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MODIFIED MINDFULNESS-BASED STRESS REDUCTION (MBSR) THERAPY TO REDUCE PSYCHOLOGICAL DISTRESS IN CHRONIC KIDNEY DISEASE (CKD) PATIENTS ON HAEMODIALYSIS (HD)

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ABSTRACT
Chronic Kidney Disease (CKD), is a disease with high mortality and mortality, so it requires lifelong hemodialysis (HD) management, this will trigger psychological distress which increases the risk of worsening in CKD. So, it is necessary to give non-pharmacological therapies, one of which is a modification of Mindfulness-Based Stress Reduction (MBSR) Therapy. Objective: The purpose of this study was to determine the effect of MBSR therapy modification on psychological distress in CKD patients. Method: Quasi-experiment with pretest-posttest control group approach. A population of 44 respondents with a sample of 29 respondents using a simple random sampling technique. Measurement of psychological distress variables using the Kessler Pshycological Distress Scale-10 (K-10). MBSR modification therapy intervention has 4 sessions in one treatment, applied 7 days with a total duration of 30 minutes. Data analysis using paired t-test and independent t-test. Results: The results showed that the mean scores of Psychological Distress intervention group (21.7 (pre-test); 17.1 (post-test)), control group (18.8 (pre-test); 18.5 (post-test)). There were differences in mean psychological distress scores between the intervention and control groups (MD=4.38, t=5.92 (95%CI, 2.81; 5.95), p < 0.001, d=2.22). Conclusions: MBSR modification therapy can be used to reduce psychological distress in patients.

Keywords: chronic kidney disease (CKD); hemodialisis; mindfulness-based stress reduction (MBSR); psychological distress

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INTRODUCTION

Chronic kidney disease (CKD) is one of the most common public health problems with high morbidity and mortality rates (Zhao et al., 2020). The number of CKD cases in Indonesia until 2021 is 1,417,104 (Kemenkes RI, 2022). The prevalence of chronic kidney disease was 3.8% with the lowest prevalence of 1.8% and the highest of 6.4%. The prevalence of dialysis was 19.3% (RISKESDAS, 2018). The prevalence of CKD in men (0.3%) was higher than that in women (0.2%). Based on age characteristics, the highest prevalence was in the age category

above 75 years (0.6%), where there was an increase at the age of 35 years and above (Aulia, 2017).

The high number of CKD cases and its prevalence means that this disease requires special management, one of which is haemodialysis (HD). HD therapy is a lifelong treatment that will significantly impact the psychological condition of patients, one of which can trigger psychological distress in patients (Astuti, 2018). In previous research by Senanayake et al (2018), showed the prevalence of psychological distress in CKD patients undergoing HD reached 75% of 1174 patients. Other research results from Fradelos et al (2021), This study illustrates that HD patients often experience psychological distress, including 189 patients (51.5%) experiencing depression, and 133 patients (36.2%) experiencing anxiety. Psychological distress requires treatment, one of which is with non-pharmacological therapy. Non-pharmacological therapy treatment methods to overcome psychological distress that have been carried out in CKD patients include benson relaxation, deep breath relaxation, guided imagery, and CBT (Barello et al., 2023). Another non-pharmacological therapy to overcome psychological distress in CKD patients is mindfulness, which has several types including Mindfulness-Based Cognitive Therapy (MBCT), and Mindfulness-Based Stress Reduction (MBSR) (Gerogianni et al., 2019).

The results of research from Yang et al., 2020 state that MBSR reduces symptoms of psychological distress (anxiety and depression) with a high effect size (d = 1.65; -1.44). Based on the results of these studies, MBSR therapy is one of the non-pharmacological therapy options that can be done to overcome psychological distress in CKD patients. The MBSR programme aims to reduce stressful conditions by modifying the process of cognition and affection so that it affects the regulation of emotions, physical sensations, and individual confidence (Kabat-Zinn in Munazilah & Hasanat, 2018). MBSR therapy intervention is a mindfulness meditation therapy that consists of 3 main programmes namely bodyscan, sitting meditation, mindful movement meditation. Researchers made modifications to the MBSR intervention. MBSR modification intervention is the application of meditation and relaxation techniques including bodyscan, sitting meditation, mindful movement meditation, and added with mindful breath. This modified MBSR intervention has never been done in previous studies. This modified MBSR intervention will be conducted at RSUD R. Syamsudin, SH, Sukabumi City, which is a type B teaching hospital and has a haemodialysis service unit. Haemodialysis is carried out for 4-5 hours and is generally carried out 2-3 times per week (RSUD R. Syamsudin, SH, 2020). The purpose of this study was to determine the effect of modified MBSR therapy on Psychological Distress in CKD Patients on HD.

METHOD

The research method used was quasi experiment with pretest-posttest control group approach. This research was conducted at RSUD R. Syamsudin, SH, Sukabumi City with the research implementation time from March 2023 to January 2024. The independent variable was Modified MBSR Therapy Intervention, and the dependent variable was Psychological Distress. The population in this study were all CKD patients on HD with samples according to the inclusion and exclusion criteria resulting in 44 suitable respondents. Then randomisation was carried out using simple random sampling technique to get 34 respondents who were in accordance with the g-power calculation, and randomised again using simple random sampling technique to divide into intervention groups and control groups between shifts of patients undergoing morning HD and patients undergoing afternoon HD. Then 34 respondents were obtained (17 people in the intervention group and 17 people in the control group), but there were 5 people who refused to be respondents, so the final sample of this

study was 15 people in the intervention group, and 14 people in the control group (Figure 1). The final sample size of 29 people (intervention group = 15 and control group = 14) can be large enough to detect significant differences (5% margin of error and *75% power *). Measurement of the Pychological Distress variable using the Kessler Psychological Distress Scale (K10) instrument, which was created by Kessler R et al in 1994 (Andrews & Slade, 2001).

This questionnaire consists of 10 items with each question scored from 1 (never) to 5 (all the time), has a score range of 10-50, the higher the score, the more severe the psychological distress. The Kessler Psychological Distress Scale 10 (K10) has been translated into Indonesian by Sitompul's research (2021). The MBSR modification intervention is an application of meditation and relaxation techniques that adopt the formal or main MBSR programme from Kabat-Zin including body scan, sitting meditation, mindful movement, and modifications to informal practice in the awareness of breathing session using mindful breath: five finger hand breathing (star breathing). In the intervention group, modified MBSR therapy was carried out every day for 7 days (1 week) with a duration of 30 minutes with 4 sessions at the patient's home. After being given informed consent by the researcher, a pre-test was conducted, days 2-6 of the modified MBSR therapy intervention, and day 7 of the intervention and post-test. In the control group, standard care observations were carried out every day for 7 days (1 week) with a duration of 30 minutes by telephone. On the first day, an explanation of the research, informed consent and pre-test, days 2-6 of observation and day 7 of observation and post-test were conducted, then the control group was given 1x MBSR modified therapy intervention after the study was completed. Univariate analysis used the distribution of mean, SD, min-max values on the characteristics of age, length of HD, comorbid diseases, the dependent variable psychological distress. Categorical characteristic analysis used the distribution of frequency values and percentages on gender, occupation, education. Bivariate analysis using paired t-test and independent t-test, effect size (d) was used (mention results and how to calculate). This study was approved by the ethics committee of the Faculty of Nursing, University of Muhammadiyah Jakarta with no: 1578/F.9-UMJ/XI/2023.

RESULTS

Descriptive Characteristics

The sample consisted of 29 respondents, 15 intervention and 14 control, and there was no difference between the intervention group and the control group in characteristics such as age, gender, comorbid diseases, education, occupation ($p>0.05$). There was a difference in the duration of HD between the intervention and control groups ($p<0.05$). Further analysis was conducted to see the significance of these variables using ANCOVA analysis and found non-significant results ($p>0.005$). Table 1, shows the average age of respondents in both groups is around 52-54 years old, the average respondent underwent HD is 2.2-2.8 years. The average mordibity value of respondents is 3.1-3.7. Then, the results showed that women dominated in both groups. Most respondents have high school and university education levels and almost all respondents are currently not working.

Psychological Distress

In the intervention group, the mean value was 21.7 (pre-test); 17.1 (post-test) with a min-max value of 12-34 (pre-test); 10-27 (post-test). Meanwhile, in the control group, the mean value was 18.8 (pre-test); 18.5 (post-test) with a min-max value of 10-36 (pre-test); 10-34 (post-test) (table 1).

Effectiveness of MBSR in Reducing Psychological Distress

The results of the paired simple t-test analysis showed that there was a significant decrease in the average value of psychological distress after being given modified MBSR therapy in the intervention group. Meanwhile, in the control group there was a low decrease in the average value of psychological distress, by (table 2, graph 1). The results also showed that there was a significant difference in mean scores between the intervention group and the control group. The mean score in the intervention group was higher than the mean score in the control group, indicating that the decrease in psychological distress was higher in the intervention group compared to the control group (MD = 4.38, t = 5.92, p < 0.001), with the effect size of Cohen's d obtained a value of d = 2.22 (strong effect) (table 3, graph 2).

Table 1.

Distribution of Respondents' Characteristics by Age, Length of HD, Comorbidities, and Psychological Distress Variables, Gender, Education, Occupation (Intervention n=15, Control n=14)

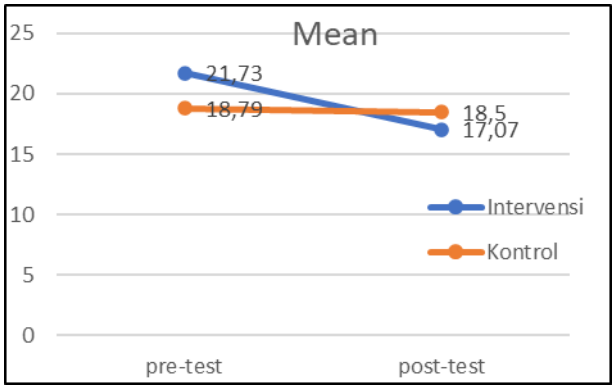
Characteristics	$\bar{x}$ (±SD)	*min-max*	*t*	*p-value*	95% CI (*Lower;Upper*)	n(%)
Age						
Intervention	54,5 (±14,8)	28-86	0,345	0,650	47,12;64,16	-
Control	52,8 (±12,2)	32-75			45,76;59,81	
Length of time in HD (years)						
Intervention	2,8 (±2,3)	0,17-7	0,800	*0,010	1,27;3,72	
Control	2,2 (±1,2)	0,58-4			1,58;2,92	-
Comorbid Diseases (CCI)						
Intervention	3,7 (±1,3)	2-6	1,091	0,773	3,03;4,54	
Control	3,1 (±1,2)	2-5			2,45;3,86	-
Psychological Distress						
Intervention	21,7 (±6,4)	12-34			17,62;24,10	-
Pre-test	17,1 (±5,0)	10-27			13,80;19,06	
Post-test			1,540	0,225		
Control	18,8 (±7,7)	10-36			14,33;23,24	-
Pre-test	18,5 (±7,5)	10-34			14,16;22,84	
Post-test						
Gender						
Intervention						
Male						7 (46,7)
Female	-	-	-	1,000	-	8 (53,3)
Control						
Male						6 (42,9)
Female						8 (57,1)
Education						
Intervention						6 (40,0)
Elementary Scool & Junior High School						9 (60,0)
Senior Highr School & College	-	-	-	0,209	-	
Control						3 (21,4)
Elementary Scool & Junior High School						11 (78,6)
Senior Highr School & College						
Job						
Intervention						
Employed						1 (6,7)
Unemployed	-	-	-	1,000	-	14 (93,3)
Control						2 (14,3)
Employed						12 (85,7)
Unemployed						

Table 2.
Statistical Analysis of Paired T-Test of Psychological Distress Variables Pre-Test and Post-Test of Modified MBSR Therapy in Intervention Group and Control Group

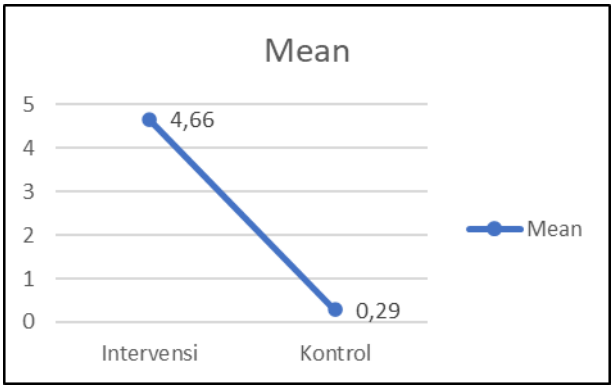
Group	M (SD)	MD	df	t	*p-value*
Intervention (n=15)					
Pre-test	21,73 (±6,39)	4,66	14	6,47	0,000
Post-test	17,07 (±5,03)				
Control (n=14)					
Pre-test	18,79 (±7,72)	0,29	13	1,75	0,104
Post-test	18,50 (±7,52)				

Table 3.
Statistical Analysis of Independent T-Test in Intervention Group and Control Group

Group	M(SD)	MD	df	t	*p-value*	Cohen's d
Intervention(N=15)	4,66 (±2,80)	4,38	15,43	5,92	0,000	2,22
Control(N=14)	0,29 (±0,61)					



Graphic 1
Mean pre-test and post-test scores of Intervention group and Control group



Graphic 2
Difference in mean scores of Intervention group and Control group

DISCUSSION

Characteristic

Age

Based on the results of the study (table 1), in the control group and intervention group, the mean age of respondents was not much different, 54 years and 52 years respectively. Ageing contributes to the increased prevalence of chronic kidney disease (CKD). Through functional and structural changes, with aging the kidney undergoes microscopic changes such as glomerulosclerosis, interstitial fibrosis, glomerular basement membrane thickening, arteriosclerosis, and tubular atrophy. These changes lead to a decrease in renal mass, glomerular filtration, and autoregulatory function (Merchant & Vathsala, 2022).

Gender

Both intervention and control groups were dominated by women (table 1). The prevalence of chronic kidney disease (CKD) is generally higher among women compared to men (García et al., 2022). In married women, pregnancy can impact on kidney function and kidney disease, leading to complications such as preeclampsia, prematurity, low birth weight, and foetal or neonatal death. In addition, recurrent urinary tract infections in childhood and pyelonephritis in adults may also increase the risk of CKD in women (Kirsztajn et al., 2023).

Education

Most respondents had a high school education and college graduates in both groups (table 1). In this study, many people with higher education have been diagnosed with CKD. This happens because a person with higher education usually has a good quality job, in this case a quality job usually has many demands, so in the end a person is more prone to stress and accumulates over time without treatment. Stress can indirectly cause CKD, by activating sympathetic nervous system activity, altering the hypothalamic-pituitary-adrenal, impaired immune function, and increased inflammatory reactivity. These physiological responses to stress can lead to tissue ischaemia, haemodynamic changes and impaired immune function, all of which can contribute to the onset and progression of CKD (Su et al., 2021).

Job

Almost all respondents did not work (table 1). The statements of some respondents at the end of the intervention session stated that they were workers before they got sick, many respondents stated that they used to work as factory employees, some respondents were online drivers, and others were employees in workshops. Work that has many demands often causes respondents to neglect their health, such as rarely drinking mineral water, often drinking energy drinks as an effort to maintain stamina and others state that sometimes work provides high stressors. Work with a heavy workload, shift work, or with a work environment that is often exposed to cigarette smoke, can increase the risk of CKD. For example, heavy workloads and shift work may cause physical strain and disruption of circadian rhythms, while exposure to cigarette smoke may contribute to the development of kidney injury (Lan et al., 2023).

Length of time in HD (years)

Both groups had undergone HD for an average of 2 years (table 1). The main benefit of haemodialysis is to replace the function of the kidneys in filtering waste products and excess fluid from the blood in patients with kidney failure. This helps maintain the body's overall electrolyte and fluid balance. In addition, haemodialysis can help manage complications associated with kidney failure, such as high blood pressure and imbalances in body chemistry (Seto et al., 2022). However, after undergoing haemodialysis for 2 years, individuals will have unwanted feelings of dependence on the haemodialysis machine, inferiority, loss of independence, and difficulty in maintaining quality of life. Patients also face strict fluid and dietary restrictions, fatigue, and financial constraints (Gebrie et al., 2023).

Comorbid Diseases

The mean score of comorbid diseases in the intervention group and control group, each below 4 (table 1). In the results of this study, many comorbid diseases of Diabetes Mellitus (DM) without complications were found. There were also, some respondents who stated that they had DM comorbid diseases with complications such as glucoma. DM can cause chronic kidney disease (CKD) through several mechanisms. In people with type 1 diabetes mellitus (T1DM), chronic hyperglycaemia and glomerular hyperfiltration are the main causative factors of CKD. In contrast, the pathophysiology of CKD in people with type 2 diabetes mellitus (T2DM) is more complex, involving a cluster of cardiovascular risk factors such as obesity, hypertension and dyslipidemia. These factors may contribute to the development of microvascular damage, and glomerular hyperfiltration is thought to play an important role in the development and progression of CKD in both T1DM and T2DM (Hoogeveen, 2022).

Psychological Distress

Based on the results of the study, there was a significant decrease in the mean score in the Intervention group after being given MBSR modified therapy Intervention. Patients often perceive haemodialysis that must be done for life as a threatening stressor, and patients often allow these negative perceptions to continue, this triggers psychological distress, and this condition which is left unchecked will worsen the patient's health condition. After giving MBSR modified therapy Intervention for 7 days, psychological distress that occurs in patients has decreased quite high. This may also be caused by various things, outside the Intervention. Based on the facts in the field, after the research session was conducted, the patient often stated that during this time the patient also always received support from the family, not only that the patient also stated that several times often participated in social activities, even though he could not work, but the patient chose to fill his spare time by socialising in the surrounding environment. In addition, the approach during the Intervention and the attention given to the patient made the patient feel more comfortable, and the patient stated that he felt more cared for. This may have contributed to the decrease in the level of psychological distress in addition to the MBSR modified therapy intervention. According to the researcher's assumptions, family support also have the potential to help with the level of psychological distress. The role of family is also very important for haemodialysis patients. Families can help reduce the psychological distress of haemodialysis patients by providing emotional support, understanding, and encouragement. The presence of family members can reduce feelings of isolation and loneliness, which are common among haemodialysis patients. Family support can also help patients cope with stress and anxiety associated with their condition, leading to improved psychological well-being (Wijayanti et al., 2023).

Effectiveness of Modified MBSR Intervention on Psychological Distress

The results showed that there was a difference in the average pre-test and post-test psychological distress scores in the Intervention group, with a decrease in the average psychological distress of 4.66 (95% CI: 3.12; 6.21), the decrease resulted in a significant difference in the average value with a p value of 0.000 (<0.05), which means there is an effect of MBSR modified therapy Intervention on psychological distress in the Intervention group. The results of this study are in line with the research of Zhang et al (2019), showing a significant decrease in depression and anxiety in the MBSR Intervention group ($f = 17.7$; $p < 0.00$), also in line with research from Mawarizka, 2019, which shows that there is an effect of MBSR on stress in CKD patients on HD ($u = 0.000$; $p = 0.000$). Haemodialysis therapy impacts psychological factors that trigger psychological distress in patients, and will certainly affect chronic kidney disease management (Natashia et al., 2019). In general, haemodialysis patients often have negative cognitive behavioural habits such as rumination and high levels of worry and fear which have been shown to worsen patients' psychological health conditions and cause psychological distress. The provision of MBSR modified therapy intervention has a positive impact on reducing psychological distress.

The provision of mindfulness-based interventions including the modified MBSR therapy intervention can reduce psychological distress through mechanisms in the nervous system described in Marchand's research (2014), that mindfulness-based MBSR modifications have an impact on the function of various brain regions, including the medial cortex, insula, amygdala, lateral frontal region, and basal ganglia. MBSR modification practices are associated with neural mechanisms involving attention, emotional regulation, and thinking patterns, which are enhanced through sustained non-judgemental awareness of one's thoughts, emotions, and sensory perceptions. In this study, after being given MBSR modification therapy, in addition to patients feeling more comfortable and calm and not often agitated

either at night or when they are not active, haemodialysis patients can also consciously assess positively the purpose of implementing lifelong haemodialysis in CKD disease as an opportunity to prevent health deterioration in a short time, patients also become aware of the importance of implementing a diet according to recommendations from health workers and patients can return to clear thinking and focus on continuing to try to be productive in activities so as to improve their welfare even in difficult situations due to the disease they suffer.

MBSR modification therapy can reduce psychological distress in patients, this therapy if often done by patients will strengthen the patient's cognition through various mechanisms that occur in the innervation system in the brain. MBSR modification therapy can also increase self-compassion, and decentering. MBSR aims to foster the skills of mindfulness, self-compassion, and decentering, which in turn can help individuals respond more skilfully and with greater wisdom to internal and external stimuli. This change in mindset and attitude can lead to a reduction in psychological distress and an improvement in mental well-being (Maloney et al., 2023). Meanwhile, in the Control group there was a decrease in the average value of psychological distress in the pre-test and post-test only by 0.29, therefore it did not indicate a significant difference in the average value of pre-test and post-test with a p value of 0.140 (> 0.05). MBSR modified therapy intervention in the group was only given once after the research was carried out. The decrease in psychological distress scores in the Control group without being given MBSR modification therapy can be caused by various factors, one of which is a high level of education. In the Control group, it was dominated by respondents with high school and college graduates. Higher education can certainly affect various aspects including stress management. Higher education can have a positive impact on reducing psychological distress. Research has shown that individuals with higher levels of education tend to have better coping mechanisms, increased access to resources to manage stress, and a greater understanding of mental health issues (Barello et al., 2023).

The results showed that there was a significant difference in mean scores between the Intervention group and the Control group. The mean score in the Intervention group is higher than the mean score in the Control group, this indicates that the decrease in psychological distress is more in the Intervention group compared to the Control group (MD = 4.38, t = 5.92, p < 0.001). The results of this study also obtained an effect size value of d = 2.22 (strong effect), when compared to the results of previous research by Chen et al (2013), obtained the result of η^2= 0,31 (large *effect size*), then the results of this study both have a relatively good effect. Then, when juxtaposed with the research of Yang et al (2020), on psychological distress (anxiety and depression) a good effect was obtained (d = 1.65; -1.44). Therefore, MBSR modified therapy intervention has a significant effect with a relatively good effect on reducing the value of psychological distress. In this study there are several aspects that need to be considered, firstly researchers have not measured the level of mindfulness of patients when they have been given MBSR modified therapy Intervention, the level of mindfulness of patients can be measured by The Mindful Attention Awareness Scale (MAAS). Then the researcher also did not identify any very likely possibilities of other variables that could affect the psychological distress of haemodialysis patients.

CONCLUSION

This study focuses on the effectiveness of MBSR modified therapy in reducing psychological distress in patients. This intervention shows a high effect size, so that this Intervention can be used as one of the non-pharmacological therapies to be able to reduce the psychological distress of CKD on HD patients. Implications for practical use are that this research can be

useful for health practitioners, especially nurses, to be able to apply the Modified MBSR SOP as a discharge planning program for haemodialysis patients, and can be used as one of the abilities to carry out homecare programs applying Modified MBSR to haemodialysis patients in helping to reduce patient psychological distress. As for future researchers, this study can be used as a reference to conduct further research by adding spiritual aspects integrated into the MBSR Modification Intervention, so that the Intervention can cover holistic aspects of the patient. Then add new covariate variables that can affect the psychological distress of patients such as IDWG values and add measurements to measure the level of mindfulness of patients after administering the Modified MBSR Therapy Intervention using The Mindful Attention Awareness Scale (MAAS).

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