

Original Research

The Relationship Between Anxiety Levels and Blood Pressure in Chronic Kidney Disease Patients Undergoing Hemodialysis at Panembahan Senopati Regional Hospital

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ABSTRACT

Introduction: Chronic kidney disease (CKD) is one of the leading causes of death in the world that affects metabolic function. Hemodialysis (HD), as a commonly used kidney replacement therapy, often causes anxiety in patients due to the adaptation process to the hemodialysis routine. This study aims to determine the relationship between anxiety levels and blood pressure in CKD patients undergoing HD at Panembahan Senopati Hospital.

Methods: This study aims to determine the relationship between anxiety levels and blood pressure in CKD patients undergoing HD at Panembahan Senopati Hospital

Results: The results showed that the majority of respondents did not experience anxiety (55%), with normal blood pressure in 90% of respondents. The Pearson correlation test showed a moderate relationship between anxiety levels and blood pressure ($r = 0.454$, $p = 0.003$), and was positive, which means that the higher the anxiety, the higher the blood pressure.

Conclusion: Further researchers are advised to conduct more in-depth interviews to explore anxiety symptoms, psychological approaches to managing mild anxiety, and further studies related to blood pressure fluctuations during hemodialysis

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Introduction

Kidney failure is a sudden decline in kidney function that leads to the kidneys' inability to eliminate metabolic waste and disrupts endocrine and metabolic functions, as well as fluid, electrolyte, and acid-base balance (Pratiwi, 2022). According to Kovesdy, (2022) approximately 800 million people worldwide suffer from chronic kidney disease (CKD), which is one of the leading causes of death globally. CKD ranks as the 11th leading cause of death in the world, with over 1.42 million deaths annually. In Indonesia Christa, (2024) reported that chronic kidney disease accounts for approximately 42,000 deaths each year.

One type of therapy that can improve the quality of life in CKD patients is hemodialysis. Hemodialysis (HD) is the most commonly used renal replacement therapy for CKD patients and is intended to help prolong patient survival. However, undergoing long-term, routine, and lifelong hemodialysis may lead to uncertainty, which in turn can cause anxiety (Husna *et al.*, 2021).

According to Andryani, (2022) excessive anxiety can impair the immune system and increase the risk of contracting viruses that affect hemodynamic

function. Hemodynamics refers to the assessment of the physical aspects of blood circulation, cardiac function, and the physiological characteristics of peripheral vasculature. When a person experiences anxiety, the body responds by activating the sympathetic nervous system, which can result in a temporary rise in blood pressure. This condition may significantly affect blood pressure in CKD patients undergoing hemodialysis (Dallas, 2023).

Blood pressure refers to the force exerted by blood as it flows through the arterial walls, as a result of heart contractions. Blood pressure can be measured by calculating the Mean Arterial Pressure (MAP), which is derived by adding one-third of the systolic pressure to two-thirds of the diastolic pressure (Sulastri *et al.*, 2023).

Chronic kidney disease is a long-term medical condition that requires continuous management, one of which is through hemodialysis therapy. Patients undergoing this procedure often experience anxiety due to various factors, such as lifestyle changes, dependence on dialysis machines, and potential complications. Anxiety experienced by patients may influence various aspects of their health, including blood pressure.

This study aims to examine the relationship between anxiety levels and blood pressure in chronic kidney disease patients undergoing hemodialysis at Panembahan Senopati Regional Hospital. Specifically, the study will assess the patients' anxiety levels, measure their blood pressure, and analyze the correlation between the two variables. The results are expected to provide further insight into the psychological impact on patients' physiological conditions, which could serve as a basis for more holistic therapy management.

A preliminary study conducted by the researcher at Panembahan Senopati Regional Hospital in August 2024 found that a total of 332 patients were undergoing hemodialysis, consisting of 213 male and 119 female patients. Based on this data, the researcher was motivated to investigate the relationship between anxiety levels and blood pressure in chronic kidney disease patients undergoing hemodialysis at Panembahan Senopati Regional Hospital.

Method

This study employed a quantitative correlational method with a cross-sectional approach. The research was conducted in January 2025 using a sample of patients undergoing hemodialysis at Panembahan Senopati Regional Hospital who were not taking antihypertensive medications and had been undergoing hemodialysis for less than 12 months. The inclusion criteria were determined based on a study by which found that the use of antihypertensive drugs had a significant effect on lowering both systolic and diastolic blood pressure. Therefore, in order to minimize potential bias in blood pressure measurement due to fluctuations, this study included only respondents who were not on antihypertensive medication.

Patients undergoing hemodialysis for less than 12 months were selected to limit the duration of exposure to the treatment, as individuals who have been on hemodialysis for a longer period typically experience lower levels of anxiety due to increased familiarity with the procedure (Husna *et al.*, 2021).

The total population consisted of 72 individuals, from which a sample of 40 participants was determined using Slovin's formula. This study used a simple random sampling technique. The dependent variable was anxiety level, while the independent variable was blood pressure. The instrument used to assess anxiety was the Hamilton Anxiety Rating Scale (HARS), which had previously been tested for validity and reliability in a study by Khoirini *et al.*, (2023) yielding a validity coefficient of 0.491 and a Cronbach's alpha of 0.911.

Blood pressure was measured using Mean Arterial Pressure (MAP), calculated with the formula: one-third of the systolic pressure plus two-thirds of the diastolic pressure. This approach facilitated the hypothesis testing through correlational analysis using a single numerical value.

Data analysis included a Shapiro-Wilk normality test for both variables. The results showed a normality value of 0.88 for anxiety levels and 0.24 for blood pressure, indicating that both variables were normally distributed. Subsequently, univariate analysis using frequency distribution and bivariate analysis using Pearson correlation test were conducted

Results

Following interviews with 40 respondents, the results were as follows:

Table 1. Respondent Characteristics

Variable	Frequency	Percentage
Gender		
Male	25	62,5 %
Female	15	37,5 %
Age		
<40 years	5	12,5 %
40 – 60 years	25	62,5 %
>60 years	10	25 %

Among the 40 respondents who completed the research questionnaire, the majority were male (62.5%). Most respondents were aged between 40 and 60 years, totaling 25 individuals (62.5%).

Table 2. Respondents' Anxiety Levels

Anxiety Level	Frequency	Percentage
No Anxiety	22	55 %
Mild Anxiety	18	45 %
Moderate Anxiety	0	0 %
Severe Anxiety	0	0 %
Very Severe Anxiety	0	0 %

The majority of respondents, 22 individuals (55%), experienced no anxiety, indicated by a HARS score below 14. A total of 18 respondents (45%) experienced mild anxiety. None of the respondents reported moderate, severe, or very severe anxiety levels.

Table 3. Respondents' Blood Pressure Data

Blood Pressure Category	Frequency	Percentage
Hypotension	0	0%
Normal	36	90 %
High Normal	4	10 %
Stage I Hypertension (Mild)	0	0 %
Stage II Hypertension (Moderate)	0	0 %
Stage III Hypertension (Severe)	0	0 %
Stage IV Hypertension (Very Severe)	0	0 %

The majority of respondents, 36 individuals (90%), had normal blood pressure, with a MAP range between 70–100 mmHg. Four respondents (10%) had high-normal blood pressure, and none experienced hypertension of any stage.

Table 4. Relationship Between Anxiety Levels and Respondents' Blood Pressure

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Anxiety Level	Blood Pressure (MAP)				Total		P-Value
	Normal		High Normal				
	n	%	n	%	n	%	
No anxiety	21	52,5 %	1	2,5 %	22	55 %	0.003

Mid anxiety	15	37,5 %	3	7, 5%	18	45 %
Correlation Coefficient	0,454					

The significance value of the parametric hypothesis test using Pearson Correlation was 0.003 ($p < 0.05$), with a correlation coefficient of 0.454. This indicates a moderate strength of correlation between anxiety levels and blood pressure.

Discussion

In this study, the majority of respondents were male, totaling 25 individuals (62.5%), while females comprised 15 individuals (37.5%). A similar pattern was found in a study conducted by Malinda et al., (2022) where 49 participants (55.7%) were male and 39 (44.3%) were female. Men are more likely to engage in habits such as smoking, alcohol consumption, and unhealthy diets, all of which contribute to the risk of hypertension and diabetes—two leading causes of kidney failure. Additionally, the hormone estrogen in women is known to have protective effects on the kidneys, whereas testosterone in men may accelerate the progression of chronic kidney disease.

This finding is also supported by Salsabilla et al., (2023) who reported that 53% of respondents were male. Men are also at risk for prostate enlargement, which can cause urinary obstruction and infection; if untreated, these can lead to kidney failure. According to Tampah et al., (2023) found that 47 male respondents (15.9%) experienced intradialytic hypotension. The high incidence of kidney failure among men may be attributed to excessive physical activity, supplement and alcohol consumption, and smoking, all of which can trigger hypertension and diabetes. Moreover, the longer male urethra can result in urine crystallization into stones, causing obstruction, infection, and damage to the bladder, ureters, and kidneys.

In the present study, the majority of respondents were aged between 40 and 60 years (25 respondents, 62.5%), while 5 (12.5%) were under 40 years, and 10 (25%) were over 60. These findings align with a study by Siagian et al., (2021) where most respondents were aged 56–65 years (13 individuals, 35.1%). Kidney failure is often diagnosed later in life due to the cumulative effects of long-term unhealthy lifestyles. However, other factors beyond age also contribute to the rising number of patients undergoing hemodialysis.

Komariyah et al., (2024) similarly reported that the majority of respondents (81.3%) were adults. As people age, the risk of chronic illnesses, including chronic kidney disease—increases. Certain diseases tend to manifest at specific life stages, particularly chronic illnesses that develop over time and typically present in adulthood. Wahyuningsih & Astuti, (2022) found that most patients undergoing hemodialysis were between 45 and 60 years old. One key factor in the development of chronic kidney disease is aging, which can lead to a decline in renal function. With age, some individuals experience a decrease in creatinine clearance of approximately 0.75 mL/min per year, while others do not.

In this study, most respondents did not experience anxiety, likely due to effective coping mechanisms and favorable health conditions. Anxiety disorders may occur when individuals struggle to manage stress, and clinically, these conditions can become pervasive and persistent, lasting for at least one month. Among hemodialysis patients—especially those who have undergone therapy for less than a year—anxiety and depression are common. This is due to the adaptation process, which includes new experiences such as the use of large needles, lying down for 3–4 hours, and a radically altered routine that can be difficult for some patients to accept (Marisi Dame et al., 2022).

Wahyuni, (2023) using the Hamilton Anxiety Rating Scale (HARS), found that 22 respondents (36.7%) reported no anxiety, while 23 respondents (38.3%) experienced mild anxiety out of a total of 60 participants. Generally, factors influencing anxiety in hemodialysis patients fall into two categories: internal and external. Internal factors include emotional state, personality, religiosity, and spirituality, while external factors involve

social support, treatment experience, and the social environment. Saadah & Hartanti, (2021) reported that 112 respondents (34.46%) experienced no anxiety. Hemodialysis patients often undergo physical and psychological changes, including a sense of loss due to disrupted normal life. This may lead to psychological distress, particularly anxiety over uncertainty in recovery. Unfortunately, anxiety in hemodialysis patients is often overlooked, despite its significant impact on health and treatment adherence.

In this study, most hemodialysis patients had normal blood pressure, possibly due to healthy cardiovascular function. The study also applied inclusion criteria that excluded those taking antihypertensive medications and included only those who had been undergoing hemodialysis for less than 12 months—both factors that can influence blood pressure readings. Contributing factors to increased blood pressure during dialysis include patient-specific factors, dialysis therapy, endothelial dysfunction, and fluid or volume shifts. These combined factors may increase cardiac output and induce vasoconstriction, leading to intradialytic hypertension, which is characterized by a ≥ 20 mmHg rise in systolic blood pressure (SBP) during dialysis. Intradialytic hypertension is reported in 5–15% of regular hemodialysis patients (Omega & Kezia Prilla, 2023).

Contrasting findings were reported by Utomo & Rochmawati, (2021) where respondents had hypertensive blood pressure levels, with a systolic average of 162.5 mmHg and a diastolic average of 88.5 mmHg. Hypertension may be caused by fluid overload that increases cardiac workload. Moreover, sympathetic nervous system activation and alterations in the renin-angiotensin-aldosterone system can also contribute to elevated blood pressure. Yanti Rosalina Pasaribu et al., (2021) found in their study at the hemodialysis unit of RSUD Bethesda Tomohon that only 9 out of 40 respondents (22.5%) had normal blood pressure prior to hemodialysis. Patients' blood pressure may be normal before dialysis but increase afterward, or remain elevated throughout the session. Cardiovascular disorders are a major risk factor among patients with chronic kidney disease, with a 10–30 times higher risk compared to the general population.

Based on Pearson's correlation test conducted to examine the relationship between anxiety levels and blood pressure, a p-value of 0.003 was obtained. Since this value is less than the significance level of 0.05, it can be concluded that there is a significant relationship between anxiety levels and blood pressure among chronic kidney disease patients undergoing hemodialysis at RSUD Panembahan Senapati.

A study by Irawan et al., (2023) demonstrated that anxiety can affect blood pressure through physiological mechanisms, including activation of the sympathetic nervous system and the release of stress hormones such as adrenaline and cortisol. These mechanisms can elevate both systolic and diastolic blood pressure. The study also noted that chronic anxiety may contribute to long-term hypertension risk, particularly in individuals with existing cardiovascular risk factors. Khasanah et al., (2023) also found that anxiety is a contributing factor to increased blood pressure. A study among employees at Panca Bhakti University supported this finding; using the Spearman Rho test, it revealed a significant relationship between anxiety levels and diastolic blood pressure, with a p-value of 0.001. This suggests that anxiety not only affects psychological well-being but also has a significant physiological impact on blood pressure.

In this study, the relationship between anxiety levels and blood pressure was positive. Dallas, (2023) when a person experiences anxiety, the body responds by activating the sympathetic nervous system, which can temporarily increase blood pressure. If this response occurs continuously, it can damage the cardiovascular system. A positive

correlation indicates that higher anxiety levels are associated with higher blood pressure. Several strategies can be employed to reduce anxiety, including the implementation of autogenic training (Prasestiyo, Nurachmah, & Nuraini, 2024)

The correlation coefficient (r) in this study was 0.454, indicating a moderate correlation. According to Samuel J. Wisniewski, (2025) this suggests a meaningful association between the variables, though not strong enough to be considered a high correlation. Multiple factors may influence patients as respondents, including caregiver involvement (Prasestiyo, Nurachmah, Nurmaguphita, et al., 2024). Further observation is necessary to identify factors that may affect the strength of the relationship between these variables.

Conclusion

Based on the findings of this study, the majority of respondents (55%) did not experience anxiety. Most respondents also had normal blood pressure, with a mean arterial pressure (MAP) ranging between 70–100 mmHg. The results of the Pearson correlation test indicated a significant relationship between anxiety levels and blood pressure. The hypothesis was tested using parametric analysis, and the Pearson correlation yielded a p -value of 0.003. The correlation coefficient (r) was 0.454 with a positive direction, indicating a moderate, direct relationship. This means that higher anxiety levels are associated with higher blood pressure, and vice versa.

As a recommendation, this study suggests conducting more in-depth interviews to obtain additional information regarding anxiety symptoms, as well as further research to explore the underlying causes of blood pressure fluctuations. In addition, a more comprehensive approach could be developed to help respondents manage mild anxiety independently. These findings are also expected to serve as a valuable reference for hemodialysis nurses in implementing preventive measures and for future studies examining the relationship between anxiety levels and blood pressure.

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