



THE EFFECT OF MINDFULNESS BASED STRESS REDUCTION (MBSR) ON PSYCHOLOGICAL DISTRESS IN CORONARY ARTERY DISEASE (CAD) PATIENTS AFTER CORONARY ARTERY BYPASS GRAFTING (CABG)

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ABSTRACT

Coronary artery disease (CAD) patients undergoing preventive coronary artery bypass graft (CABG) surgery commonly experience psychological distress in the form of anxiety, stress, and depression, which can hinder the recovery process. Mindfulness-Based Stress Reduction (MBSR) programs are known to be effective in reducing psychological burden in various chronic disease conditions, but research in the CHD population after preventive CABG is limited. Objective to determine the effect of a mindfulness-based stress reduction (MBSR) intervention on psychological distress in CHD patients undergoing preventive CABG. The study used a true-experimental design. The sample consisted of CHD patients who met the inclusion criteria, divided into intervention and control groups. The intervention group participated in the MBSR program for 21 days, while the control group received standard care. A total of 12 respondents participated. Stress, anxiety, and depression levels were measured using standardized instruments such as the Hospital Anxiety and Depression Scale (HADS) instrument, the level of stress using the Perceived Stress Scale (PSS) instrument. Data analysis was performed using bivariate paired t-tests and multivariate. The MBSR program demonstrated a significant reduction in stress, anxiety, and depression levels in the intervention group compared to the control group ($p < 0.05$). The difference in mean psychological scores before and after the intervention indicated a greater improvement in mental well-being in MBSR participants. The MBSR intervention was effective in reducing psychological distress in coronary artery disease patients after CABG prevention.

Keywords: coronary artery bypass grafting; coronary artery disease; mindfulness based stress reduction; psychological distress

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INTRODUCTION

Coronary Heart Disease (CHD) is the leading cause of death worldwide, with approximately 126 million individuals (a prevalence rate of 1,655 per 100,000) or 1.72% of the world's population affected by it in 2020, according to the Global Burden of Disease (GBD) (Usri et al., 2022). This prevalence is expected to continue to increase to 1,845 per 100,000 by 2030 (Marfuah et al., 2024). In Indonesia, the estimated prevalence of CHD is 1.5%, or approximately 2,650,340 individuals (Pasiën et al., 2021). The high rate of coronary heart disease increases the risk of death. Coronary Heart Disease (CHD) causes an imbalance between blood flow in the coronary arteries and myocardial oxygen demand (Directorate of P2PTM, 2023).. If this condition persists for a long time and is not promptly and appropriately treated, it can lead to the death of heart muscle tissue (myocardial infarction), which can be fatal. Therefore, appropriate treatment is essential to prevent the risk of death (Rahmatullah Hidayat et al., 2024). There are several methods for treating myocardial infarction, one of which is Coronary Artery Bypass Grafting (CABG).

Coronary artery disease patients undergoing CABG often experience a variety of physical and psychological problems and symptoms related to the procedure and their underlying heart disease. These problems include anxiety, depression and stress symptoms, immobility issues, complications such as neck and shoulder pain, respiratory complications, sleep deprivation, and postoperative

fatigue, which can worsen the patient's condition and reduce their quality of life. (Kusnanto et al., 2019). At RSPAD Gatot Soebroto, there has been no focused discussion on interventions specifically for coronary artery disease patients undergoing coronary artery bypass grafting (CABG), as interventions are still general. Standard care provided to pre- and post-CABG patients related to psychological distress at RSPAD Gatot Soebroto includes education, relaxation techniques, and mosaic music therapy.

One intervention approach currently developing to reduce psychological distress such as depression, anxiety, and stress is the Mindfulness-Based Stress Reduction (MBSR) program. The MBSR intervention has been proven effective in reducing anxiety, depression, and stress in patients with cardiovascular disease, particularly coronary heart disease (Verma et al., 2021). The incidence of coronary heart disease (CHD) continues to increase annually at the Gatot Soebroto Army Hospital in Jakarta. Data from the heart clinic at the Gatot Soebroto Army Hospital in Jakarta showed that 1,500 people with CHD, 50 of whom underwent Coronary Artery Bypass Graft (CABG) surgery, were diagnosed in 2017. In 2018, there were 2,000 people with CHD and 67 patients underwent CABG surgery (Suyanti & Rahayu, 2020). Delayed treatment for coronary heart disease (CHD) can lead to worsening conditions. Medical management for patients with CHD includes pharmacological therapy and coronary revascularization, including coronary artery bypass grafting (CABG) (Bachar & Manna, 2023).

Patients undergoing CABG often experience a variety of physical and psychological symptoms. These include chest pain (angina), shortness of breath, fatigue, nausea and dizziness, and limitations in physical and daily activities (Ridwan et al., 2020). Meanwhile, psychological symptoms include disturbances in the patient's perception of their illness (including the level of self-acceptance and satisfaction with their life), stress, anxiety and even depression in post-operative patients (Hapsari et al., 2022). In general, patients experiencing psychological distress after CABG have no desire to continue rehabilitation programs and are often socially isolated (Aziza, 2013). Patients with depression, anxiety, and stress have a low tolerance for diet, medication, cigarette use, and do not participate in recommended exercise/training activities. Depression can cause a 5.4-fold lower quality of life compared to CHD patients who are not depressed, and may increase the frequency because its effects can worsen the condition of patients with CHD and even reduce quality of life (Bachtiar et al., 2023).

While physical problems in patients with coronary heart disease (CHD) have received significant attention in healthcare settings, psychological aspects remain under-recognized, particularly by nurses as healthcare providers. Providing psychological support to patients in this population is highly recommended. One form of non-pharmacological nursing intervention that can reduce depression, anxiety, and stress, and improve quality of life, is mindfulness-based stress reduction (MBSR), currently recognized as an alternative approach and an effective complementary therapy for improving patient health and well-being (Chakraborty et al., 2022).

Mindfulness-Based Stress Reduction is the ability to focus on and understand each situation. MBSR can affect the central nervous system by relaxing blood vessels, thus improving blood flow (Nursadrina et al., 2025). The conceptualization of mindfulness includes two main components: (a) self-regulation of attention and awareness, and (b) an accepting or non-judgmental attitude toward present-moment experience (Nugroho et al., 2022). The advantage of MBSR compared to other non-pharmacological interventions is that it combines elements from cognitive and behavioral aspects. The primary goal is to foster mindfulness, which helps individuals increase awareness and acceptance of their disease state. The behavioral aspect is expected to improve behavioral skills in responding to every experience experienced during the disease process, thereby fostering a greater sense of emotional balance and well-being, ultimately leading to long-term psychological distress management (Creswell, 2017).

Based on these situations and issues, the author wants to implement the MBSR intervention in CHD patients undergoing CABG at Gatot Soebroto Army Hospital. The purpose of this study is to analyze the effect of implementing a mindfulness-based stress reduction intervention on reducing psychological distress in post-coronary artery bypass graft patients at Gatot Soebroto Army Hospital, based on recent research findings.

METHOD

This type of research method is quantitative. The population for the EBNP implementation will be inpatients with coronary heart disease (CHD) undergoing CABG at Gatot Soebroto Army Hospital. The sampling technique used purposive sampling. The inclusion criteria are inpatients diagnosed with CHD who will undergo CABG, aged ≥ 18 years, able to communicate, read, and write, and willing to participate in the study as evidenced by informed consent.

Meanwhile, the exclusion criteria are patients not currently undergoing intervention for anxiety, either medically or psychologically. A total of 12 respondents participated. The EBNP application is targeted to start in May 2024, The time period allocated for the implementation of EBNP mindfulness based stress reduction includes pre-intervention: 0 days (filling out the questionnaire measuring anxiety, depression and stress), session length: 4 sessions (3x in the hospital, 1x day 21) and evaluation: 4x follow-up for each session after the intervention (Pre-op (day 0), Post op (day 3), Discharge from the hospital, and Day 21 during the control.

The implementation of the application of mindfulness based stress reduction. towards reducing depression, anxiety, stress is carried out by measuring the level of depression and anxiety using the Hospital Anxiety and Depression Scale (HADS) instrument, the level of stress using the Perceived Stress Scale (PSS) instrument. The HADS Validity test results show good construct validity, with factor loadings generally ranging from 0.40 to 0.80. The questionnaire has a stable two-factor structure (Anxiety/HADS-A and Depression/HADS-D). The Cronbach's Alpha reliability test results show HADS-A (anxiety): 0.80 – 0.93 and HADS-D (depression): 0.70 – 0.90. Test-retest reliability: 0.85 (good) within a 2-week interval. The Perceived Stress Scale (PSS) questionnaire found adequate construct validity. The PSS-10 factor loadings were generally 0.50–0.80 (two factors: perceived helplessness and self-efficacy). Cronbach's Alpha reliability test results were 0.78–0.91. This measurement is carried out manually paper-based test with equipment provided by the author. The significant relationship between the Mindfulness Based Stress Reduction intervention and reducing Psychological Distress will be analyzed using the using bivariate paired t-tests and multivariate.

RESULT

Table 1.
Distribution of Respondents Based on Age and Length of CHD Diagnosis (n=5)

Variable	Mean	Standard Deviation	Min-Max	95%CI
Age	58,80	7,823	51-68	49.09 - 68.51
Length of CHD Diagnosis	6,80	3,114	3-10	2.93 - 10.67

Table 1 shows that the average age of respondents was 58 years, with the youngest being 51 and the oldest 68. The average length of time since being diagnosed with CHD was 6 years, with the lowest score being 3 years and the highest being 10 years.

Based on table 2, the average anxiety score before the intervention showed a reduction in mindfulness-based stress at the first measurement was 9.6 (± 1.8) to 6.8 (± 1.5). The average depression score before the mindfulness-based stress reduction intervention at the first measurement was 8.2 (± 1.09) to 4.8 (± 1.78). The average stress score before the mindfulness-based stress reduction intervention at the first measurement was 10.6 (± 2.7) to 7.8 (± 3.3).

Table 2.
Mean Anxiety, Depression, and Stress Scores Before and After the Mindfulness-Based Stress Reduction Intervention in Inpatients (n=5)

Anxietas	Mean	SD	Min	Max
Pre (Day 0)	9,60	1,817	8	12
Post I (Day 3)	12,40	1,517	10	14
Post II (Discharge)	8,80	2,280	5	11
Post III (Day 21)	6,80	1,483	5	9
Depresi	Mean	SD	Min	Max
Pre (Day 0)	8,20	1,095	7	10
Post I (Day 3)	8,20	2,168	6	11
Post II (Discharge)	6,60	2,408	4	9
Post III (Day 21)	4,80	1,789	3	7
Perlakuan	Mean	SD	Min	Max
Pre (Day 0)	10,60	2,702	7	14
Post I (Day 3)	11,60	2,074	8	13
Post II (Discharge)	8,60	1,673	6	10
Post III (Day 21)	7,80	3,033	4	12

Table 3.
Differences in Average Anxiety, Depression, and Stress Scores Before and After Mindfulness-Based Stress Reduction Intervention in Inpatients (n=5)

Anxiety	Mean	SD	MD	t	df	Sig	95% CI	
							Lower	Upper
Before (Day 0)	9,60	1,817	2,800	2,746	4	0,052	-0,031	5,631
After (Day 21)	6,80	1,483						
Depression	Mean	SD	MD	t	df	Sig	95% CI	
Before (Day 0)	8,20	1,095	3,400	4,185	4	0,014	1,144	5,656
After (Day 21)	4,80	1,789						
Stress	Mean	SD	MD	t	df	Sig	95% CI	
Before (Day 0)	10,63	2,702	2,800	2,256	4	0,087	-0,645	6,245
After (Day 21)	7,80	3,033						

Table 3 shows a decrease in anxiety scores, indicating a decrease in anxiety levels. Before the intervention, the average score was 9.60 (± 1.817), and after the intervention, the average score was 6.80 (± 1.483). This finding demonstrates that mindfulness-based stress reduction has a clinical impact. However, statistically, mindfulness-based stress reduction did not significantly reduce anxiety ($t = -2.746$, $p = 0.052$, 95% CI = -0.031-5.631). The table also shows a decrease in depression scores, indicating a decrease in depression levels. Before the intervention, the average score was 8.20 (± 1.095), and after the intervention, the average score was 4.80 (± 1.789). These findings demonstrate that mindfulness-based stress reduction had both a clinical and statistically significant impact on reducing depression ($t = -4.185$, $p = 0.014$, 95% CI = (1.144)-(5.656). Table 3 also shows the results of a paired simple t-test analysis, indicating a decrease in stress scores, indicating a decrease in stress levels. Before the intervention, the average score was 10.63 (± 2.702), and after the intervention, the average score was 7.80 (± 3.033). These findings demonstrate that mindfulness-based stress reduction had a clinical impact on reducing stress scores. However, statistically, mindfulness-based stress reduction did not significantly reduce stress ($t = -2.256$, $p = 0.087$, 95% CI = (-0.645)-(6.245).

Multivariate Analysis

This study aimed to assess the effect of mindfulness-based stress reduction on anxiety, depression, and stress in patients undergoing CABG using repeated measures ANOVA. This study examined changes in anxiety, depression, and stress scores across four measurements: pretest (T0) and follow-

up measurements on day 3, at hospital discharge, and day 21 (T4). This approach efficiently handles correlated data, providing a comprehensive understanding of the intervention's impact over time. The purpose of this EBNP application is to contribute insights into the potential benefits of mindfulness-based stress reduction as a treatment for reducing symptoms and the impact of anxiety, depression, and stress in patients undergoing CABG.

Analysis of the Effect of Time on Anxiety Reduction Following the Mindfulness-Based Stress Reduction Intervention.

Table 4.
Analysis of Time Effect on Anxiety Reduction Scores

Anxiety	Sum Of Square	df	Mean Square	F	P-Value	Partial Eta Square
Time	80,800	3	26,933	11,882	0,001	0,748
Error (Time)	27,200	12	2,267	-	-	-
Depression	Sum Of Square	df	Mean Square	F	P-Value	Partial Eta Square
Time	39,350	3	13,117	10,564	0,001	0,725
Error (Time)	14,900	12	1,242	-	-	-
Stress	Sum Of Square	df	Mean Square	F	P-Value	Partial Eta Square
Time	46,150	3	15,383	4,976	0,018	0,554
Error (Time)	37,100	12	3,092	-	-	-

Table 4, the results of the analysis show that the effect of time on anxiety reduction scores showed statistically significant results ($F(3) = 11.882, p = 0.001, \text{partial eta square} = 0.748$). The application of EBNP identified significant variations in anxiety reduction scores across four measurement periods: pre-test (T0), post-day 3 (T1), post-discharge (T2), and post-day 21 (T3). The high partial eta squared value (0.748) indicates that most of the observed variation in anxiety reduction scores can be attributed to the effect of time. This finding supports that the mindfulness-based stress reduction intervention has a significant impact on improving anxiety scores. The analysis results showed that the effect of time on depression reduction scores was statistically significant ($F(3) = 10.564, p = 0.001, \text{partial eta squared} = 0.725$). This study identified significant variations in depression reduction scores across four measurement periods: pre-test (T0), post-day 3 (T1), post-discharge (T2), and post-day 21 (T3). The high partial eta squared value (0.725) indicates that most of the observed variation The difference in depression reduction scores can be attributed to the effect of time. These findings support that the mindfulness-based stress reduction intervention has a significant impact on improving depression scores.

The analysis showed that the effect of time on depression reduction scores was statistically significant ($F(3) = 4.976, p = 0.018, \text{partial eta square} = 0.554$). This study identified insignificant variation in stress reduction scores across four measurement times: pre-test (T0), post-day 3 (T1), post-discharge (T2), and post-day 21 (T3). The high partial eta square value (0.554) indicates that most of the observed variation in stress reduction scores can be attributed to the effect of time. These findings indicate that the mindfulness-based stress reduction intervention has a statistically significant impact on improving stress scores.

DISCUSSION

Anxiety Overview in Post-Coronary Artery Bypass Graft Patients Before and After Mindfulness-Based Stress Reduction Therapy

The results of this study indicate that the average anxiety score before the mindfulness-based stress reduction intervention was 9.6 (± 1.8) at the first measurement, with a minimum score of 8 and a maximum score of 12. The results of the fourth measurement after the intervention showed a mean anxiety score of 6.8 (± 1.5) with a minimum score of 5 and a maximum score of 9. These data indicate a decrease in scores before and after the intervention. Anxiety is an individual's subjective emotional state and experience toward an unclear and specific object due to anticipation of danger, which allows the individual to take action to deal with the threat (Ilahi et al., 2021). Anxiety can also be called worry. In this study, the respondents were patients undergoing CABG surgery.

CABG surgery can cause anxiety at every stage. Anxiety can hinder psychological adjustment in heart patients and hinder physical recovery, thus impacting their quality of life (Ilahi et al., 2021). The body's response to anxiety consists of physiological and affective responses. Physiological symptoms include cardiovascular symptoms, including palpitations, a pounding heart, fainting, decreased blood pressure, and a decreased pulse rate (Jee & Sawal, 2024). The anxiety level and quality of life of post-CABG patients are influenced by age, education, and occupation. Therefore, anxiety management in heart disease patients undergoing surgical procedures is crucial to prevent the physical effects of anxiety, including changes in pulse rate, blood pressure abnormalities, and changes in respiration, which ultimately impair perfusion and circulation.

Depression in Post-Coronary Artery Bypass Graft Patients Before and After Mindfulness-Based Stress Reduction Therapy

The results of the study showed that the average depression score before the mindfulness-based stress reduction intervention was 8.2 (± 1.09) at the first measurement, with a minimum score of 7 and a maximum score of 10. The results of the study showed that the average depression score at the fourth measurement after the intervention was 4.8 (± 1.78) with a minimum score of 3 and a maximum score of 7. These data indicate a decrease in scores before and after the intervention. Depression is a change in emotion that is manifested by depression, mania or both (Zhuo et al., 2023). Depression can affect a person's physical, social, and psychological condition. Long-term depression can lead to a decrease in a person's quality of life. In patients undergoing CABG (Coronary Artery Bypass Graft), depression is associated with longer hospital stays, poorer self-function, more perioperative complications, poorer quality of life, the occurrence of atherosclerosis, higher rates of readmission, and mortality (Gu et al., 2016).

Stress Profile in Post-Coronary Artery Bypass Graft Patients Before and After Mindfulness-Based Stress Reduction Therapy

The study results showed that the average stress score before the mindfulness-based stress reduction intervention was 10.6 (± 2.7) at the first measurement, with a minimum score of 7 and a maximum score of 14. The fourth measurement, after the intervention, showed a mean stress score of 7.8 (± 3.3) with a minimum score of 4 and a maximum score of 12. These data indicate a decrease in scores before and after the intervention. Stress is an individual's response to changes in situations or threats. It is also an important factor in motivation, adaptation, and responding to the surrounding environment. However, if stress is not managed properly, it can lead to biological, psychological, and social problems, and even serious harm. Individuals experiencing prolonged stress have a twofold increased risk of coronary heart disease, and in addition to increasing blood pressure and cholesterol levels, it can also increase blood cholesterol levels (Suhermi et al., 2022). In post-CABG patients, stress management is essential to support the recovery process and improve quality of life. Effective stress management will train individuals to manage stress to improve psychological and physical function, which will impact their well-being, both subjectively and psychologically (Suyanti & Rahayu, 2020).

The Effect of Mindfulness-Based Reduction on Anxiety in Post-Coronary Artery Bypass Graft Patients

The results of the EBNP implementation showed a statistically significant effect of the intervention on anxiety reduction scores ($F(1,201) = 11.882, p = 0.014, \text{partial eta square} = 0.748$). The results of the EBNP implementation align with research conducted by Mudazilah & Hasanat (2018), which concluded that the Mindfulness-Based Stress Reduction (MBSR) program can significantly reduce anxiety in individuals with CHD ($p\text{-value} = 0.043$). Nurrahman, A., et al. (2024), in their study, also showed that Mindfulness-Based Stress Reduction (MBSR) can reduce anxiety in 66.67% of respondents with chronic heart disease. Stinson et al. (2020) define anxiety as a subjective feeling of fear, nervousness, and worry. Mindfulness-based interventions such as mindfulness have been shown to reduce the detrimental impact of depression and anxiety (Legu, E., T. et al. 2024).

Mindfulness-Based Stress Reduction can improve self-awareness, emotion recognition, emotion regulation, and coping skills in any situation. Mindfulness-Based Stress Reduction works by influencing the central nervous system by relaxing blood vessels, thus improving blood flow (Zuo, Cao, and Chair, 2021).

The Effect of Mindfulness-Based Stress Reduction on Reducing Depression in Post-Coronary Artery Bypass Graft Patients

The results of this study showed a statistically significant effect of the intervention on depression scores ($F(1,787) = 10.564$, $p = 0.008$, partial eta square = 0.725). The results of this EBN implementation align with research by Krisyaningrum (2022), which showed that mindfulness therapy reduced depression levels in high-risk pregnant women with a p-value of 0.018. Mamuroh et al. (2022) stated that Mindfulness-Based Stress Reduction (MBSR) has a positive effect on reducing stress, depression, anxiety, fear, and pain. The effectiveness of mindfulness occurs due to changes in breath-focused attention regulation in the parietal and occipital brain regions associated with visual attention. Furthermore, there is evidence that MBSR and long-term mindfulness practice can directly influence attentional deployment, particularly the ability to exert cognitive control (Mahyubi & Sari, 2024). This activates the brain's parasympathetic nervous system in "being-mode," focusing on "accepting" and "allowing" each situation as it is without immediate pressure to change it (Ramadhan et al., 2022).

The Effect of Mindfulness-Based Reduction on Stress Reduction in Post-Coronary Artery Bypass Graft Patients

The results showed a statistically significant effect of the intervention on anxiety reduction scores ($F(1,676) = 4.976$, $p = 0.051$, partial eta square = 0.554). The effect of mindfulness-based reduction on stress scores in the EBNP program aligns with the research findings of Faulina et al. (2022), which showed a significant difference in stress levels in the experimental group before and after treatment, with a P-value of 0.002. Stress is a mental disorder often experienced by individuals due to pressure arising from excessive anxiety. Stress arises from increased secretion of adrenal granules, which can disrupt the function of the autonomic nervous system, endocrine system, and immune system, and can lead to psychosomatic symptoms (Handayani et al., 2021). Yuliana et al. (2022) concluded in their study that mindfulness therapy was effective in reducing stress in the intervention group, with a P-value of 0.001. Handayani et al. (2021) stated that practicing mindfulness therapy can relax a person. The relaxed state during mindfulness therapy occurs because mindfulness therapy works by reaching alpha brain waves (the lowest brain wave frequency) thereby influencing an increase in the secretion of the hormones norepinephrine, serotonin, and beta-endorphine, which is accompanied by a reduction in the level of stress hormone production (Yuliana et al., 2022).

CONCLUSION

There is a significant influence of the Mindfulness Based Stress Reduction intervention on reducing the level of Psychological Distress in post Coronary Artery Bypass Graft patients.

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