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Original Article

The Impact of Psychoeducation on Anxiety Levels in Chronic Kidney Disease Patients Undergoing Hemodialysis: A Quasi-Experimental Study

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ABSTRACT

Background: Anxiety is a common psychological problem in patients with chronic kidney disease (CKD), resulting from medical conditions, lifelong hemodialysis treatment, and lifestyle changes. If not properly managed, anxiety may negatively affect patient's health and well-being. Therefore, appropriate interventions are needed to reduce anxiety levels in CKD patients.
Methods: This study used a quasi-experimental design with a pre-test and post-test control group approach. A total of 42 hemodialysis patients at RS Tk. II 04.05.01 dr. Soedjono were selected using purposive sampling and assigned to experimental and control groups. The experimental group received psychoeducation, while the control group received standard care. Anxiety levels were measured using the Hamilton Anxiety Rating Scale (HARS) and factors influencing anxiety were assessed using the Kuesioner Faktor Penyebab Kecemasan pada Pasien Penyakit Ginjal Kronik (K-FPK PGK). Data were analyzed using paired t-test, independent t-test, and binary logistic regression.
Results: A significant reduction in anxiety levels was observed in the intervention compared with the control groups ($p < 0.05$). Logistic regression analysis showed that medical factors ($p = 0.005$) and psychological factors ($p = 0.035$) were significantly associated with anxiety levels.
Conclusion: Psychoeducation was associated with reduced anxiety levels of CKD patients undergoing hemodialysis. However, the findings should be interpreted cautiously due to the limitations of the study design.

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INTRODUCTION

Chronic kidney disease (CKD) has become a global public health concern. This condition is defined as impaired kidney function lasting more than 3 months with a glomerular filtration rate (GFR) <60 mL/min/1.73m^2 and irreversible (Ammirati, 2020). In Asia, the prevalence of CKD has been estimated to range from 7-34,3% affecting approximately 434 million people (Liyanage et al., 2022). In Indonesia, according to the Indonesian Health Survey (2023), the prevalence of CKD diagnosed by doctor was recorded at 0,18% equivalent to 638.178 individuals. Meanwhile, in Central Java Province, the prevalence was reported at 0,2% or approximately 13.975 cases, as documented in the Non-Communicable Disease data (2024).

Various complications have been reported as a result of CKD, such as cardiovascular disease, ischemic stroke, anemia, hyperkalemia, metabolic acidosis, hyperphosphatemia, vitamin

D deficiency, and secondary hyperparathyroidism (T. K. Chen, Knicely, & Grams, 2019; Ghoshal et al., 2020; Li & Lindholm, 2023). A higher risk of mortality has been observed in patients with moderate to severe CKD, which negatively impacts life expectancy (Liu et al., 2024). These complications not only worsen physical conditions but also increase psychological burden. Disturbing symptoms include insomnia, anxiety and depression, uremic pruritus, restless leg syndrome, chronic pain, nausea and vomiting, constipation, and shortness of breath (Rao et al., 2021). One of the most common psychological symptoms experienced by CKD patients is anxiety.

Anxiety is defined as an emotional response to threatening situations, characterized by fear, uncertainty, and helplessness. Among CKD patients, the prevalence of anxiety disorders has been reported at 19%, while anxiety symptoms reach 43% (C. W. Huang et al., 2021). A recent cross-sectional study revealed that one in five patients experienced anxiety or depression before initiating renal replacement therapy (Alaoui et al., 2024). Anxiety may be triggered by fear of death, uncertain prognosis, hopelessness about treatment, and medication side effects (Nair et al., 2021; Zadeh et al., 2022). If left untreated, anxiety may increase the risk of mortality and length of hospitalization (Schouten et al., 2019), interfere with decision-making (Montalescot et al., 2022), reduce medication adherence (P. Huang et al., 2024), and lower quality of life (Alshelleh et al., 2022).

Holistic-oriented interventions are needed to support psychological adaptation in CKD patients, particularly given its incurable and its impact on quality of life. From a nursing perspective, Callista Roy's Adaptation Theory is considered a relevant framework for providing holistic care in these condition (Krismiadi, Dina, Apriyanti, Nazaruddin, & Fujianti, 2024; Nobahar, Saffari, Babamohamadi, Sotodehasl, & Mirmohammadkhani, 2020). This theory conceptualizes adaptation as a coping mechanism that enables individuals to manage changes in CKD patients (Maria, Rondhianto, & Suhari, 2024). In CKD patients, focal, contextual, and residual stimuli such as disease burden and ongoing hemodialysis, may contribute to increased anxiety when coping mechanisms are not effective. These responses are regulated through the regulator and cognator subsystems, which determine whether individuals exhibit adaptive or maladaptive responses. Therefore, constructive adaptive coping has been shown to be effective and realistic in resolving long-term psychological issues (Soeli, Rahim, Bahua, & Masionu, 2022), highlighting the importance of interventions that can support patient's coping processes.

Although various non-pharmacological interventions, such as cognitive behavioral therapy, physical exercise, relaxation, social support, and education, have been reported to reduce anxiety, many of them do not yet fully address psychological aspects comprehensively (Gerogianni, Babatsikou, Polikandrioti, & Grapsa, 2019; Menekli & Çevik, 2021; Sułkowski, Matyja, & Matyja, 2024). Furthermore, psychoeducation considered a more comprehensive method to improve patient's understanding and transform coping mechanism into more adaptive ones. Its implementation focuses on enhancing knowledge and training skills involving emotional regulation, problem-solving, and coping strategies (Sarkhel, Singh, & Arora, 2020; Zhang, Zou, & Zhou, 2024). Several studies in hemodialysis patients have demonstrated the effectiveness of psychoeducation in reducing anxiety (H.-C. Chen et al., 2022; Darmawati, Supriyatno, & Widigdo, 2021; Hidayatulloh, Dewi, Lestari, & Apriliani, 2023; Sumai, Rahmat, & Warsini, 2023). Some studies have examined anxiety alongside other conditions, such as insomnia (Sumai et al., 2023), while others have focused on multiple outcomes, including self-efficacy, depression, medication adherence, and quality of life (H.-C. Chen et al., 2022). In addition, factors associated with anxiety have not been widely explored, offering an opportunity to further examine factors related to anxiety levels in this population.

METHODS

This study applied a quasi-experimental pre-test and post-test with a control group and was conducted at RS Tk. II 04.05.01 dr. Soedjono from January to May 2025, with data collection carried out between March and April 2025. A total of 42 CKD patients undergoing hemodialysis were recruited using purposive sampling. Participants were eligible if they were (1) diagnosed

with CKD, undergoing hemodialysis for at least 3 months, (3) receiving dialysis twice a week, (4) aged 19-59 years old, (5) able to communicate, (6) having adequate cognitive and sensory functions, (7) experiencing anxiety based on HARS, and (8) provided written informed consent. Exclusion criteria included: (1) history of heart disease, (2) use of antidepressants, (3) terminal conditions such as cancer, and (4) uncooperative during the study.

Participants were allocated into experimental and control groups using a non-random assignment by the researcher, with an equal number in each group. Baseline characteristics, including demographic variables and pre-test anxiety levels, were comparable between groups. The experimental group received a structured psychoeducation supported by a psychoeducation booklet, consisting of four sessions delivered over two weeks (20-30 minutes per session). The session included problem identification, knowledge management on CKD and anxiety, anxiety management techniques (relaxation, positive affirmation, and adaptive coping). The control group received standard discharge planning provided by the hospital.

Anxiety levels were measured using the Hamilton Anxiety Rating Scale (HARS), a 14-item instruments measuring psychic and somatic symptoms using a 0-4 Likert scale. Scores range from 0-56, categorized as no anxiety (<14), mild (14-20), moderate (21-27), severe (28-41), and very severe (42-56). Factors associated with anxiety were measured using the Kuesioner Faktor Penyebab Kecemasan pada Penyakit Ginjal Kronik (K-FPK PGK), which evaluates five aspects: medical, psychological, social, economic, and environmental factors. The instrument consists of 20 dichotomous items (Yes/No), with a total score >50 indicating high contributing factors. Content validity was established through expert judgment involving a psychiatric nurse specialist and a psychologist however reliability testing was not performed and is acknowledged as a study limitation.

Before conducting the data analysis, normality and homogeneity tests were performed, and the results showed that the data were normally distributed and homogeneous. Data were analyzed using univariate analysis to describe respondent's characteristics. Bivariate analysis was performed using paired t-test for within-group comparisons and independent t-test for between-group comparisons. Logistic regression was used in the multivariate analysis to identify factors associated with anxiety levels, based on bivariate analysis. Furthermore, ethical approval for this study was obtained from the Research Ethics Committee of RS Tk. II 04.05.01 dr. Soedjono (No. 1051/EC/III/2025).

RESULTS

A total of 42 patients with chronic kidney disease undergoing hemodialysis were included in the study, comprising 21 participants in the experimental group and 21 in the control group. The results are presented in sequence, covering respondents' characteristics, changes in anxiety levels before and after the intervention, comparisons between the two groups, factors associated with anxiety levels, and the explanatory performance of the logistic regression model.

Table 1. Characteristics of Respondent

Characteristics	Experimental Group		Control Group		Total		P-value
	n	%	n	%	n	%	
Age							
19-29 Years	6	28.6	2	9.5	8	19.0	
30-39 Years	6	28.6	4	19.0	10	23.8	0.246
40-49 Years	6	28.6	3	14.3	9	21.4	
50-59 Years	3	14.3	12	57.1	15	35.7	
Gender							
Male	11	52.4	9	42.9	20	47.6	0.537
Female	10	47.6	12	57.1	22	52.4	
Education Level							0.293

Characteristics	Experimental Group		Control Group		Total		P-value
	n	%	n	%	n	%	
Elementary School	4	19.0	7	33.3	11	26.2	
Junior High School	8	38.1	2	9.5	10	23.8	
Senior High School	7	33.3	10	47.6	17	40.5	
Diploma 1	1	4.8	1	4.8	2	4.8	
Bachelor's Degree	1	4.8	1	4.8	2	4.8	
Marital Status							
Single	3	14.3	3	14.3	6	14.3	
Married	17	81.0	15	71.4	32	76.2	0.248
Divorced (Alive)	1	4.8	0	.0	1	2.4	
Widowed	0	.0	3	14.3	3	7.1	
Occupation							
Merchant	3	14.3	2	9.5	5	11.9	
Farmer	2	9.5	4	19.0	6	14.3	
Private Employee	0	.0	1	4.8	1	2.4	
Entrepreneur	2	9.5	0	.0	2	4.8	0.544
Teacher	1	4.8	1	4.8	2	4.8	
Civil Servant	1	4.8	0	.0	1	2.4	
Military Pensioner	1	4.8	0	.0	1	2.4	
Housewife	3	14.3	6	28.6	9	21.4	
Unemployed	8	38.1	7	33.3	15	35.7	
Duration of CKD Diagnosis							0.708
<1 Year	5	23.8	4	19.0	9	21.4	
1-3 Years	8	38.1	10	47.6	18	42.9	
4-6 Years	5	23.8	2	9.5	7	16.7	
7-9 Years	1	4.8	2	9.5	3	7.1	
10-12 Years	2	9.5	3	14.3	5	11.9	
Hemodialysis Frequency							0.[a]
2x/week	21	100.0	21	100.0	42	100.0	

Based on the respondent's characteristics in both groups, the majority were aged 50-59 years (35.7%), female (52.4%), education level in senior high school (40.5%), married (76.2%), unemployed (35.7%), diagnosed with CKD for 1-3 years (42.9%), and all undergoing hemodialysis with a frequency of twice per week. Baseline characteristic showed no statistically significant differences between groups ($p > 0.05$), indicating baseline homogeneity.

Table 2. Differences of Anxiety Levels Before and After Intervention

Groups	Mean	SD	95% CI	Sig. (2-tailed)
Pre-post Experimental Group	6.476	3.444	4.908 – 8.044	0.000
Pre-post Control Group	1.143	2.651	-0.064 – 2.350	0.062

The experimental group showed a significant reduction in anxiety levels after the psychoeducation intervention (mean difference = 6.476 ± 3.444; 95% CI: 4.908 – 8.044; $p < 0.05$), while no significant change was found in the control group ($p = 0.652$).

Table 3. Comparison of Anxiety Levels Between the Groups

	t	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% CI
Equal variances assumed	5.034	0.000	4.286	0.851	2.565 – 6.007

The independent t-test showed a statistically significant difference in anxiety levels between the experimental and control groups following the intervention (mean difference = 4.286; 95% CI: 2.565 – 6.007; $p < 0.05$).

Table 4. Bivariate Analysis of Factors Associated with Anxiety Levels

		Anxiety		No Anxiety		P-Value	OR	95% CI	
		n	%	n	%			Lower	Upper
Medical	Yes	26	96.3	1	3.7	0.000	0.034	0.004	0.316
	No	7	46.7	8	53.5				
Psychological	Yes	24	92.3	2	7.7	0.016	0.107	0.019	0.615
	No	9	56.3	7	43.8				
Social	Yes	1	100.0	0	0.0	1.000	0.780	0.664	0.918
	No	32	78.0	9	22.0				
Economic	Yes	24	82.8	5	17.2	0.422	0.469	0.102	2.147
	No	9	69.2	4	30.8				
Environmental	Yes	14	87.5	2	12.5	0.442	0.388	0.070	2.158
	No	19	73.1	7	26.9				
Total		33	78.6	9	21.4				

Based on the results of the bivariate analysis, only medical and psychological factors were eligible for inclusion in the multivariate analysis ($p < 0.25$).

Table 5. Results of Logistic Regression Analysis of Factors Associated with Anxiety Levels

	B	S.E.	Wald	df	Sig.	Exp (B)
Medical Factors	-3.447	1.241	7.714	1	0.005	0.032
Psychological Factors	-2.307	1.091	4.469	1	0.035	0.100
Constant	1.241	0.808	2.362	1	0.124	3.460

The Logistic regression analysis identified medical factors and psychological factors as significant predictors of anxiety levels among CKD patients. Medical factors showed the strongest association with anxiety (OR = 0.032; $p = 0.005$), while psychological factors were also significantly associated (OR = 0.100; $p = 0.035$).

Table 6. Goodness-of-Fit Statistics for the Logistic Regression Model

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
23.932	0.375	0.580

The logistic regression model demonstrated moderate explanatory power, with a Nagelkerke R Square value of 0.580, indicating that the model explained 58.0% of the variance in anxiety levels among CKD patients.

DISCUSSION

The respondents in this study were characterized by age, gender, education level, marital status, occupation, duration of CKD diagnosis, and hemodialysis frequency. Most respondents were aged 50-59 years (35.7%), although a notable proportion were aged 19-29 years (19.0%), indicating that CKD also affects younger populations. This aligns with global CKD burden literature, showing increasing prevalence among aged 15-39 years and a progressive increase with age (Sun et al., 2024). The majority of respondents were female (52.4%), which is in line with evidence suggesting that gender-related biological and socio-cultural factors may influence CKD

susceptibility (García et al., 2022). In terms of education, most respondents had completed senior high school, with a considerable proportion having lower educational levels, which may affect health literacy and disease management understanding, as lower education is associated with poorer health information comprehension, while higher education is linked to better health literacy (Albuquerque et al., 2022; Jassem & Al-Ashour, 2023; Park et al., 2021). Most respondents were married (76.2%), reflecting the typical social characteristics of patients in late adulthood (Darmawati et al., 2021; Sumai et al., 2023). Additionally, a substantial proportion of respondents were unemployed (35.7%), which may reflect the impact of CKD on patient's social and economic functioning. Furthermore, low socioeconomic background has been associated with increased vulnerability to the disease, due to limited access to healthcare services and delayed early detection, particularly among individuals living in rural areas (Buralli, Moreira, Santo, Calice-Silva, & Nerbass, 2024; Shen et al., 2019; Zeng et al., 2018). Most respondents had been diagnosed with CKD for 1-3 years (42.9%), followed by <1 year (21.4%), indicating that many were in the early phase of adaptation to chronic illness. Overall, these demographic and clinical characteristics may influence patient's psychological responses, including anxiety, in the context of chronic disease management.

Based on the results, the baseline anxiety between the experimental and control groups were relatively comparable. Following the intervention, a reduction in mean anxiety was observed in the experimental group, while the control group showed minimal change. This indicates a greater improvement in anxiety levels following psychoeducation in the experimental group compared to the control group. These findings are consistent with previous studies reporting that anxiety in CKD patients is influenced by multiple stressors, including uncertainty about disease progression, fear of long-term treatment, and the burden of hemodialysis (Alshelleh et al., 2022; Nair et al., 2021). In addition, the duration of hemodialysis has been identified as a contributing factor to anxiety (Uzoechi & Figueiredo, 2022), highlighting the interaction between medical and psychosocial determinants.

Variations in anxiety levels may also be associated with adaptation processes and coping mechanism. Most respondents had been diagnosed with CKD for 1-3 years, suggesting that they had likely passed the initial adaptation phase. This aligns with the adaptation theory by Callista Roy, which emphasizes that the adaptation process involves coping mechanisms through the regulator and cognator subsystems in response to focal, contextual, and residual stimuli. This theory is considered appropriate and relevant for application to CKD patients (Krismiadi et al., 2024; Maria et al., 2024). Patients who have undergone longer treatment durations may develop more effective coping strategies, leading to better emotional regulation and lower anxiety levels (Tiwouw, Umboh, & Awaludin, 2024). Furthermore, social support and adaptive coping have been shown to be inversely associated with anxiety levels (Soeli et al., 2022), and that emotional support from family contributes to better psychological well-being in CKD patients (Anggraini, Baihaqi, Antoni, Faizin, & Lahdji, 2024). Nevertheless, it must be acknowledged that each patient has a different adaptation pattern influenced by their personal perception of the illness, life experiences, and the social support they receive. Employment status may also influence the perception of stress, as a considerable proportion of respondents in this study were unemployed. This finding is supported by previous research indicating that employment status is associated with anxiety levels (Sumai et al., 2023). While being unemployed may reduce certain social demands, it can also increase feelings of dependency or helplessness, which can trigger anxiety. Anxiety in CKD patients is recognized as a dynamic and multifactorial condition that changes over time (Jeronimus, 2019). Although most patients experienced mild anxiety, appropriate management remains necessary to prevent potential worsening. Therefore, psychoeducation may be beneficial in helping patients better understand their condition and develop adaptive coping strategies to manage anxiety.

Psychoeducation is a form of psychotherapy designed to provide information, enhance knowledge, and support CKD patients in developing anxiety management skills. In CKD patients, psychoeducational intervention is considered highly relevant, as the prolonged course of the

disease often triggers psychological issues. In this study, psychoeducation was delivered in a structured manner to the experimental group, covering problem identification, information about CKD, anxiety, and its management. The intervention was associated with a statistically significant reduction in anxiety levels in the experimental ($p < 0.05$), indicating its effectiveness in reducing anxiety. These findings are consistent with the study by Darmawati et al (2021) which reported a mean difference in anxiety levels among hemodialysis patients before and after receiving psychoeducation of 4.8 ($p = 0.000$). In contract, the control group showed no statistically significant change in anxiety levels was observed ($p > 0.05$), indicating that anxiety levels remained relatively stable without intervention. The complexity of the medical condition, the time-consuming nature of hemodialysis therapy, and uncertainty about prognosis are several factors that may contribute to anxiety if not adequately managed. In this study, psychoeducation has contributed to helping patients understand and accept their health condition, while also supporting emotional adaptation strategies through educational and supportive approaches. This is reinforced by the findings showing that psychoeducation is effective in addressing psychosocial issues, including anxiety, depression, and quality of life in CKD patients (Zhang et al., 2024).

A comparison between the two groups showed a significant effect of psychoeducation on anxiety levels in CKD patients ($p < 0.05$). This result is consistent with three previous studies that also reported a significant effect of psychoeducation on anxiety levels in CKD patients (Darmawati et al., 2021; Hidayatulloh et al., 2023; Sumai et al., 2023). The structured intervention provided in this study may contribute to reducing anxiety and highlights the importance of addressing psychological aspects in holistic nursing practice. The impact of psychoeducation may be explained by increased understanding and emotional regulation skills developed during the intervention. Patient's psychological adaptation mechanisms were strengthened through a series of systematic sessions, which may lead to more controlled responses to stress. The systematic delivery of psychoeducation helps improve patient's understanding, making them better prepared to cope with psychological challenges (Parry, 2019).

In addition to providing information, psychoeducation may also support behavioral adaptation and enhance coping capacity. For example, the use of positive affirmation may help foster a more adaptive mindset, thereby reducing the tendency toward excessive anxious thoughts (Susanti, Fuspita, Eliyanti, Amita, & Yatimah, 2023). These findings suggest that a holistic approach addressing emotional, cognitive, and social aspects may support anxiety management in CKD patients. If anxiety is not properly managed, it may affect various aspects of a patient's health and well-being. Previous studies have shown that untreated anxiety may be associated with physical symptoms, reduced treatment adherence, and lower quality of life (M., S., Vadakkiniath, & A., 2023; Roy et al., 2024). Furthermore, anxiety has been linked to increased risk of hospitalization and poorer clinical outcomes (P. Huang et al., 2024; Schouten et al., 2019, 2020), as well as impacting patient's ability to make decisions related to their care (Montalescot et al., 2022). Collectively, these findings suggest that addressing anxiety remains an important component of patient care in CKD.

Based on the results of logistic regression analysis, medical factors were found significantly affecting anxiety levels in CKD patients ($p = 0.005$). This finding suggests that clinical-related conditions captured in the medical domain (e.g., disease progression, dependence on hemodialysis, perceived complications, medication side effects, and physical limitations) may influence patient's emotional responses. Complications such as hypertension, anemia, metabolic acidosis, hyperuremia, and hyperkalemia have been reported in CKD patients undergoing hemodialysis (Singh et al., 2023; Utami, Santhi, & Lestari, 2020). More than two-thirds of patients have been reported to experience complications, particularly those with cardio-renal-metabolic comorbidities (Lau et al., 2024). These clinical burdens may contribute to psychological distress, including anxiety. As disease symptoms worsen and treatment becomes long-term, emotional stress, particularly anxiety, may increase. Furthermore, anxiety arising from medical conditions is also associated with uncertainty about the future. The routine hemodialysis procedure, conducted twice a week for about 4-5 hours per session, demands significant time and energy,

thereby limiting patient's daily activities. In addition, concerns about potential complications and uncertainty regarding disease prognosis may further contribute to psychological stress. This is supported by findings indicating that higher perceived uncertainty is associated with increased anxiety among CKD patients (Cheng et al., 2022).

In addition, psychological factors were significantly associated with anxiety levels in CKD patients ($p = 0.035$). These factors included fear of death, helplessness, emotional distress, concerns about the future, and loneliness. Psychological distress in CKD patients is closely related to illness perception and the long-term burden of hemodialysis, which may increase vulnerability to anxiety (Muscat, Weinman, Farrugia, Callus, & Chilcot, 2021). However, variations in psychological responses of patients may be influenced by individual coping mechanisms and illness acceptance. In the Indonesian cultural context, death is not always perceived negatively; spirituality and cultural values may shape a more positive meaning of death (Sitanggang et al., 2024). This interpretation is supported by previous studies suggesting that death may be perceived as a spiritual transition, contributing to emotional preparedness (Anggariani & Malik, 2021; Irwan, Zulfitri, & Jumaini, 2022; Pribadi, Shih, Wu, & Lin, 2023). These psychological responses may also be influenced by social support, the meaningfulness of life, and the spirituality experienced by the patients (Sitanggang et al., 2024; Surjoseto & Sofyanty, 2023; Wijayanti & Irman, 2021). Some patients may have achieved better illness acceptance and developed more effective coping strategies, resulting in lower anxiety levels. In this context, illness acceptance has been associated with better mental health outcomes, including reduced anxiety (Wen, Fang, Su, Cai, & Chen, 2023).

Social, economic, and environmental factors were excluded from logistic regression analysis because they did not meet the variable selection criterion in the bivariate analysis ($p > 0.25$). Social factors showed no association with anxiety levels ($p = 1.000$). The social factors assessed in this study included lack of emotional support, negative social perceptions toward CKD, and dependence on others in performing daily activities. The non-significant findings may indicate that most patients had adapted to their social conditions and continued to receive adequate support from those around them. In addition, the majority were married, which may have contributed to better emotional support and psychological adaptation during long-term hemodialysis treatment. Economic factors were also not associated with anxiety levels ($p = 0.422$). Although CKD treatment may increase a financial burden, the availability of national health insurance coverage for most patients may have helped reduce treatment-related financial stress. This finding is consistent with previous studies reporting that health insurance can reduce out-of-pocket expenses and strengthen financial support (Cao, Chen, & Yang, 2023). Similarly, environmental factors were not associated with anxiety levels ($p = 0.442$). These factors included healthcare access, disruption of daily activities, and limited disease-related information. However, as many patients had undergone hemodialysis for a relatively long period, these environmental stressors may have been adapted to over time, reducing their perceived impact. As suggested in the literature, longer treatment duration is often associated with better adaptation (Tiwouw et al., 2024).

These findings suggest that medical factors showed the strongest association with anxiety levels of CKD patients compared with other variables examined in this study. However, the variables that were not included in the final regression model should not be interpreted as clinically unimportant, as they may still interact with other factors and indirectly contribute to anxiety. For example, financial stress may contribute to increased anxiety when accompanied by worsening medical conditions and limited of emotional support. Therefore, a comprehensive biopsychosocial nursing approach remains essential in managing anxiety among CKD patients and supporting holistic patient care. The logistic regression model, which included medical and psychological factors, explained 58.0% of the variance in anxiety levels among CKD patients, while the remaining 42.0% may be attributed to other factors not included in this study. These may include comorbidities, medication use, biochemical parameters, body mass index (BMI), fatigue, and vascular access type (Dame, Rayasari, Irawati, & Kurniasih, 2022). In addition, previous

psychological history and traumatic experiences have also been reported to influence anxiety levels (Koskinen & Hovatta, 2023; Yucens et al., 2019). Overall, these findings indicate that the model demonstrated moderate explanatory power and should therefore be interpreted with caution.

This study has several limitations that should be considered when interpreting the findings. The relatively small sample size (n=42), non-randomized allocation of participants, and single-center setting may limit the generalizability of the findings. Furthermore, the K-FPK PGK instrument was assessed only through content validity using expert judgement, while reliability testing was not performed, which may affect the consistency of the measurement.

CONCLUSION

The study found that most CKD patients were aged 50-59 years, female, had completed senior high school, were married, unemployed, had been diagnosed with CKD for 1-3 years, and underwent hemodialysis twice weekly. Baseline anxiety levels were comparable between the groups. Following the intervention, anxiety levels decreased in the experimental group, whereas no meaningful change was observed in the control group. Psychoeducation was associated with a significant reduction in anxiety levels in the experimental group ($p = 0.000$) and a significant difference was observed between two groups after the intervention ($p = 0.000$). Among the examined factors, medical-related factors were significantly associated with anxiety levels in CKD patients ($p = 0.005$), followed by psychological factors ($p = 0.035$).

Overall, these findings suggest that psychoeducation may be beneficial in reducing anxiety among CKD patients undergoing hemodialysis. However, given the quasi-experimental design and limited sample size, the results should be interpreted with caution. Future studies are recommended to use larger samples, randomized designs, and longer follow-up periods to improve generalizability and strengthen causal inference. The psychoeducational intervention may be further refined to better suit patient characteristics. These findings may contribute to the development of nursing education and clinical practice as supporting evidence for psychosocial care in hemodialysis settings.

Author's Contribution Statement: Putri Agustina Dwi Bintari: Conceptualization, Methodology, Investigation, Formal Analysis, and Writing – Original Draft. Heru Supriyatno: Conceptualization, Methodology, Formal Analysis, and Writing – Review & Editing. Dwi Ari Murti Widigdo: Conceptualization, Methodology, Formal Analysis, and Writing – Review & Editing. All authors contributed to the interpretation of the findings.

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