

# Frailty among hemodialysis patients

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Original Article

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### ABSTRACT

**Introduction:** Hemodialysis patients have physical vulnerability due to the progressive decline of the body's systems. The physical changes in the patients can lead to haemostatics failure, known as frailty syndrome. The frail condition can cause maladaptive psychological responses due to changes that can cause anxiety in patients.

**Objective:** This study aims to determine the prevalence of frailty in hemodialysis patients and to find out the different factor that correlates in frailty patients undergoing hemodialysis therapy.

**Method:** This is a cross-sectional study involving 55 respondents who underwent hemodialysis therapy at the Jember Klinik Hospital. The instruments used in this study were the Edmonton Frail Scale (EFS) and the Hamilton Anxiety Rating Scale.

**Results:** Moderate frailty was found in 23 patients (41.8%), followed by mild frailty in 18 patients (32.7%) and severe frailty in 14 patients (25.5%). In terms of anxiety, 18 patients (32.7%) had severe anxiety, 20 had moderate anxiety (36.4%), 12 (21.8%) had mild anxiety, and the other 7 (12.7%) were not anxious. The statistical analysis shows a significant difference in the average level of anxiety and the frailty status ( $p < 0.001$ ) among the patients.

**Conclusion:** Frailty was highly prevalent in hemodialysis patients and had relations with anxiety and different sociodemographic characteristics of patients. The assessment of frailty should be considered when clinicians intervene and prevent worsening in patients.

### INTRODUCTION

Hemodialysis is a therapy for patients with kidney problems. The prevalence of patients receiving hemodialysis therapy is 92% due to chronic renal failure. Based on the global situation from 79 countries, the average number of new chronic renal failure diagnoses worldwide was 144 individuals per million general population and.<sup>2</sup> In Indonesia, patients with chronic kidney failure continue to increase annually, the incidence of chronic kidney failure in 2018 was 0.38% compared to 0.2% in 2013.<sup>1</sup> Furthermore, the number of new patients undergoing hemodialysis therapy in 2018 was 66,443 this is a two-fold increase compared to 30,831 cases in 2017.<sup>3</sup> Patients on hemodialysis continue to bear a high burden of disease, shortened life expectancy, outcome suboptimal, high rates of comorbidities, and poor health-related quality of life.<sup>4,5</sup>

Impact of hemodialysis in patients widely known such as decreased kidney function, decreased muscle mass, comorbid conditions, and decreased physical and cognitive function.<sup>6</sup> These clinical conditions can lead to high vulnerability for sudden adverse health or a decrease in the physiological functions from various stressors or the aging process; this concept is called frailty.<sup>7,8</sup> Frailty is a syndrome of the decreased physiological capacity of the body due to the aging process. It impacts reducing resistance to stress and vulnerability to experiencing poor health outcomes.<sup>9</sup> Although the concept of frailty was initially closely related to the elderly, several clinical conditions can deteriorate the frailty in people with chronic kidney disease.<sup>8,10</sup>

In patients with kidney failure who underwent hemodialysis, 14-73% of them had the frailty syndrome.<sup>11</sup> In addition, in frail patients, 1.43 fold higher number of hospitalization

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independent of age, sex, comorbidity, and disability.<sup>12</sup> The relationship between kidney failure and the incidence of frailty is not fully understood. However, clinical conditions such as chronic kidney failure may limit the patient's fluid and nutrient intake due to food restriction and reduce muscle mass due to Physical inactivity, making them at risk of frailty. In addition, an increase in pro-inflammatory cytokines was observed in patients with kidney failure and patients with frailty.<sup>11,13</sup> Frailty in hemodialysis patients has additive adverse on the clinical outcome.<sup>14</sup> Identifying frailty can provide important prognostic information for providers and patients before and after initiation of dialysis.<sup>5</sup>

In addition to frailty syndrome, alteration of a patient with hemodialysis therapy shows psychological disorders such as anxiety and depression. The prevalence of anxiety disorder among chronic kidney disease patients was around 19.7% to 61% in various studies.<sup>15-17</sup> Anxiety in patients with chronic kidney failure undergoing hemodialysis therapy may be triggered by various stressors, including the experience of pain, financial problems, difficulty in the fulfilling job, loss of libido, depression, and fear of death.<sup>18</sup> Anxiety and frailty syndrome are inter-linked. In hemodialysis patients, the psychological disorder makes it challenging to take up a physical activity that can make patients frailer.<sup>19</sup> For this reason, we included the anxiety variable in this study to determine might anxiety can correlate with frailty syndrome.

**7** This study aimed to determine the prevalence of frailty syndrome in kidney failure patients undergoing hemodialysis therapy. We also will analyze the association between frailty syndrome and anxiety in patients with kidney failure undergoing hemodialysis therapy.

## METHOD

### Study Design

This is a cross-sectional study design.

### Setting and Respondent

The population in this study was hemodialysis patients at the Jember Clinical Hospital. 55 Respondent were recruited between January-Maret 2021. The inclusion criteria were patients over 18 years, level of consciousness compos mentis when hemodialysis, and not diagnosed COVID-19. The exclusion criteria in this study were refused as respondent, decreased consciousness, or physiological condition during data collection. All participants provided written informed consent.

### The Variable, Instrumen, and Measurement

In the study, Sociodemographic (age, gender, income level, religion, time on hemodialysis, and education) collected used questionnaires through medical reports and

participant self-report. In variable Frailty, Status was assessed using the Edmonton Frail Scale (EFS) questionnaire. EFS consists of nine domains (cognition, general health status, functional independence, social support, medication use, nutrition, mood, continence, functional performance). EFS showed inter-rater reliability ( $k=0.77$ ,  $p=0.0001$ ,  $n=18$ ). The internal consistency of the EFS using Cronbach's  $\alpha$  was 0.62.<sup>20</sup> Frailty status in EFS is divided into five categories non-frail (0-5), vulnerable (6-7), mild (8-9), moderate (10-11), severe frail (12-17).<sup>21</sup> The variable anxiety was assessed using the HARS (Hamilton Anxiety Rating Scale) questionnaire. HARS questionnaire consists of 14 items, each defined by a series of symptoms, and measures both psychic anxiety (mental agitation and psychological distress) and somatic anxiety (physical complaints related to anxiety). HARS had Cronbach's (0.921) and Bartlett's test of sphericity =  $p < 0.001$ .<sup>22</sup> Anxiety classification in HARS divided into five categories not anxiety (0-14), Mild (15-20), Moderate (21-30), Severe (31-40).<sup>23</sup>

### Data analysis

Statistical analysis in this study was performed using the Spearman, Lamda, Somers, and Kruskal Wallis test. The data is not normally distributed.

### Ethical Consideration

This study had passed the ethics test by the committee of the University of Muhammadiyah Jember with the registration number. 01220/KEPK/FIKES/I/2021.

## RESULTS

Fifty-Five patients undergoing hemodialysis were included in this study. Participant sociodemographic showed in Tabel 1 according to age, gender, income, religion, time on hemodialysis, and education level. Overall, twenty-three participants had moderate frailty. Although frailty related with age, a younger age (<60 years) showed more frailness compared with older age. Although in this study, most participants were less than 60 years old. The male gender (mildly frail) showed lower frailty status than females (moderate frail). Income participant level above minimum wage similar in mildly and moderate frail status. Ninety-six percent of the participant was Muslim, and there is no significant correlation between religion and frailty status. The frail condition will increase with age, and the physical condition worsens, but patients who underwent hemodialysis for less than six months also showed a frail condition in this study. Regarding participant education level, 58.2% were senior high school, and 30.9% held a university degree. Table 1 demonstrated that 36.4% of the participant were experiencing severe anxiety, and only 12.7% were not anxious.

Based on table 1, statistical analysis showed that age, gender, religion, and anxiety levels are not significantly correlated with the frailty status of patients undergoing hemodialysis therapy; however, income level ( $p=0.045$ ),

length of time undergoing hemodialysis ( $p=0.027$ ), an education level ( $p=0.049$ ) and anxiety ( $p=0.001$ ) had a significant correlation with frailty status in a hemodialysis patient.

**Table 2.** Sociodemographic and Clinical Characteristic of Patients by Frailty Status (n=55)

Variable	Frailty Status			Total	p-value
	Mildly Frail (n=18)	Moderate Frail (n=23)	Severe Frail (n=14)		
<b>Age</b>					
<60 years	14 (25.5%)	20 (36.4%)	11 (20.0%)	45 (81.8%)	0.378
>60 years	4 (7.3%)	3 (5.5%)	3 (5.5%)	10 (18.2%)	
<b>Gender</b>					
Male	15 (23.7%)	13 (23.6%)	9 (16.4%)	37 (63.7%)	0.218
Female	3 (5.5%)	10 (18.2%)	4 (9.1%)	18 (32.7%)	
<b>Income level</b>					
Above minimum wage	15 (27.3%)	15 (27.3%)	7 (12.7%)	37 (63.7%)	0.045
Below minimum wage	3 (5.5%)	8 (14.5%)	7 (12.7%)	18 (32.7%)	
<b>Religion</b>					
Muslim	18 (32.7%)	21 (38.2%)	14 (25.5%)	53 (96.4%)	0.850
Catholic	0 (0%)	1 (0%)	0 (0%)	1 (1.8%)	
Protestant	0 (0%)	1 (0%)	0 (0%)	1 (1.8%)	
<b>Time on Hemodialysis</b>					
>6 months	4 (7.3%)	0 (0%)	0 (0%)	4 (7.3%)	0.027
<6 months	14 (25.5%)	23 (41.8%)	14 (25.5%)	51 (92.7%)	
<b>Education level</b>					
Not going to school	0 (0%)	1 (1.8%)	1 (1.8%)	2 (3.6%)	0.049
Primary school	0 (0%)	2 (3.2%)	1 (1.8%)	3 (5.5%)	
Junior high school	0 (0%)	0 (0%)	1 (1.8%)	1 (1.8%)	
Senior high school	11 (20.0%)	12 (21.8%)	9 (16.4%)	32 (58.2%)	
University	7 (12.7%)	8 (14.5%)	2 (3.2%)	17 (30.9%)	
<b>Anxiety</b>					
Not anxious	2 (3.6%)	3 (5.5%)	2 (3.6%)	7 (12.7%)	0.001
Mild	3 (5.5%)	5 (9.1%)	4 (7.3%)	12 (21.8%)	
Moderate	7 (12.7%)	7 (12.7%)	2 (3.6%)	16 (29.1%)	
Severe	6 (10.9%)	8 (14.5%)	6 (10.9%)	20 (36.4%)	

## DISCUSSION

Frailty is defined as a failure to repair homeostasis after experiencing a specific stress.<sup>24</sup> Stress on hemodialysis patients is caused by a clinical change that can make the patient more vulnerable. Based on this study, the frailty status of patients undergoing hemodialysis therapy showed that most participants have moderate frail (41.8%) and mild frail (32.7%). In their systematic review, Chowdhury et al. report that frailty was more prevalent amongst patients on hemodialysis, ranging from 14-73%.<sup>11</sup> This result is appropriate with our finding that more than sixty percent of patients have moderate or severe frailty. Clinical conditions cause frailty in hemodialysis patients to change, such as limitation of fluid and nutrients and physical inactivity that makes them at risk of frailty.<sup>13</sup> In addition, other condition that can make worsening frailty status was anemia, sarcopenia, fall/fracture, vascular disease, cognitive impairment, functional impairment, and decreased physiological reserve.<sup>25</sup> Based on EFS results in our research, most participants got high scores in domain-general health status, functional independence, medication use, mood, and functional performance. This domain can indicate that

frail patients have a problem with their health status because most patients have been hospitalized more than two times in one year. Besides, medication received by the patient has more than five types, and patient compliance in treatment needs to be studied further. This condition can worsen and affect the patient's outcome because frailty was associated with poor short-term outcomes and higher mortality rates, gustatory dysfunction, quality of life, fatigue visits to hospital emergency services, hospitalization.<sup>21,26,27</sup>

Anxiety was a common yet frequently overlooked psychological disorder in patients treated with hemodialysis.<sup>16,28</sup> In our study, most patients with hemodialysis report that eighty percent of patients had anxiety from mild to moderate. This result following Gadia et al. showed anxiety disorder in chronic kidney disease happens in 61% of patients. In hemodialysis patients, anxiety happens because of changes that occur due to decreased kidney function. Several causes of anxiety in patients with kidney failure who underwent hemodialysis therapy are physical changes due to clinical manifestations of hemodialysis such as physical weakness, palpitations, tremors, indiges-

tion, shortness of breath, nervousness, edema, and diaphoresis. Psychosocial changes such as feeling helpless, depressed, and restless are other causes of anxiety in patients undergoing hemodialysis therapy.<sup>18</sup> Based on our analysis from HARS questioner symptoms of anxiety in hemodialysis patient in a dimension cardiovascular, genitourinary and autonomic symptoms it happened caused of physiological change in a patient not impact from an anxiety disorder. In addition to clinical change or the impact of anxiety, anxiety in hemodialysis patients is associated with poorer quality of life.<sup>15,29</sup>

Patients undergoing hemodialysis therapy with various physical, social, and spiritual problems will reduce the patient's quality of life.<sup>28</sup> Based on the results of the statistical tests, we found variables that have a significant association and some variables that do not have a significant association with frailty. We categorized the patient's age into more than 60 years and less than 60 years to distinguish the effect of frailty on the elderly and non-elderly groups ( $p>0.05$ ). The results of this study are in line with the results of a study by Canton et al., which showed that age did not affect patients with heart failure who had frailty or did not have frailty.<sup>21</sup> The association between age and frailty status is related to a decrease in the body function in the elderly due to aging processes. In this study, the frailty status was assessed using the Edmonton Frailty Scale, and the test showed that patients who aged more than 60 years had mild, moderate, and severe frailty. The results also showed almost the same proportion, ranging from 5.5% to 7.3%. This means that the elderly did not experience a worsening frailty status. Gender also did not show significant ( $p>0.05$ ). Women have a higher prevalence of frailty than men. This is because women have a lower mean of muscle mass and strength.<sup>7</sup> The study by Canton et al. showed a non-significant association of gender variables in patients who experienced frailty ( $p>0.05$ ).<sup>21</sup> In this study, most patients were male (67.3%), meaning that the female patients were poorly represented. We analyzed that males had higher peak bone mineral density and muscle mass, and also, in males, they have a slower rate of losing muscle and bone to maintain their strength.<sup>30</sup>

In the time on hemodialysis variable, the statistical results showed a p-value of 0.027 ( $p<0.05$ ) (Table 1), meaning that the variable had a significant relationship with frailty status. Long-term time hemodialysis patients can decrease their body. This is also associated with the patient's ability to perform health management. **The results of this study are also in line with the research** of Mc Adam et al., which showed a relationship between the length of undergoing dialysis in months with frailty.<sup>12</sup> In patients with kidney failure undergoing hemodialysis therapy, frailty status can predict the outcomes. About 40% of patients with frailty showed a high mortality rate at the third year of undergoing hemodialysis.<sup>13</sup>

Related to the level of education in this study found a significant relationship between educational level with frailty status. This level of education is also correlated with the level of income of participants where they have income above the minimum limit to study well. Both of these variables have a correlation with frailty status in hemodialysis patients. Several studies have shown that education and income affect a person's frail status, although there is no definite reason for correlating these two variables.<sup>31,32</sup> The complexity of frail status in functional independence requires high cognitive skill, which can be negatively influenced by poor frail status. Other possible reasons include that educational level can lead to barriers in communication, which creates difficulties for engagement in more complex activity.<sup>31</sup>

Anxiety and frailty status in patients with kidney failure will predict clinical outcomes in patients undergoing hemodialysis and will affect their quality of life.<sup>5</sup> We found limited data related to anxiety and frailty status in patients with kidney failure. This study observed a difference between frailty and anxiety between patients with mild and severe frailty. Anxiety in this study is most often accompanied by severe anxiety (36.4%), but the most frequent category of frailty variables is moderate frailty (41.8%). This difference shows that patients who have a higher risk of frailty also show an increase in anxiety scores (Tabel 2). Pathophysiologically, frailty, and anxiety are predictors of the clinical outcomes in patients with kidney failure, especially regarding the patient's quality of life. The incidence of frailty and anxiety in patients with kidney failure can be caused by various factors, including changes in physical functions. **Despite frailty's strong associations with poor outcomes for patients with ESRD, frailty is not routinely assessed clinically.**<sup>33</sup> Therefore, in patients with kidney failure, specific screening for physical and psychological symptoms should be taken into account and can be used to predict survival and better inform the shared decision-making process for patients with advanced kidney disease.<sup>26,34-37</sup>

This study had several limitations. First, a relatively small group was studied, and the patient was the same as of hemodialysis service, so a variety of patients were needed from the other hemodialysis center. Second, this study was not randomized. Third, a control group was needed, especially on the difference between elderly and non-elderly respondents because the concept of frailty is more widely used in the elderly.

## CONCLUSIONS AND RECOMMENDATION

This study revealed that frailty is high prevalent in hemodialysis patients. Our study also found that frailty was associated with income, educational level, anxiety, and time on hemodialysis. The importance of assessing risk factors for a decrease in a person's performance, or called frailty,

can be identified early by health workers because it dramatically affects the patient's quality of life. The suggestion for the hospital is to perform a special screening for patients undergoing hemodialysis regarding frailty. The assessment result can be used as a reference for clinicians to educate patients and their families about the conditions. We expect that particular interventions by nurses or families can be done to prevent the patient's worsening with

the known conditions. Future studies should specifically explore the impact or risk factors and nursing interventions that can prevent or treat the patients.

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