed among unemployed individuals undergoing hemodialysis, indicating that employment status significantly influences frailty. Unemployment can lead to psychological burdens and social isolation, increasing the risk of frailty (Godin et al., 2019). Financial instability, reduced access to healthcare, and diminished social support associated with unemployment negatively impact physical health. Additionally, the lack of daily structure and purpose can contribute to mental health issues like depression and anxiety, exacerbating frailty. This highlights the need to consider socio-economic factors when addressing frailty among hemodialysis patients. Recognizing unemployment as a stressor affecting both physical and mental well-being is crucial. Integrating vocational rehabilitation and social support services into care plans can help mitigate the adverse effects of unemployment.

The association between higher Charlson Comorbidity Index (CCI) scores and increased frailty underscores the importance of considering overall health status and the cumulative impact of comorbidities in assessing and addressing frailty among hemodialysis (HD) patients. Patients with higher CCI scores have a greater burden of comorbid conditions, which can compound the challenges of managing frailty in those undergoing HD (Zanotto, 2019). This finding suggests that comprehensive health assessments, including evaluations of comorbidities, are crucial for developing effective treatment plans for frail HD patients.

Another significant finding was the association between a history of diabetes and increased frailty levels in patients with chronic kidney disease (CKD) undergoing HD. Diabetes is a chronic condition that can lead to various complications, such as neuropathy, retinopathy, and cardiovascular diseases, which can exacerbate frailty. This suggests a potential link between diabetes and the development of frailty, emphasizing the need for targeted interventions and management strategies for individuals with diabetes undergoing HD. Effective glycemic control, regular monitoring, and addressing diabetes-related complications are vital to reducing frailty in this population (Abdelhafiz & Sinclair, 2020).

This study among CKD patients undergoing HD shows an association between anxiety levels and frailty, suggesting they influence each other. The connection between depression or anxiety and frailty in these patients could be due to several reasons. Firstly, psychological distress like depression and anxiety might lead to changes in behavior, such as reduced physical activity and unhealthy eating habits, which are known to increase frailty risk (Feng et al., 2017). Additionally, these distressful states can worsen inflammation and oxidative stress, contributing to frailty (Fried et al., 2004). They may also disrupt sleep and hormonal balance, further weakening physical function and increasing frailty risk. Finally, the emotional burden of coping with a chronic illness like CKD and undergoing HD can worsen feelings of depression and anxiety, creating a cycle that contributes to frailty over time (Liu et al., 2023). Thus, addressing psychological distress is essential not just for emotional well-being but also for preventing or managing frailty among CKD patients on HD.

Predictors Associated with Frailty among Patients CKD undergoing HD

The multivariate analysis in this study identified four predictors of frailty among patients with CKD undergoing HD: age, engagement in a healthy lifestyle, anxiety, and depression. These predictors offer valuable insights into the factors contributing to frailty development and progression in this population. Age emerged as a significant predictor of frailty, consistent with existing literature highlighting age as a major risk factor for frailty development (Mitnitski et al., 2015; Verghese et al., 2021).

The association between adopting a healthy lifestyle and increased frailty levels suggests a nuanced interplay between chronic illness management and lifestyle behaviors. Essentially, individuals managing chronic conditions like CKD undergoing HD may face challenges in maintaining a healthy lifestyle due to various factors such as dietary restrictions, treatment regimens, and physical limitations (Griva et al., 2013). Consequently, despite efforts to manage their conditions, they may inadvertently engage in behaviors that contribute to frailty, such as reduced physical activity or poor dietary choices. Thus, while aiming for a healthier lifestyle is generally beneficial, for individuals with chronic illnesses, the balance between managing their health and maintaining lifestyle habits can sometimes lead to unexpected outcomes like increased frailty.

Psychological factors, particularly anxiety and depression, also showed associations with frailty among CKD patients undergoing HD (Feng et al., 2017; Liu et al., 2023). Elevated levels of anxiety and depression were significantly linked to increased frailty, highlighting the significant impact of psychological problems on frailty outcomes.

Healthcare providers should recognize the significance of age, lifestyle behaviors, and psychological factors in identifying individuals at risk of frailty and implementing targeted interventions to mitigate frailty risk.

CONCLUSION

In conclusion, this study provides important insights into how physical and psychological aspects interact in hemodialysis patients. The findings show the need for a holistic approach to managing frailty that addresses both physical and psychological factors. This approach could improve care strategies and enhance the overall quality of life for people undergoing hemodialysis.

RECOMMENDATION

The study findings underscore the importance of tailored interventions for managing hemodialysis (HD) patients effectively. Early interventions targeting modifiable risk factors, such as hypertension, are recommended to slow chronic kidney disease (CKD) progression, especially among younger individuals. Comprehensive assessments that encompass physical, psychological, and social dimensions of frailty are essential for enhancing the overall well-being of HD patients. Routine mental health screenings and access to psychosocial support services are recommended to alleviate anxiety and depression symptoms, taking into account gender-specific and disease-specific risk factors. Collaboration among healthcare professionals is crucial to address modifiable risk factors like unemployment and comorbidities, thereby improving the holistic care of HD patients.

REFERENCES

Abdelhafiz, A. H., & Sinclair, A. J. (2020). Cardio-renal protection in older people with diabetes with frailty and medical comorbidities-A focus on the new hypoglycaemic therapy. *Journal of Diabetes and its Complications*, *34*(9), 107639.

Alkhaqani, A. (2022). Psychological impact of chronic kidney disease and Hemodialysis: Narrative review. *Psychosom Med Res*, *4*(2), 1-5.

Al Rahbi, F., Al Salmi, I. (2020). Awareness, knowledge, and perception of chronic kidney disease patients at renal medicine outpatients' clinic. Saudi Journal of Kidney Diseases and Transplantation, 31(6), 1351-1360.

Black, J. M., & Hawks, J. H. (2014). Keperawatan Medikal Bedah (8 ed., Vol. 2). Singapore: Elsevier.

Carrero, J. J., Stenvinkel, P., Cuppari, L., Ikizler, T. A., Kalantar-Zadeh, K., Kaysen, G., Mitch, W. E., Price, S. R., Wanner, C., Wang, A. Y., ter Wee, P., & Franch, H. A. (2013). Etiology of the protein-energy wasting syndrome in chronic kidney disease: a consensus statement from the International Society of Renal Nutrition and Metabolism (ISRNM). Journal of Renal Nutrition, 23(2), 77-90.

Clegg, A., Young, J., Iliffe, S., Rikkert, M. O., & Rockwood, K. (2013). Frailty in elderly people. The Lancet, 381(9868), 752-762.

Delgado, C., Grimes, B. A., Glidden, D. V., Shlipak, M., Sarnak, M. J., & Johansen, K. L. (2015). Association of Frailty based on self-reported physical function with directly measured kidney function and mortality. BMC nephrology, 16(1), 1-9.

Dziubek W, Kowalska J, Kusztal M, Rogowski Ł, Gołębiowski T, Nikifur M, et al. The level of anxiety and depression in dialysis patients undertaking regular physical exercise training a preliminary study. Kidney Blood Press Res. 2016;41(1):86–98.

Feng, Z., Lugtenberg, M., Franse, C., Fang, X., Hu, S., Jin, C., & Raat, H. (2017). Risk factors and

protective factors associated with incident or increase of frailty among community-dwelling older adults: A systematic review of longitudinal studies. *PloS one*, *12*(6), e0178383.

Fried, L. P., Ferrucci, L., Darer, J., Williamson, J. D., & Anderson, G. (2004). Untangling the concepts of disability, frailty, and comorbidity: implications for improved targeting and care. The journals of gerontology series a: biological sciences and medical sciences, 59(3), M255-M263.

Fried, L. P., Tangen, C. M., Walston, J., Newman, A. B., Hirsch, C., Gottdiener, J., ... & McBurnie, M. A. (2001). Frailty in older adults: evidence for a phenotype. The journals of gerontology series a: biological sciences and medical sciences, 56(3), M146-M157.

Gobbens, R. J., van Assen, M. A., Luijkx, K. G., Wijnen-Sponselee, M. T., & Schols, J. M. (2010). The Tilburg frailty indicator: psychometric properties. Journal of the American Medical Directors Association, 11(5), 344-355.

Gobbens, R. J., Schols, J. M., & Van Assen, M. A. (2017). Exploring the efficiency of the Tilburg Frailty Indicator: a review. Clinical interventions in aging, 12, 1739.

Goh, Z. S., & Griva, K. (2018). Anxiety and depression in patients with end-stage renal disease: impact and management challenges–a narrative review. *International journal of nephrology and renovascular disease*, 93-102.

Godin, J., Armstrong, J. J., Wallace, L., Rockwood, K., & Andrew, M. K. (2019). The impact of frailty and cognitive impairment on quality of life: employment and social context matter. *International psychogeriatrics*, *31*(6), 789-797.

Griva, K., Ng, H. J., Loei, J., Mooppil, N., McBain, H., & Newman, S. P. (2013). Managing treatment for end-stage renal disease–a qualitative study exploring cultural perspectives on facilitators and barriers to treatment adherence. *Psychology & Health*, *28*(1), 13-29.

Harmilah. (2020). Asuhan Keperawatan pada Pasien dengan Gangguan Sistem Perkemihan. Yogyakarta: Pustaka Baru Press.

Hinkle, J. L., & Cheever, K. H. (2018). *Brunner and Suddarth's textbook of medical-surgical nursing*. Wolters kluwer india Pvt Ltd.

Hoogendijk, E. O., Afilalo, J., Ensrud, K. E., Kowal, P., Onder, G., & Fried, L. P. (2019). Frailty: implications for clinical practice and public health. The Lancet, 394(10206), 1365-1375.

Indonesian Renal Registry. (2018). 11th report of Indonesian renal registry. Perkumpulan Nefrologi Indonesia

International Society of Nephrology. (2017). ISN Global Kidney Health Atlas.

Ignatavicius, D. D., Workman, M. L., & Rebar, C. (2017). *Medical-Surgical Nursing-E-Book: Concepts for Interprofessional Collaborative Care*. Elsevier Health Sciences.

Irawati, D., Nugraha, R., Natashia, D., Narawangsa, A., Purwati, N. H., & Handayani, R. (2023). PERUBAHAN FISIK DAN PSIKOSOSIAL MEMPENGARUHI KUALITAS HIDUP PASIEN HEMODIALISIS: Physical and Psychosocial Changes Affect the Quality of Life of Hemodialysis Patients. Jurnal Ilmiah Keperawatan (Scientific Journal of Nursing), 9(1), 96-104.

Işık Ulusoy, S., & Kal, Ö. (2020). Relationship among coping strategies, quality of life, and anxiety and depressive disorders in hemodialysis patients. *Therapeutic Apheresis and Dialysis*, *24*(2), 189-196.

Kimmel, P.L.; Cukor, D. Anxiety Symptoms in Patients Treated with Hemodialysis: Measurement and Meaning. Am. J. Kidney Dis. 2019, 74, 145 –147.

Kivimäki, M., Bartolomucci, A., & Kawachi, I. (2023). The multiple roles of life stress in metabolic disorders. Nature Reviews Endocrinology, 19(1), 10-27.

Kojima, G. (2017). Frailty as a predictor of disabilities among community-dwelling older people: a systematic review and meta-analysis. Disability and rehabilitation, 39(19), 1897-1908.

Liu, X., Chen, T., Chen, S., Yatsugi, H., Chu, T., & Kishimoto, H. (2023). The relationship between psychological distress and physical frailty in Japanese community-dwelling older adults: a cross-sectional study. *The Journal of frailty & aging*, *12*(1), 43-48.

Mitnitski, A., Collerton, J., Martin-Ruiz, C., Jagger, C., von Zglinicki, T., Rockwood, K., & Kirkwood, T. B. (2015). Age-related frailty and its association with biological markers of ageing. *BMC medicine*, *13*, 1-9.

Mosleh, H., Alenezi, M., Alsani, A., Fairaq, G., & Bedaiwi, R. (2020). Prevalence and factors of anxiety and depression in chronic kidney disease patients undergoing hemodialysis: a cross-sectional single-center study in Saudi Arabia. *Cureus*, *12*(1).

Natashia, D., Yen, M., Chen, H. M., & Fetzer, S. J. (2019). Self management behaviors in relation to psychological factors and interdialytic weight gain among patients undergoing hemodialysis in Indonesia. *Journal of Nursing Scholarship*, *51*(4), 417-426.

Nixon, A. C., Bampouras, T. M., Pendleton, N., Woywodt, A., Mitra, S., & Dhaygude, A. (2018). Frailty and chronic kidney disease: current evidence and continuing uncertainties. *Clinical*

kidney journal, *11*(2), 236-245.

Ozturk, S., Cetin, D. G., Cetin, M., Yilmaz, M. D., Ozler, T. E., Cebeci, E., ... & Bahat, G. (2022). Prevalence and associates of frailty status in different stages of chronic kidney disease: a cross-sectional study. *The journal of nutrition, health & aging*, *26*(9), 889-895.

Ravaghi, H., Behzadifar, M., Behzadifar, M., Taheri Mirghaed, M., Aryankhesal, A., Salemi, M., & Luigi Bragazzi, N. (2017). Prevalence of depression in hemodialysis patients in Iran a systematic review and meta-analysis. *Iranian journal of kidney diseases*, *11*(2).

Santos, D. G. M. D., Ferreira, L. G. S., Pallone, J. M., Ottaviani, A. C., Santos-Orlandi, A. A., Pavarini, S. C. I., ... & Orlandi, F. D. S. (2022). Association between frailty and depression among hemodialysis patients: a cross-sectional study. *Sao Paulo Medical Journal*, *140*(3), 406-411.

Salk, R. H., Hyde, J. S., & Abramson, L. Y. (2017). Gender differences in depression in representative national samples: Meta-analyses of diagnoses and symptoms. *Psychological bulletin*, *143*(8), 783.

Salmi, I. A., Kamble, P., Lazarus, E. R., D'Souza, M. S., Maimani, Y. A., & Hannawi, S. (2021). Kidney Disease-Specific Quality of Life among Patients on Hemodialysis. *International Journal of Nephrology*, *2021*, 1-8.

Sari, F., Raveinal, & Apriyanti, E. (2020). Characteristic description of compliance with fluid limitation, interdyalitic weight gain (IDWG), and quality of life in hemodialysis patients in Palembang city. *International Journal of Nursing and Midwifery Science (IJNMS), 4*(2), 112-121.

Theofilou, P. (2011). Depression and anxiety in patients with chronic renal failure: the effect of sociodemographic characteristics. *International journal of nephrology*, *2011*(1), 514070.

Tonelli, M., Wiebe, N., Guthrie, B., James, M. T., Quan, H., Fortin, M., ... & Hemmelgarn, B. R. (2015). Comorbidity as a driver of adverse outcomes in people with chronic kidney disease. *Kidney international*, *88*(4), 859-866.

Verghese, J., Ayers, E., Sathyan, S., Lipton, R. B., Milman, S., Barzilai, N., & Wang, C. (2021). Trajectories of frailty in aging: prospective cohort study. *PLoS One*, *16*(7), e0253976.

Zanotto, T. (2019). *Frailty, cardiovascular function and risk of falling amongst patients with stage 5 chronic kidney disease on haemodialysis* (Doctoral dissertation, Queen Margaret University, Edinburgh).