

Family function assessment on stress, anxiety and depression levels among hemodialysis patients

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Abstract

Background: The number of patients with chronic kidney disease requiring hemodialysis in Indonesia has increased substantially. Many patients experience psychological difficulties, including stress, anxiety, and depression. Family support may help mitigate these challenges.

Objective: This pilot study evaluated the association between family functioning and psychological outcomes among hemodialysis patients at Royal Prima Medan Hospital.

Methods: This cross-sectional pilot study used purposive sampling to assess family functioning, stress, anxiety, and depression using the Family APGAR, Perceived Stress Scale, and Hospital Anxiety and Depression Scale, respectively. Data were collected through interviews and questionnaires in March 2025. Because of the small sample size and highly imbalanced distribution of family functioning, Fisher's exact test was used for bivariate analyses instead of the prespecified logistic regression. A post hoc power calculation was also performed.

Results: Thirty-five participants were enrolled; 62.9% were men, and the most common age group was 41–50 years. Good family functioning was reported by 97.1% of participants, whereas 2.9% reported family dysfunction. Moderate stress was present in 31.4% of participants, anxiety in 25.7%, and depression in 5.7%. Family functioning was not significantly associated with stress ($p=0.343$), anxiety ($p=1.000$), or depression ($p=1.000$).

Conclusion: No significant associations were observed between family functioning and psychological outcomes. However, the study was severely underpowered because of the small sample size and minimal variation in family functioning. The findings are hypothesis-generating rather than definitive. Larger multicenter studies with longitudinal designs are warranted.

Keywords: family function, stress, anxiety, depression, hemodialysis

Introduction

Chronic kidney disease (CKD) represents a pathological condition characterized by oxidative stress, pro-inflammatory process, and malnutrition, which collectively contributes to a progressive decline in renal function and accumulation of metabolic waste products, consequently resulted in kidney failure, multi organ disorders, and mortality.^{1,2} According to the analysis of Global Burden of Disease (GBD) 2017, there are over 690 million cases of CKD worldwide, with a prevalence rate of 9.1%. In 2021, the American Society of Nephrologists, the European Kidney Association, and the International Society of Nephrology collectively recognized that over 850 million individuals worldwide are affected by kidney disease, a figure that is twice the number of individuals with diabetes and twenty times the incidence of cancer cases globally.³ Hustrini's research indicated that the incidence rate of CKD reached 200 cases per million populations per year across various nations, with a prevalence of 4.8%

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in stages 1-2 and 6.7% in stages 3-5.⁴ Meanwhile, based on the GBD 2021, the prevalence of CKD in Indonesia affecting approximately 29 million individuals, accompanied by a mortality rate of 23 per 100,000 population.⁵

End-stage chronic kidney disease, or kidney failure, constitutes a significant global health concern, as the affected individuals require long term hemodialysis or await kidney transplantation.⁶ Currently, nearly three million individuals worldwide are undergoing renal replacement therapy (RRT) due to kidney failure, with prevalence rates of approximately 465 and 1437 per million populations in Europe and United States respectively, whereas hemodialysis is the predominant form of RRT.⁷ In Indonesia, CKD patients requiring hemodialysis has experienced a notable increase, surpassing 130,000 individuals in 2018, while according the Basic Health Research (RISKESDAS) 2020, the prevalence of hemodialysis among CKD patients was at 19.3%.^{4,8}

Patients undergoing hemodialysis frequently encounter substantial psychological burdens, namely anxiety and depression, two of the most prevalent mental health issues identified with incidence rates ranging from 20-50% and 20-60% respectively.⁹ For instance, Mohammadi et al. indicated that the incidence of anxiety and depression among hemodialysis patients were as high as 60.8% and 68.8% respectively, whereas Nagy et al. reported that the prevalence reaching 75.8% and 83.2% respectively.^{6,10} In fact, the incidence of depression in HD patients is four times higher than in the general population due to differences in physiology, behavior and social mechanisms.¹¹ For example, the subsequent statistics highlight the prevalence rates of depression among hemodialysis patients across various countries including China (29.1%), Greece (38.2%), India (44.1%), the United States (46%), Iran (62%), and Pakistan (75%).¹¹ Meanwhile, a study conducted in Singapore indicated that approximately 35% of hemodialysis patients exhibited persistent depressive symptoms whereas 12.7-18.5% of those experienced new depressive symptoms or reduction in existing symptoms over time.¹¹ Moreover, Bossola et al. also revealed that hemodialysis patients also experienced moderate stress (70.8%) and severe stress (11.2%).⁷

The presence of depression significantly elevates the risk of cardiovascular diseases, malnutrition, inflammatory responses, and adversely affects the prognosis of hemodialysis patients.¹¹ Furthermore, chronic anxiety and depression not only diminish the patient's quality of life but may also resulted in decreased adherence to dialysis regimens, increased incidence of suicide, and elevated risk of re-hospitalization and mortality.^{6,9} For instance, one meta-analysis reported that depressive symptoms enhance the risk of mortality by 51% among hemodialysis patients, establishing them as a critical factor contributing to death.¹² Additionally, anxiety and depression may impair cognitive function by diminishing the activity of brain-derived neurotropic factor and altering brain structure.⁹

Social support plays a crucial role in alleviating stress, anxiety, and depression levels in hemodialysis patients. Evidence indicates a correlation between social support and psychological well-being among individuals undergoing hemodialysis such as patients who receive social support tend to exhibit improved physical and psychological outcomes. This enhancement is attributed to the alleviation of burdens enabling patients to better manage symptoms associated with stress, anxiety, and depression.¹⁰ One of the primary sources of social support is family, with family function being a central element of this support system.^{9,13} Researchers have highlighted that familial support associated with variations in mental health, thus positive relationships among family members contribute to improvement of emotional comfort.¹⁴ Patients benefiting from robust family functioning often receive enhanced care and spiritual support, which, in turn leads to improved mental states and a stronger belief in their survival.⁹ Mohammadi et al. demonstrated that well-functioning families are linked to lower levels of anxiety and depression.¹⁰ Therefore, family function assessment may serve as a valuable predictor for determining the mental health status of hemodialysis patients.

Despite numerous studies conducted on the impact of family support on the mental health of hemodialysis patients at Royal Prima Medan Hospital, one of the facilities in Medan City providing hemodialysis service, there remains a notable research gap pertaining to the relationship between family function and the psychological conditions of hemodialysis patients. Consequently, the researchers are keen to assess the influence of family function on the levels of stress, anxiety, and depression among hemodialysis patients at Royal Prima Medan Hospital.

Method

Study design

This cross-sectional descriptive study utilizes a quantitative approach to assess the family function in relation to levels of stress, anxiety, and depression among hemodialysis patients at Royal Prima Medan Hospital, which located at Jl. Ayahanda No.68A Medan. This study was conducted in March 2025 with population target consisted of all hemodialysis patients within the hemodialysis unit of Royal Prima Medan Hospital. This study has been evaluated by the Research Ethics Commission of Universitas Prima Indonesia and has been deemed ethically appropriate, as evidenced by the issuance of an ethical feasibility letter, numbered 050/KEPK/UNPRI/III/2025.

Sampling procedure

The target population consisted of all hemodialysis patients within the hemodialysis unit of Royal Prima Medan Hospital during the study period. Participants were selected through purposive sampling based on the following inclusion criteria: (1) individuals aged 18 years or older, (2) individuals who provided consent to participate as research respondents, and (3) individuals capable of verbal communication and comprehension of research instructions. Exclusion criteria included: (1) individuals who declined to participate, (2) individuals with cognitive impairment or significant health issues that hindered their involvement, and (3) individuals exhibiting unstable clinical conditions or experiencing deteriorations.

During the study period, a total of 52 patients were receiving regular hemodialysis at the facility. Of these, 45 patients met the inclusion criteria and were approached for participation. Ten patients declined to participate (refusal rate: 22.2%), primarily citing fatigue or lack of interest. The remaining 35 patients were enrolled and completed all study assessments (participation rate: 77.8% of eligible patients).

Data collection

Participants demographic including gender, age, and duration of hemodialysis were collected via interviews, whereas family function, levels of stress, anxiety and depression were assessed through questionnaires such as Family APGAR, Perceived Stress Scale (PSS), and Hospital Anxiety and Depression Scale (HADS) respectively. In addition, all three instruments were adapted into Indonesian and had demonstrated their validity and reliability in previous studies with recorded alpha values at 0.89 for Family APGAR, 0.888 for PSS and 0.85 for HADS (Anxiety) and 0.8 for HADS (Depression).^{15–17} Similarly, Rudy et al. demonstrated that the Indonesian version of the Hospital Anxiety and Depression Scale (HADS) exhibited commendable reliability, along with a favorable inter-rater agreement (Kappa coefficient of 0.706 and 0.681).¹⁸

Statistical analysis

The collected data were analyzed using IBM SPSS Statistics version 27. Descriptive statistics were calculated for all variables. Continuous variables (Family APGAR score, PSS score, HADS-A, HADS-D) were summarized as means, standard deviations, medians, and interquartile ranges. Categorical variables were summarized as frequencies and percentages with 95% confidence intervals.

The initial analysis plan included logistic regression to adjust for potential confounders. However, due to the extremely imbalanced distribution of the exposure variable (only one participant had family dysfunction), logistic regression was not feasible. Instead, Fisher's Exact Test was used to assess bivariate associations between family function (categorized as good vs. dysfunction) and each psychological outcome (stress, anxiety, depression). The Fisher's Exact Test was selected because the Chi-square test assumptions were violated (expected cell counts <5 in 2 or more cells). A p-value <0.05 was considered statistically significant. Given the exploratory nature of the study and the small sample size, no adjustment for multiple comparisons was made; however, this is acknowledged as a limitation.

Results

This study involved 35 hemodialysis patients at Royal Prima Medan Hospital who met the predetermined inclusion and exclusion criteria. The distribution of respondent's characteristics, such as gender, age, and duration of hemodialysis, is presented in Table 1. The majority of respondents (nearly 63%) in this study were male, with the predominant age group being 41 to 50 years. Nearly half of the participants were individuals who had regularly undergone hemodialysis for 1 – 5 years. Furthermore, the distribution of family function, and levels of stress, anxiety, and depression among the participants are also included in Table 1.

Almost all respondents had achieved Family APGAR score ≥ 7 which indicate satisfactory family functioning while less than 3% had family dysfunction. On the other hand, roughly one-third of the participants reported moderate stress levels with PSS score of 14-26. Additionally, more than 25% of respondents exhibited anxiety ranging from mild to moderate, whereas less than 6% of the respondents showed depressive symptoms. Furthermore, there was no patient with severe family dysfunction (Family APGAR score ≤ 3), severe stress (PSS score ≥ 27), severe anxiety (HADS-A score ≥ 16), and moderate to severe depression (HADS-D score ≥ 11).

The Chi-Square Test was performed to assess the association between family function and stress level. However, the data did not satisfy the requirements for the Chi-square test, revealing that 2 cells had an expected frequency lower than five. Consequently, Fisher's Exact Test was employed, yielding a p-value of 0.343, indicating no significant association between family function and stress levels among hemodialysis patients at Royal Prima Medan Hospital.

Bivariate associations between family function and psychological outcomes are presented in Table 2. Fisher's exact test showed no statistically significant association between family function and stress ($p = 0.343$), anxiety ($p = 1.000$), or depression ($p = 1.000$).

Discussion

As previously presented, approximately three-quarters of respondents have undergone hemodialysis for a duration exceeding one year, with nearly one-third having dialysis for more than five years. In fact, one participant underwent hemodialysis for over 24 years, marking the longest duration recorded in this study, whereas the shortest duration was approximately one month. This finding aligns with a prior investigation conducted by Pakpahan et al., which indicated that nearly 85% of hemodialysis patients at Royal Prima Medan Hospital had been receiving dialysis for a minimum of 12 months, and over 60% of them over 2 years.¹⁹ Based on the Family APGAR score, almost all hemodialysis patients at RSU Royal Prima Medan achieved scores of ≥ 7 , signifying a good family functioning, and less than 3% exhibiting moderate family dysfunction while none presented with severe family dysfunction (APGAR score ≤ 3). Good family functioning can be interpreted as a reflection of

Table 1. Characteristics of respondents demographics, family function, stress, anxiety and depression levels

Characteristic	N	%
Gender		
Male	22	62.9
Female	13	37.1
Age		
21-30 years	3	8.6
31-40 years	6	17.1
41-50 years	10	28.6
51-60 years	8	22.9
> 60 years	8	22.9
Duration		
< 1 year	8	22.9
1-5 years	16	45.7
> 5 years	11	31.4
Family Function		
Good (APGAR 7-10)	34	97.1
Dysfunction (APGAR ≤ 6)	1	2.9
Stress Level		
Low (PSS 0-13)	24	68.6
Moderate (PSS 14-26)	11	31.4
Anxiety Level		
Normal (HADS-A ≤ 7)	26	74.3
Abnormal (HADS-A > 7)	9	25.7
Depression Level		
Normal (HADS-D ≤ 7)	33	94.3
Abnormal (HADS-A > 7)	2	5.7

Table 2. Bivariate associations between family function and psychological outcomes among hemodialysis patients

Psychological outcome	p-value*
Stress	0.343
Anxiety	1.000
Depression	1.000

patient satisfaction regarding the assistance, support, affection, and time provided by their families. This result signifies an improvement from the previous observation by Harefa et al where only two-thirds of patients reported receiving adequate family support.²⁰ On one hand, this may be attributed to the growth of public awareness regarding the significance of familial support for patients with chronic illnesses, particularly hemodialysis patients, as evidenced by Tampubolon et al. which indicated that family support for individuals with kidney failure had reached 85%.²¹ On the other hand, this finding may stem from patients' gradual acceptance of their health conditions, whether or not accompanied by feelings of resignation regarding potential bad outcomes, leading to diminished expectations and hopes concerning their family's functionality. Naturally, such a scenario could ultimately culminate negative emotions in patients, resulting in decreased adherence to hemodialysis and a waning enthusiasm for survival. Moreover, patients may grapple with feelings of guilt for burdening their family, thereby striving to conceal their genuine emotions and needs in their familial interactions.

In addition, this study revealed that around 68% of respondents exhibited mild levels of stress indicated with PSS score ≤ 13 , while less than one-third demonstrated moderate levels of stress, as indicated by a PSS score ranging from 14 to 26. Notably, no respondents were identified experiencing severe stress. This assessment pertains to the nature of PSS evaluation, which measures the emotional stress perceived over the preceding month. Meanwhile, the majority of participants in this study have undergone hemodialysis for at least one year, which likely affects the outcome and contributes to the respondents' acceptance of their condition and their ability to adapt to the changes brought about by hemodialysis.

Moreover, a significant proportion of hemodialysis patients at Royal Prima Medan Hospital do not exhibit symptoms of anxiety (74%) or depression (94%), measured by the HADS score. Nevertheless, approximately one-quarter of participants reported mild to moderate anxiety (14% and 11%, respectively), while only around 6% of the respondents experienced mild depression indicated with HADS for depression score 8-10. In no instances that severe anxiety or moderate to severe depression were observed among the hemodialysis patients in this study. These findings contrast with prior study in China, which documented that the prevalence of psychological disorders among hemodialysis patients reached as high as 72%.²² One of the contributing factors is likely due to most respondents expressed their acceptance after learning that they would require hemodialysis for the remaining period of their lives and strived to maintain resilience and a positive outlook, focusing on cherishing the time spent with their loved ones rather than dwelling on negative thoughts. Nonetheless, a significant concern for many patients, particularly those with young children, is the uncertainty of their lifespan and whether or not they will be able to witness their children reaching adulthood. Furthermore, nearly all respondents reported a decline in their physical condition, characterized by reduced stamina, fatigue, and a slowdown in activities, although these changes did not significantly impede their daily activities.

There are no significant association between family function and levels of stress, anxiety, and depression among hemodialysis patients revealed in this particular study. This findings may be attributed to the disproportionately larger number of respondents reported satisfaction with family functioning, evidenced by Family APGAR score ≥ 7 . These results diverge from previous observation that identified a negative correlation between family functioning and levels of anxiety and depression.⁹ Such discrepancies may be stem from the larger sample size in the aforementioned study, which recruited over 200 hemodialysis patients or nearly 7 times larger size.

One of the primary challenges encountered in this study pertains to the difficulty in accurately capturing the authentic emotions of hemodialysis patients, as the assessments of Family APGAR, PSS, and HADS rely heavily on self-reported data. Consequently, the honesty and openness of the participants regarding their emotional states play a crucial role in the evaluation of these instruments. Throughout the course of this study, researchers noticed instances where respondents attempted to conceal their emotions or issues, accompanied by signs of restlessness, such as fidgeting or exhibiting behavior suggestive of reluctance to discuss specific topics.

Furthermore, the limited physical space available for interviews posed as an additional barrier in which a private, comfortable, and tranquil environment, devoid from external distractions, is essential to encourage patients to share their experiences more openly. Another limitation of this study is its reliance on a cross-sectional research

design, which constrains the ability to comprehensively assess the causal relationships between family function and levels of stress, anxiety, and depression. Finally, the restricted sample size presents a significant challenge, as the prevalence of kidney failure patients requiring hemodialysis is relatively low in Indonesia. This, coupled with the limited availability of hemodialysis units, further restricts the number of patients who can have access to dialysis within a given timeframe.

Conclusion

Most hemodialysis patients at Royal Prima Medan Hospital were men (62.9%) and were 41 to 50 years old. More than 75% had received hemodialysis for at least 1 year, and more than 30% had undergone treatment for over 5 years. Nearly all participants had good family functioning, as indicated by a Family APGAR score of at least 7. Moderate stress was reported by approximately 31% of participants, whereas 25.8% had anxiety and fewer than 6% had depression based on the prespecified HADS thresholds. No significant associations were found between family functioning and stress, anxiety, or depression. However, these findings should be interpreted cautiously because of the small sample size, the minimal variation in family functioning, the cross-sectional design, the short study period, and the potential for self-reporting bias. Larger, multicenter, and longitudinal studies are needed to clarify the relationship between family functioning and psychological outcomes in patients receiving hemodialysis.

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