



FACTORS ASSOCIATED WITH DEPRESSION AMONG CHRONIC KIDNEY DISEASE PATIENTS RECEIVING HEMODIALYSIS

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ABSTRACT	Keywords
Chronic kidney disease (CKD) is one of the therapies for CKD is hemodialysis. Hemodialysis can have psychological effects, one of which is depression. The purpose of this study was to identify factors associated with depression in patients with chronic kidney failure undergoing hemodialysis. This is a quantitative study with a descriptive correlational design using a cross-sectional design on 52 samples with purposive sampling. The study was conducted using the Beck Depression Inventory II questionnaire, Fatigue Severity Scale, Pittsburgh Sleep Quality Index, and data were tested using Kendall's Tau b and c tests and Ordinal Logistic Regression. The study found that 46.2% of CKD patients experienced severe depression. Depression was more prevalent among CKD patients aged 41–55 years (40.0%), females (61.5%), married individuals (65.4%), those with a high school education (40.4%), those who had undergone hemodialysis for 13–36 months (44.2%), respondents with poor sleep patterns (55.8%), and those with comorbid conditions (hypertension) (34.6%). The results of Kendall's tau analysis showed that factors associated with depression include age, gender ($p=0.001$), marital status ($p=0.001$), duration of hemodialysis ($p=0.016$), education ($p=0.001$), sleep patterns ($p=0.001$), fatigue ($p=0.001$), and comorbidities ($p=0.001$), while age did not show a significant association ($p=0.057$). Among the factors analyzed using the partial test, no single factor was dominant in influencing depression levels in CKD HD patients. The odds ratio for education was the highest, with a value of 603,801.0287. Clinically, the odds ratio results indicate that education is the dominant factor, with a 60-fold influence on depression in CKD HD patients.	Depression, Chronic Kidney Disease, Hemodialysis

INTRODUCTION

Chronic kidney disease (CKD) is one of the diseases that increase disease and death rates from non-communicable diseases worldwide (Muzaenah et al., 2022; Kovesdy, 2022). According to the Global Burden of Disease Study (GBDS) (2017), CKD ranks as the 12th leading cause of death. The disease directly causes approximately 1.23 million deaths, with an additional 1.36 million deaths associated with cardiovascular disease due to decreased kidney function (Institute for Health Metrics and Evaluation, 2020). CKD requires long-term treatment and renal replacement therapy, such as hemodialysis (HD), peritoneal dialysis, or transplantation (Costantinides et al., 2018). The most common therapy for CKD is hemodialysis, HD is a procedure by removing blood from the patient's body and then circulating it in a machine called a dialyzer that is outside the patient's body. According to data from the Indonesian Renal Registry (IRR) (2019) the prevalence of CKD patients undergoing hemodialysis in 2018 was 66,433 new patients and 135,486 active patients, while in 2019 there were 69,124 new patients and 185,901 active patients. This shows an increase in new patients and active patients in 2019. According to the results of the Indonesian Health Survey (IHS) the prevalence of patients (Munira et al., 2023) diagnosed with chronic kidney failure in Indonesia was 638,178 patients out of 877,531 people surveyed, where in Central Java province there were 73,358 patients diagnosed with chronic kidney failure out of 88,180 surveyed (Munira et al., 2023).

End-stage renal disease affects various aspects of patients' lives and is considered one of the diseases with a significant impact on patients' physical condition, social status, and psychology (Qawaqzeh et al., 2023). One of the frequent psychological disorders in patients undergoing dialysis is depression, which is a common mental health problem in this group (Zegarow et al., 2020). Research conducted by Qawaqzeh et al. (2023) in Jordan on 230 respondents showed that 22 patients (9.6%) had mild depression, 81 patients (35.2%) had moderate depression, and 127 patients (55.2%) had severe depression. Furthermore, research conducted by Maulana et al. (2020) in the Hemodialysis room of RSUD Dr. Slamet Garut to 40 respondents revealed that 24 patients (60%) had severe depression, 12 patients (30%) had moderate depression, and 4 patients (10%) had mild depression. Research conducted by Mane (2023) at the Maumere Hemodialysis Unit, Sikka Regency, on 86 respondents showed that 52 patients (60%)

had mild depression, 25 patients (29%) had moderate depression, and 9 patients (10%) had severe depression. Meanwhile, research conducted by Wakhid et al. (2018) in the Hemodialysis Unit of Semarang Regency Hospital on 85 respondents showed that 14 patients (16.5%) did not experience depression, 41 patients (48.2%) experienced moderate depression, and 30 patients (35.3%) experienced mild depression.

According to Maulana et al. (2020), factors that influence the level of depression in patients with chronic kidney disease include age (p -value = 0.000), education level (p -value = 0.000), gender (p -value = 0.003), duration of undergoing hemodialysis (p -value = 0.000), and sleep patterns (p -value = 0.000). The results of the study Musa et al. (2018) depression is influenced by marital status ($p < 0.20$), research Syafira et al. (2024) depression is influenced by fatigue (p -value < 0.005), zafira, (2024) explained that depression is influenced by comorbid diseases DM (p value 1.000) and hypertension (0.692).

Based on previous research findings, it can be concluded that PGK patients undergoing HD experience mild to severe depression. From previous research findings, it was found that the factors causing depression in hemodialysis patients vary, prompting the author to conduct research by combining the factors related to depression, including age, gender, marital status, sleep, education, duration of hemodialysis, fatigue, and comorbidities. Additionally, the study aims to identify the dominant factors most influential in depression among patients with chronic kidney disease.

METHOD

The type of research used was quantitative and descriptive correlational with a cross-sectional analysis method on 52 respondents using purposive sampling techniques. The instruments used in this study were the Beck Depression Inventory (BDI), The Pittsburgh Sleep Quality Index (PSQI), and Fatigue Severity Scale (FSS) questionnaires, which had been tested for validity and reliability as follows: BDI validity test (range 0.369–0.739), reliability (Cronbach's alpha of $0.883 \geq 0.361$), PSQI validity test (range 0.394–0.623), reliability (Cronbach's alpha of 0.469) and FSS validity test (0.349), reliability (Cronbach's alpha > 0.5) Bivariate analysis using Kendall's Tau b and c tests, multivariate analysis using ordinal logistic regression tests.

RESULTS

Table 4.1 Characteristics of Respondents Based on Age, Gender, Marital Status, Education, Length of Hemodialysis, Sleep Patterns, Fatigue, Cormobid Disease, and Level of Depression in CKD patients at Gondo Suwarno Ungaran Hospital (n=52)

Respondent characteristics		Frequency	Percentage (%)
Age	18-25 years	2	3,8
	26-40 years	12	23,1
	41-55 years	21	40,0
	56-64 years	16	30,8
	>65 years	1	1,9
Gender	Male	20	38,5
	Female	32	61,5
Marital status	Not married	3	5,8
	Marry	34	65,4
	Widow	14	26,9
	widower	1	1,9
Education	Not in school	0	0
	Elementary school	5	9,6
	Middle school	13	25,0
	High school	21	40,0
	College	13	25,0
Length of hemodialysis	≤12 months	18	34,6
	13-36 months	23	44,2
	>36 months	11	21,2
Sleep patterns	Good sleep patterns	23	44,2
	Poor sleep patterns	29	55,8
fatigue	No fatigue	30	57,7
	Experiencing fatigue	22	42,3
Comorbid disease	None	7	13,5
	hypertension	18	34,6
	Diabetes mellitus	16	30,8
	Urinary tract infection	11	21,2
	Total	52	100

Based on table 4.1, it is known that CKD patient respondents in the hemodialysis room of RSUD dr. Gondo Suwarno Ungaran are in the age range of 41-55 years with a frequency of 21 (40.4%) respondents, the majority of CKD patient respondents are female with a frequency of 32 (61.5%) respondents. Respondents of CKD patients were married with a frequency of 34 (65.4%) respondents. CKD patients have high school education with a

frequency of 21 (40.4%) respondents. CKD respondents who have undergone hemodialysis for 13-36 months with a frequency of 23 (44.2%) respondents. Respondents had poor sleep patterns with a frequency of 29 (55.8%). CKD patients who do not experience fatigue with a frequency of 30 (57.7%) respondents. Respondents with comorbid hypertension amounted to 18 (34.6%) respondents.

Table 4.2 Respondents' Depression Level in CKD patients at RSUD Gondo Suwarno Ungaran (n=52)

Depression level	Frequency	Percentage (%)
Not depressed	17	32,7
Mild depression	2	3,8
Moderate depression	9	17,3
Severe depression	24	46,2
Total	52	100

Based on table 4.2, it is known that the respondents of CKD patients in the hemodialysis room of RSUD dr. Gondo Suwarno Ungaran

experienced severe depression with a frequency of 24 (46.2%) respondents, who were not depressed 17 (32.7%) respondents.

Table 4.3 Test Results of Bivariate Analysis of Factors Associated with Depression Level in CKD Patients in the Hemodialysis Room at Gondo Suwarno Ungaran Hospital (n=52)

No	Independent variable	Dependent variable	Correlation coefficient	p-value	Correlation direction
1.	Age	Depression	0,198	0,057	+ (positive)
2.	Gender	Depression	0,510	<0,001	+ (positive)
3.	Education	Depression	-0,367	<0,001	-(negative)
4.	Duration of hemodialysis	Depression	0,273	0,016	+ (positive)
5.	Sleep patterns	Depression	0,908	<0,001	+ (positive)
6.	Fatigue	Depression	0,765	<0,001	+ (positive)
7.	Marital status	Depression	0,366	<0,001	+ (positive)
8.	Comorbid disease	Depression	0,677	<0,001	+ (positive)

Based on the results of the bivariate analysis test in table 4.3, it can be seen

Age shows no significant correlation with the level of depression, where the *p-value* = 0.057 which indicates that age is not related to the level of depression, the value of the Kendall's Tau coefficient (τ) = 0.198 so that the relationship between age and the level of depression is very weak and with the direction of correlation + (positive) called a unidirectional relationship which means that the younger the patient's age, the higher the level of depression.

Gender shows that there is a significant correlation with the level of depression, where the *p-value* = 0.001 which indicate that gender is related to the level of depression, the value of the Kendall's Tau coefficient (τ) = 0.510 so that gender has a strong relationship with the level of depression and with the direction of correlation + (positive) called a unidirectional relationship which means that gender is related to the level of depression, with the potential for depression being higher in the female gender.

Marital status shows there is a significant correlation with the level of depression, where the *p-value* = 0.001 which indicates that gender is related to the level of depression, the value of the Kendall's Tau coefficient (τ) = 0.366 so that the relationship between marital status and the level of depression is sufficient and with the direction of correlation + (positive) called a unidirectional relationship which means that patients who are married tend to experience higher depression than those who are not married or widowed or widowed.

Education shows that there is a relationship between gender and depression level which is proven to be significant, with a *p value* of 0.001 which indicates that education is related to the level of depression, the Kendall's Tau coefficient value

(τ) = -0.367 so that the relationship between education and depression level is sufficient and with the direction of correlation - (negative) called a meaningful opposite direction relationship, which indicates that the higher the patient's education level, the lower the level of depression experienced.

The length of hemodialysis shows that there is a relationship between the length of hemodialysis and the level of depression which is proven to be significant, with a *p value* of 0.016 which indicates that the length of hemodialysis is related to the level of depression, the value of the Kendall's Tau coefficient (τ) = -0.273 so that the relationship between the length of hemodialysis and the level of depression is very weak and with the direction of correlation + (positive) called the opposite direction relationship which means that the longer the patient undergoes hemodialysis, the higher the level of depression felt.

Sleep patterns show that there is a relationship between sleep patterns and depression levels, with a *p value* of 0.001 which indicates that sleep patterns are related to depression levels, the Kendall's Tau coefficient value (τ) = 0.908 so that the relationship between sleep patterns and depression levels is very strong and with a correlation direction + (positive) called a unidirectional relationship which means that patients with poor sleep patterns tend to experience higher levels of depression.

Fatigue shows that there is a relationship between fatigue and depression level proved significant, with a *p value* of 0.001 which indicates that fatigue is associated with depression level, Kendall's Tau coefficient value (τ) = 0.765 so that the relationship between fatigue and depression level is very strong and with the direction of correlation + (positive) called unidirectional relationship which means that

fatigue plays a major role in increasing the patient's depression level.

Comorbid diseases show that there is a significant correlation with the level of depression, where the p -value = 0.001 which indicates that comorbid diseases are related to the level of depression, the value of the Kendall's Tau

coefficient (τ) = 0.677 so that the relationship between fatigue and the level of depression is strong and with the direction of correlation + (positive) called a unidirectional relationship which means that patients suffering from comorbid diseases such as hypertension or diabetes mellitus tend to experience higher depression.

Table 4.4 Partial Test Results

	Step	B	p-value	Results
1	Not depressed	-40,267	0,871	Not significant
	Mild depressed	-38,962	0,875	Not significant
	Moderate depressed	-16,005	0,945	Not significant
	Male	-0,867	0,526	Not significant
	Female	0 ^a		
	Not married	5,277	0,981	Not significant
	Marry	11,998	0,956	Not significant
	Widow	2,112	0,992	Not significant
	Widower	0 ^a		Not significant
	Elementary school	13,311	0,685	Not significant
	Middle school	12,879	0,695	Not significant
	High school	1,885	0,319	Not significant
	College	0 ^a		
	≤12 months	-10,820	0,741	Not significant
	13-36 months	1,237	0,431	Not significant
	>36 months	0 ^a		Not significant
	Good sleep patterns	-11,997	0,715	Not significant
	Poor sleep patterns	0 ^a		
	No fatigue	-12,316	0,708	Not significant
	Experiencing fatigue	0 ^a		Not significant
	No comorbidities	-18,545	0,841	Not significant
	Hypertension	-31,195	0,774	Not significant
	Diabetes mellitus	-17,969	0,846	
	Urinary tract infection	0 ^a		

Based on the results in the partial test table statistically shows that none of the eight variables significantly affect the level of depression in HD CKD patients because the p -value > α (0.05).

The coefficient value of the gender variable is -0.867, which when exponentiated by Exp (-0.867), the odds ratio value is 0.42021, meaning that men have a lower tendency to experience depression.

The coefficient value of the marriage variable is 5.277, which when exponentiated by Exp (5.277), the odds ratio value is 195.78164, meaning that if you are not married, you have a lower tendency to experience depression.

The coefficient value of the Education variable is 13.311, which when exponentiated by Exp (13.311), the odds ratio value is 603801.0287, meaning that if you do not go to school, you have a higher

tendency to experience depression

The coefficient value of the variable length of hemodialysis is 10.820, which when exponentiated Exp (10.820) obtained an odds ratio value of 1.99956, meaning that if the length of hemodialysis ≤12 months has a lower tendency to experience depression.

The coefficient value of the sleep pattern variable is -11.977, which is good when exponentiated Exp (-11.977), the odds ratio value is 6.16267, meaning that if the sleep pattern is good, there is a lower tendency to experience depression.

The coefficient value of the fatigue variable is obtained at -12.316 which, when exponentiated Exp (-12.316), gets an odds ratio value of 4.4795, meaning that if you experience fatigue, you have a tendency to experience higher depression.

The coefficient value of the comorbid disease variable is -18.545, which

when exponentiated by Exp (-18.545), the odds ratio value is 8.83098, meaning that if you have comorbid disease (hypertension)

DISCUSSION

Relationship between Gender and Depression in CKD Patients

Based on gender, the majority of CKD patient respondents in the hemodialysis room at RSUD Dr. Gondo Suwarno Ungaran were female, with a frequency of 32 (61.5%) respondents. The results of the bivariate analysis test using the Kendalls Tau B and C test showed that gender had a significant positive correlation with the level of depression (Kendall's Tau (τ) = 0.510, p-value = <0.001), which indicates that gender can be related to the level of depression, with a higher potential for depression in the female gender. The results of the study are in line with research conducted by Riskal and Annisa, (2020) with the highest incidence in the female gender (56.8%). Based on the results of research by Anita and Husada, (2020) it was found that the relationship was equally significant between the level of depression and gender with a p-value = 0.013. However, unlike the findings of Maulana et al. (2020), the level of depression in this study appears to be higher in men than in women, possibly because the sample size was dominated by men.

The results of this study reveal that the incidence of depression in women is higher than in men. Several factors underlie this difference, namely biological factors and differences in emotion control mechanisms. Biologically, women show higher genetic vulnerability and experience significant fluctuations in hormone levels. In addition, the emotion control mechanism in women emphasizes stress hormones, namely corticotropin releasing factor (CRF), which has a higher affinity for stress proteins in brain cells, making them more sensitive; whereas the male brain can reduce stress protein levels to reduce binding with CRF hormones.

From the results of this study and previous research, it can be concluded that the majority of chronic kidney disease patients who undergo hemodialysis and experience depression are female. This

you have a higher tendency to experience depression.

condition is influenced by the effect of CRF hormone that increases the risk of anxiety and depression.

Relationship between Marital Status and Depression in CKD Patients

Based on marital status, the majority of respondents of CKD patients in the hemodialysis room of Dr. Gondo Suwarno Ungaran Hospital were married, with a frequency of 34 respondents (65.4%). The results of the bivariate analysis test using the Kendalls Tau B test showed that marital status has a significant positive relationship with the level of depression in CKD patients undergoing hemodialysis (Kendall's Tau (τ) = 0.366, p-value = <0.001), which indicates that married patients tend to experience higher depression than those who are unmarried or widowed. These results are in line with the research of Riyadi et al. (2023) where the distribution of married respondents was 53 (88.3%) respondents and there was a significant relationship between marital status and depression with a p-value = 0.000.

Research by Hawamdeh et al. (2017) shows that marital status has a significant relationship with the incidence of depression, where patients who are married more often experience depression compared to those who are not married. A disharmonious marriage can trigger symptoms of depression and anxiety. In addition, chronic diseases such as chronic renal failure (CKD) have the potential to cause tension in marital roles, especially in terms of division of duties and responsibilities. The patient's inability to work due to their health condition can change the dynamics of the husband-wife relationship.

From the results of this and previous studies, it can be concluded that disharmonious marriages can trigger symptoms of depression and anxiety to emerge as clinical responses.

Relationship between Education and Depression in CKD Patients

Based on education, the majority of CKD patient respondents in the hemodialysis room at RSUD Dr. Gondo Suwarno Ungaran had a high school education, with a frequency of 21 respondents (40.4%). The results of the bivariate analysis test using the Kendalls Tau C test showed that education has a significant negative correlation with the level of depression (Kendall's Tau (τ) = -0.367, p-value = <0.001), which indicates that the higher the patient's education level, the lower the level of depression experienced. This study is in line with the results of research from Mane, (2023) research results, obtained data that the most respondents had a high school education level as many as 19 respondents (22%). In research from Sisya Rizkia, (2020) showed a significant relationship between education level and depression, with a p value of 0.005.

Patients who have a high level of formal education show a deeper understanding of the disease and dialysis procedures. Such patients tend to be more adherent to dialysis therapy, adopt a recommended diet, and use medications as directed, which positively affects their physical and mental health. Education level is closely linked to literacy, which impacts on overall health and well-being. Previous studies have revealed that low educational attainment and literacy limitations significantly predict limited knowledge and suboptimal symptom control. Literacy plays a mediating role in the relationship between education and knowledge, so both factors have significant potential to influence health outcomes (Wang et al., 2019).

From this and previous studies, it can be concluded that patients with CKD HD who experience depression are due to the fact that patients with higher levels of education usually have better knowledge about their health conditions, so they are better able to manage their illness.

Relationship between Duration of hemodialysis and Depression in CKD Patients

Based on the length of hemodialysis, the majority of CKD patient respondents in the hemodialysis room at RSUD dr. Gondo Suwarno Ungaran had

undergone hemodialysis for 13-36 months (44.2%). The results of the bivariate analysis test using the Kendalls Tau C test showed that the length of hemodialysis showed a positive relationship with the level of depression in CKD patients undergoing hemodialysis, with a Kendall's Tau value (τ) = 0.273 and p-value = 0.016, which means that the longer the patient undergoes hemodialysis, the higher the level of depression felt. The results of this study were supported by (Josés et al., 2020) with the results of the study the majority of respondents underwent hemodialysis for more than 12 months as many as 41 (66.1%). The length of time hemodialysis affects the level of depression in patients, as evidenced by research conducted by (Deswima et al., 2021) stating that there is a significant relationship between length of HD with depression with a p-value = 0.005.

Research conducted by Maulana et al. (2020) shows that patients who have undergone hemodialysis for a long period of time tend to experience higher levels of depression. This condition is caused by hemodialysis therapy that is carried out 2 to 3 times a week, which can affect the physical and psychological aspects of the patient. Dependence on this therapy often leads to fear and anxiety about the future, as patients feel they have to undergo this medical procedure for life.

In patients with chronic renal failure, the long duration of hemodialysis significantly affects their psychological state. Feelings of fear are one of the most common forms of emotional expression expressed by patients, especially related to uncertainty about the future and feelings of anger towards the conditions they experience (Baeti and Heni Maryati, 2016).

From this and previous studies, it can be concluded that patients with CKD HD who experience depression tend to feel fear because patients depend on hemodialysis medical procedures for a long time, giving rise to emotional feelings that result in depression.

Relationship between Sleep Patterns and Depression in CKD Patients

Based on sleep patterns, the majority of CKD patient respondents in the

hemodialysis room of Dr. Gondo Suwarno Ungaran Hospital have poor sleep patterns (55.8%), The results of the bivariate analysis test using the Kendalls Tau C test show that sleep patterns also have a very strong positive correlation with the level of depression in CKD patients undergoing hemodialysis (Kendall's Tau (τ) = 0.908, p-value = <0.001), which indicates that patients with poor sleep patterns tend to experience higher levels of depression. These results are in line with the research of Dewi and Hendrati, (2022) respondents with poor sleep patterns as many as 41 (68.3%) respondents and the results of the analysis of the relationship between sleep patterns and depression showed a relationship with a p-value = 0.006.

According to research Al Naamani et al., (2021) and Wulansari and Chatarina, (2020) that sleep disturbances are closely related to the level of depression in patients with chronic diseases, including kidney failure, poor sleep patterns which are often accompanied by insomnia or intermittent sleep, can exacerbate symptoms of depression and cause more severe physical and mental fatigue.

From this and previous studies, it can be concluded that CKD HD patients who experience depression are mostly accompanied by poor sleep patterns, because sleep disorders in CKD HD patients accompanied by insomnia cause physical fatigue and can worsen the patient's psychological condition.

Relationship between Fatigue and Depression in CKD Patients

Based on the level of fatigue, the majority of CKD patient respondents in the hemodialysis room of Dr. Gondo Suwarno Ungaran Hospital did not experience fatigue 30 (57.7%) respondents. The results of the bivariate analysis test using the Kendalls Tau C test showed that fatigue showed a significant positive correlation with the level of depression in CKD patients undergoing hemodialysis (Kendall's Tau (τ) = 0.765, p-value = <0.001), which indicates that fatigue plays a major role in increasing the level of patient depression. However, the results of this study with previous results obtained different results where in the research of

Syafira et al., (2024) showed that 65.1% of hemodialysis patients experienced fatigue, especially in the first six to eight months, which was associated with uremia and uremic neuropathy that caused peripheral fatigue. However, there was a significant association p-value = 0.000 between fatigue and depression in CKD HD patients in the study (Syafira et al., .2024).

According to Supriyadi et al., (2021) low hemoglobin levels can exacerbate fatigue symptoms and cause more severe fatigue. This physical fatigue often hampers patients' ability to perform their bodily functions optimally, resulting in a significant impact on their obligations in family, work, and social life. Finally, this condition increases the risk of depression in hemodialysis patients.

From this and previous studies, it can be concluded that fatigue is a common side effect experienced by patients with chronic diseases as low hemoglobin levels can exacerbate fatigue symptoms resulting in a significant impact on their obligations in daily life.

Relationship between Comorbid Diseases and Depression in CKD Patients

Based on comorbidities, the majority of CKD patients in the hemodialysis room of Dr. Gondo Suwarno Ungaran Hospital had hypertension 18 (34.6%) respondents. The results of the bivariate analysis test using Kendalls Tau B test showed that comorbid diseases, such as hypertension, showed a very strong positive relationship with the level of depression in CKD patients undergoing hemodialysis (Kendall's Tau (τ) = 0.677, p-value = <0.001), which indicates that patients suffering from comorbid diseases tend to experience higher depression. The results of this study are in line with research Aditama, Kusumajaya, (2023) that CKD patients who have comorbid diseases amounted to 52 (59.8%) patients and the relationship between comorbid diseases and depression is significantly related, obtained p-value = 0.000.

Hypertension is a comorbid disease that can exacerbate kidney damage by increasing intraglomerular pressure. This increase in pressure triggers structural and

functional disturbances in the renal glomerulus. High intravascular pressure flows into the glomerulus, causing constriction of afferent arteries as well as damage to renal blood vessels, which ultimately disrupts the renal filtration process (Artiany & Aji, 2021). This uncontrolled hypertension, in addition to worsening kidney function, also increases the risk of cardiovascular disease, which can lead to increased anxiety and stress in patients, contributing to the onset of depression. The incidence of high blood pressure in can be caused by depression (Agustiningsih, 2018)

From this and previous studies it can be concluded that HD CKD patients who experience depression are mostly accompanied by comorbid diseases (hypertension), comorbid diseases can worsen kidney damage by increasing intraglomerular pressure, thus triggering structural and functional disorders in the glomerulus.

Depression level of CKD HD patients

Based on the level of depression, the majority of respondents with Chronic Kidney Disease (CKD) in the hemodialysis room at RSUD Dr. Gondo Suwarno Ungaran experienced severe depression, with a frequency of 24 respondents (46.2%). The results of this study support the results of research showing that patients undergoing hemodialysis tend to experience mental disorders, especially depression, due to long-term dependence on therapy and major changes in their quality of life. Major depression in hemodialysis patients often results from various factors, such as physical stress, the body's inability to function normally, as well as psychosocial stress caused by dependence on the dialysis machine.

Multivariate Analysis

Based on the results of multivariate analysis conducted, the factors associated with the level of depression in CKD patients in the hemodialysis room of RSUD dr. Gondo Suwarno Ungaran are age, gender, marital status, education, length of hemodialysis, sleep patterns, fatigue, and comorbid diseases. Of all the factors analyzed by the partial test statistically

showed that none of the eight variables significantly affected the level of depression in CKD HD patients because the $p\text{-value} > \alpha$ (0.05). However, clinically, the results of the odds ratio value show that the factor variable is education which has a 60-fold influence on depression in CKD HD patients, then the gender variable has 19-fold influence on depression in CKD HD patients, and the comorbid disease variable has 8-fold influence on depression in CKD HD patients, so it can be concluded from the results of the odds ratio value that the most dominant factor is the education factor. The level of education has an influence on the incidence of depression, as found in research by Musa et al., (2018) and (Semaan et al., 2018). Based on previous studies, the incidence of depression tends to be higher in individuals who have a secondary education level. In contrast, patients with higher education generally have more in-depth knowledge about their health condition and are therefore better able to manage their illness. In contrast, patients with low education levels may not have enough information about their illness, which in turn may worsen their mental state

CONCLUSIONS

Among all the factors analyzed using partial tests, there is no factor that is associated (dominant factor) with the level of depression in CKD HD patients. However, clinically, the results of the odds ratio value show that the factor variable is education has a 60-fold influence on depression in CKD HD patients, then the gender variable is 19 times the influence on depression in CKD HD patients, and the comorbid disease variable is 8 times the influence on depression in CKD HD patients, so it can be concluded from the results of the odds ratio value that the most dominant factor is the education factor.

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