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Disassociation Between Anxiety Levels and Blood Pressure in Pre-Hemodialysis Patients: A Cross-Sectional Study

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ABSTRACT

Background: Patients with chronic kidney disease receiving hemodialysis often experience anxiety, irrespective of their treatment duration, due to the chronic nature of the condition. While anxiety is known to impact blood pressure, the correlation between anxiety levels and blood pressure in patients awaiting hemodialysis remains unclear and requires further study.
Objective: The objective of this study is to determine the association between anxiety levels and blood pressure in patients awaiting hemodialysis.
Methods: A quantitative cross-sectional study was conducted among 152 patients with chronic kidney disease undergoing hemodialysis, recruited through total sampling at the Hemodialysis Unit between April and May 2025. The Hamilton Anxiety Rating Scale (HARS) was used to evaluate anxiety levels, and blood pressure and Mean Arterial Pressure (MAP) were recorded before hemodialysis. The relationship between variables was analyzed using the Spearman rank test.
Results: The characteristics of respondents were dominated by males (57.9%, n=88), aged late elderly (32.9%, n=50), with secondary education (73.7%, n=112), not working (61.8%, n=94), and had undergone hemodialysis therapy for more than 1-5 years (57.9%, n=88). The majority of respondents did not experience anxiety (78.3%, n=119). In addition, the majority of respondents had high blood pressure (57.2%, n=87). No significant relationship between anxiety levels and blood pressure in patients before hemodialysis was found (p=0.202).
Conclusion: The findings indicate that patients undergoing hemodialysis for 1 to 5 years typically exhibit low anxiety levels. However, blood pressure remains elevated in this population, likely due to the underlying chronic kidney disease pathophysiology. Regular hemodynamic monitoring by nursing staff is crucial, even in patients with low anxiety. Additional research is needed to identify other factors related to blood pressure management in chronic kidney disease patients.

***Keywords**: Anxiety, Blood pressure, Hemodialysis, Chronic kidney disease*

INTRODUCTION

Chronic kidney disease is a pathological process of progressive kidney damage persisting for over three months, characterized by structural or functional abnormalities associated with a glomerular filtration rate (GFR) below 60 mL/min/1.73 m², and manifesting as abnormalities in imaging studies and alterations in blood or urine composition [1]. Global Prevalence Chronic kidney disease approximately 13.4% of the global population is affected by Chronic kidney disease, which translates to around 843.6 million individuals. Other estimates suggest that over 800 million individuals worldwide have Chronic kidney disease. Between 2020 and 2030, the number of Chronic kidney disease deaths is forecasted to increase further to 1,812.85 thousand [2]. Mortality due to Chronic kidney disease is projected to increase by 41.5% by 2040. Mortality Rate Chronic kidney disease is responsible for over 1.2 million deaths annually, with projections indicating it could become the fifth leading cause of death globally by 2040 [3]. The 2018 Riskesdas report reveals an increase in Chronic kidney disease prevalence in Indonesia, with rates escalating from 0.2% to 0.3% between 2013 and 2018 [4]. The Chronic kidney disease prevalence rate in Indonesia is reported to be 0.38% [5].

Alterations in the lives of hemodialysis patients can precipitate a range of complications, resulting in discomfort, anxiety, diminished self-esteem, disturbed body image, and fatigue. Anxiety is characterized by vague and diffuse apprehension, often associated with feelings of uncertainty and powerlessness that are subjective in nature [6]. Patients with Chronic kidney disease, particularly those undergoing hemodialysis, often experience a range of physical and psychological symptoms, including anxiety. Anxiety is a common mental health issue in patients with Chronic kidney disease, and it can have significant implications for their overall well-being and quality of life [7].

Anxiety is not directly detectable by the autonomic nervous system. However, the sympathetic branch of the autonomic nervous system responds directly to smooth muscle and internal organs, inducing various physiological changes. This response can stimulate the adrenal medulla to release adrenaline and cortisol into the bloodstream, leading to increased heart rate and blood pressure. Furthermore, norepinephrine is released indirectly through its action on the pituitary gland, which triggers the release of glucose from the liver. A substantial proportion (approximately 70-80%) of patients undergoing regular dialysis experience hypertension, defined as blood pressure >140/90 mmHg, yet effective blood pressure management often proves elusive [8]. The prevalence of hypertension varies widely among studies because of differences in the definition of hypertension and the methods of used to measure blood pressure [9].

Research suggests that both pre-dialysis systolic blood pressure and peridialytic changes in systolic blood pressure are predictive of adverse outcomes, including morbidity and mortality, in hemodialysis patients. Studies increasingly support a relationship between anxiety and hypertension, highlighting the importance of considering comorbid anxiety in hypertension management [10]. However, the relationship between anxiety levels and blood pressure in pre-hemodialysis patients is complex and remains poorly understood. Clinicians should prioritize early detection and management of both anxiety and hypertension to improve patient outcomes, given the significant relationship between these conditions [11]. Therefore, this study

aims to investigate the correlation between anxiety levels and blood pressure in pre-hemodialysis patients. By elucidating the association between these two variables, we seek to enhance our understanding of the intricate interplay between psychological and physiological factors in patients with chronic kidney disease. The findings of this study may have significant implications for the management of anxiety and blood pressure in pre-hemodialysis patients, and may inform the development of targeted interventions to optimize patient outcomes and improve overall quality of care.

METHODS

This study employed a quantitative approach with a cross-sectional design, utilizing the Spearman rank test for statistical analysis. A total of 152 patients with chronic kidney disease were recruited between April and May 2025. The inclusion criteria comprised patients who were undergoing routine hemodialysis, able to communicate verbally, literate, aged >18 years, and willing to participate in the study. Conversely, patients were excluded if they were in critical condition or experiencing a decline in condition, had mental disorders, severe dementia, or were initiating hemodialysis or undergoing cyto hemodialysis. This study received approval from the Health Research Ethics Committee (No. 110/KEP-PKU/IV/2025)

This study employed the Hamilton Anxiety Rating Scale (HARS) Indonesian Version questionnaire as the primary research instrument to assess anxiety symptoms in patients with chronic kidney disease undergoing hemodialysis. The reliability analysis of the Indonesian version of the HARS in dialysis patients revealed a Cronbach's Alpha coefficient of 0.793, indicating good internal consistency [2]. The HARS comprises 14 items, each scored on a scale of 0 to 4, with higher scores indicating greater anxiety severity. The total score ranges from 0 to 56, with the following anxiety level categories: no anxiety (<14), mild anxiety (15-20), moderate anxiety (21-27), severe anxiety (28-41), and very severe anxiety (42-56).

Blood pressure was measured using a calibrated digital sphygmomanometer, and the Mean Arterial Pressure (MAP) was calculated using the MAP calculation formula. The MAP values were then classified into three categories: low (<70 mmHg), normal (70-105 mmHg), and high (>105 mmHg).

Data processing was conducted using SPSS, encompassing editing, coding, and tabulation. The analysis comprised univariate analysis to describe respondent characteristics, anxiety levels, and blood pressure, as well as bivariate analysis using the Spearman rank test to examine the correlation between anxiety levels and blood pressure in pre-hemodialysis patients.

RESULT

The demographic characteristics of the respondents are presented in Table 1. The results indicate that the majority of respondents are male, accounting for 57.9% (*n*=88) of the sample. In terms of age, the largest proportion of respondents fall within the late elderly category, comprising 32.9% (*n*=50) of the sample. With regard to educational attainment, the majority of respondents have completed elementary, junior high, or senior high school, or equivalent, representing 73.7% (*n*=112) of the sample.

The occupational distribution reveals that the majority of respondents are unemployed, accounting for 61.8% (*n*=94) of the sample. Furthermore, the duration of hemodialysis treatment

indicates that the majority of respondents have been undergoing hemodialysis for a period of 1-5 years, representing 57.9% (*n*= 88) of the sample

Table 1. Characteristics of Pre-Hemodialysis

Characteristics of Respondents		**Frequency (n=152)**	**Percentage (%)**
Gender	Male	88	57.9 %
	Female	64	42.1%
Age	Late Adolescence (17-25)	2	1.3%
	Early Adulthood (26-35)	11	7.2%
	Late Adulthood (36-45)	17	11.2%
	Early Elderly (46-55)	42	27.6%
	Late Elderly (56-65)	50	32.9%
	Very old (>65)	30	19.7%
Education Level	No formal education	11	7.2%
	elementary/Junior High/Senior High	112	73.7%
	Higher Education	29	19.1%
Occupation	Employed	58	38.2%
	Unemployed	94	61.8%
Duration of Hemodialysis	<1 year	28	18.4%
	1-5 years	88	57.9%
	>5 years	36	23.7%

Table 2. Anxiety Levels among Pre-Hemodialysis Respondents (*n*=152)

Anxiety Level	**Frequency (*n*= 152)**	**Percentage (%)**
No anxiety	119	78.3%
Mild anxiety	15	9.9%
Moderate anxiety	13	8.6%
Severe anxiety	5	3.3%
Total	152	100.0%

The distribution of anxiety levels among respondents, as presented in Table 2, reveals that the majority (78.3%, *n*=119) did not experience anxiety, whereas a minority (3.3%, *n*=5) reported severe anxiety. According to Table 3, the distribution of blood pressure among respondents reveals that high blood pressure was the most prevalent, affecting 57.2% (*n*=87) of the sample, while low blood pressure was the least common, occurring in only 0.7% (*n*=1) of respondents.

Table 3. Characteristics of Blood Pressure among Pre-Hemodialysis Patients

Blood Pressure	**Frequency (*n*=152)**	**Percentage (%)**
Low blood pressure	1	0.7%
Normal blood pressure	64	42.1%
High blood pressure	87	57.2%
Total	**152**	**100.0%**

Table 4. Characteristics of Anxiety Levels and Blood Pressure among Pre-Hemodialysis Patients

	Blood Pressure						**Total**	
Anxiety	**Low Blood Pressure**		**Normal Blood Pressure**		**High Blood Pressure**			
Level	f	%	f	%	f	%	f	%
No Anxiety	1	0.8	53	44.5	65	54.6	119	100
Mild	0	0	5	33.	10	66.7	15	100
Moderate	0	0	5	38.5	8	61.5	13	100
Severe	0	0	1	20.0	4	80.0	5	100
Total	1	0.7	64	42.1	87	57.2	152	100

An analysis of Table 4 reveals that the majority of respondents (78.3%, *n*=119) did not experience anxiety, while 57.2% (*n*=87) of the total sample had high blood pressure. A breakdown of blood pressure by anxiety level shows that among respondents without anxiety, 54.6% (*n*=65) had high blood pressure. This proportion was higher among respondents with mild anxiety (66.7%, *n*=10), moderate anxiety (61.5%, *n*=8), and severe anxiety (80%, *n*=4), who predominantly had high blood pressure.

Table 5. Correlation between Anxiety Levels and Blood Pressure in Pre-Hemodialysis Patients

Correlation				
			Anxiety Level	*Blood Pressure (MAP)*
Spearman's rho	*Anxiety Level*	*Correlation Coefficient*	1.000	.104
		Sig. (2-tailed)	.	.202
		N	152	152
	Blood Pressure (MAP)	*Correlation Coefficient*	.104	1.000
		Sig. (2-tailed)	.202	.
		N	152	152

The Spearman rank analysis revealed a non-significant correlation between anxiety levels and blood pressure in pre-hemodialysis patients, with a p-value of 0.202 ($p > 0.05$). Consequently, the

null hypothesis (H0) was accepted, and the alternative hypothesis (H1) was rejected. The correlation coefficient of 0.104 indicates a weak and positive relationship between the variables; however, this relationship did not reach statistical significance. Therefore, it can be concluded that there is no significant association between anxiety levels and blood pressure in this population (Table 5)

DISCUSSION

The study's findings on the majority of hemodialysis patients being male align with existing research suggesting sex differences in kidney disease progression. Studies have consistently shown that males are more prone to kidney function decline and progression to end-stage renal disease (ESRD) compared to females [13, 14]. This notable disparity can be attributed to a multifaceted interplay of factors. From a biological perspective, differences in sex hormones and genetic predispositions may play a significant role in influencing kidney disease progression. For instance, estrogen has been found to have potential protective effects on the kidneys, which may contribute to the observed differences in disease progression between males and females [15].

The majority of respondents fell within the late elderly age group, accounting for 32.9% (*n*=50) of the study population. Age is a significant factor affecting patients undergoing hemodialysis, as kidney function naturally declines with advancing age, characterized by a decrease in glomerular filtration rate and deterioration of kidney tubule function [16, 17]. The prevalence of CKD was significantly associated with factors such as older age, hypertension, diabetes, and increased body mass index [18]. Chronic kidney disease is prevalent in older adults [19]. Chronic kidney disease was found to be prevalent among older adults, with significant associations observed with age, poor self-rated health, obesity, diabetes, and metabolic syndrome [20]. Aging-related declines in estimated glomerular filtration rate (eGFR) can complicate the diagnosis of diabetic kidney disease (DKD) in older adults, especially in the absence of significant albuminuria [21].

A striking finding was the lack of association between anxiety levels and blood pressure in the pre-hemodialysis patient population. Studies have consistently demonstrated a close interrelationship between hypertension and chronic kidney disease (CKD), wherein hypertension exacerbates kidney damage and CKD progression contributes to elevated blood pressure. The pathophysiological mechanisms underlying hypertension in CKD are complex and multifactorial, encompassing a range of factors including nephron loss, sodium retention, sympathetic nervous system overactivity, dysregulation of the renin-angiotensin-aldosterone system (RAAS), and endothelial dysfunction [22]

Most patients in our study had been receiving hemodialysis for 1-5 years. Notably, the majority of patients (78.3%, *n*=119) did not experience anxiety. This finding may be attributed to the development of better coping mechanisms and adaptation to treatment among patients who have undergone hemodialysis for an extended period. Furthermore, the complex interplay between physical and psychological factors, as well as treatment effectiveness, underscores the multifaceted nature of anxiety in hemodialysis patients. Patients undergoing dialysis employ various coping strategies to manage their stress, which can be effective in some cases, but may also be ineffective or even detrimental when unhealthy coping mechanisms are used [23].

High blood pressure was prevalent among the majority of respondents (57.2%, *n*=87), hypertension is a common comorbidity in patients with kidney disease and those undergoing hemodialysis (24). There is a complex relationship between hypertension and chronic kidney disease (CKD), and both conditions can have a considerable impact on a person's health-related quality of life (HRQoL) [25].

Anxiety is a common comorbidity among hemodialysis patients with chronic kidney disease, often precipitated by financial, employment, and mortality-related stressors [26, 27]. However, patients who have undergone long-term hemodialysis treatment frequently develop effective coping mechanisms, resulting in reduced anxiety levels [23]. Hence, blood pressure is not always correlated with anxiety, but rather with the pathophysiology of chronic kidney disease (CKD).

A limitation of the study is that the blood measurement procedure varied among patients, with measurements taken in either a sitting or prone position depending on the patient's positional ability, which may have potentially influenced the results.

CONCLUSION

Hemodialysis patients with a treatment duration of 1-5 years often present with low anxiety levels, yet hypertension is commonly observed in this group, likely due to the complex pathophysiology of chronic kidney disease. Consequently, in nursing practical implications for routine hemodynamic monitoring is crucial, regardless of anxiety levels. Additional research is needed to explore the multifaceted factors contributing to blood pressure variability in chronic kidney disease patients. Additional future research is needed to identify other factors related to blood pressure management in chronic kidney disease patients.

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