THE EFFECT OF INTEGRATED MULTIMODAL RELAXATION THERAPY (MRT) ON QUALITY OF LIFE AND COMPLICATION RISK AMONG OLDER ADULTS WITH HYPERTENSION

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ABSTRACT

Hypertension in the elderly is associated with reduced quality of life and increased cardiovascular risk. A complementary non-pharmacological intervention addressing both physical and psychological aspects is needed. Multimodal Relaxation Therapy (MRT), combining several relaxation techniques, may improve quality of life and cardiovascular risk profiles in elderly individuals with hypertension. This study used a quasi-experimental design with a pretest–posttest control group design. A total of 120 elderly hypertensive patients were divided into an intervention group (n=60) and a control group (n=60). The intervention group received MRT, while the control group received standard care. Quality of life was measured using WHOQOL-BREF, while the risk of complications was assessed using the Framingham Risk Score (FRS). Data analysis was conducted using the Wilcoxon Signed Rank Test and the Mann Whitney U Test with a significance level of 5%. The intervention group showed a significant improvement in quality of life after the intervention (81.85±18.34 to 98.78±15.19; p<0.001), while the control group did not experience significant changes (p=0.114). The risk of cardiovascular complications measured using the Framingham Risk Score (FRS) also decreased significantly in the intervention group, from 24.25±18.50 to 14.97±12.65 (p <0.001), while the control group showed no significant change (p=0.906). Multimodal Relaxation Therapy (MRT) is associated with improved quality of life and reduced cardiovascular risk scores based on the Framingham Risk Score (FRS) among elderly individuals with hypertension. MRT has potential as a complementary non-pharmacological intervention to support gerontic nursing care and hypertension management in primary healthcare settings.

Keywords: Hypertension, Elderly, Multimodal Relaxation Therapy, Quality Of Life, Framingham Risk Score

INTRODUCTION

Hypertension in the elderly is one of the chronic health problems that is still a major challenge in public health services because of its high prevalence and impact on decreased function and quality of life. (Aliffia, 2024; Lionakis et al., 2012). The aging process causes physiological changes in the cardiovascular system, such as a decrease in the elasticity of blood vessels and an increase in peripheral resistance, so that the elderly are more prone to hypertension (Dai et al., 2015). Uncontrolled hypertension can lead to a variety of serious complications, such as stroke, heart failure, chronic kidney disease, and other vascular disorders that have an impact on the decline in the quality of life of the elderly (Goorani et

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al., 2024; Khairani, 2025). In addition to physical problems, the elderly with hypertension also often experience psychological disorders in the form of stress, anxiety, sleep disorders, and emotional instability that worsen overall health conditions (Turana et al., 2021). Therefore, hypertension in the elderly requires comprehensive treatment, focusing not only on pharmacological aspects but also on a holistic approach that includes bio-psycho-socio-spiritual aspects.

The prevalence of hypertension in the elderly continues to increase as the life expectancy of the community increases (Chinnakali et al., 2012). The elderly are the age group with the highest incidence of hypertension compared to other age groups. Data World Health Organization, 2023, the prevalence of hypertension at the age of ≥60 years reached 64%, more than half of which were not well controlled (Cheraghi et al., 2025; Leszczak et al., 2024). Based on Riskesdas 2018, the prevalence of hypertension increases with age, reaching 63.2% in the age group of 65-74 years and 69.5% in the age group of ≥75 years based on the results of blood pressure measurements. This condition shows that the elderly are a group that has a high risk of experiencing hypertension and its complications (Hayati, 2026; Sari & Susanti, 2026). This high number indicates a double burden, because hypertension is often accompanied by a decrease in quality of life and the risk of cardiovascular complications such as stroke and heart failure. The results of a preliminary study conducted in December 2025 at the RW VI Elderly Posyandu, Village, Surabaya, showed that of the 113 elderly with hypertension. The results of the preliminary study showed that most hypertensive elderly people still focus on the use of pharmacological therapies in blood pressure control, while the application of nonpharmacological approaches as a supporting strategy is still limited. However, low adherence to drug consumption, the emergence of therapeutic side effects, and high levels of stress and anxiety cause blood pressure control to be less than optimal. This condition has the potential to increase the risk of cardiovascular complications and reduce the quality of life of the hypertensive elderly.

Hypertension in the elderly is not only influenced by physiological factors, but is also closely related to psychological conditions (Nurul, 2025). Prolonged psychological stress can trigger the activation of the sympathetic nervous system and increase the secretion of the hormone cortisol leading to an increase in blood pressure (Gokul et al., 2025). When stress and anxiety conditions are not controlled, blood pressure tends to increase persistently, increasing the risk of complications such as stroke and heart failure (Gokul et al., 2025). On the other hand, dependence on pharmacological therapy without psychological intervention and relaxation causes the elderly to experience emotional exhaustion, decreased sleep quality, and decreased quality of life (Yu et al., 2025). Various studies show that relaxation therapies such as Progressive Muscle Relaxation (PMR), mindfulness therapy, and ylang-ylang aromatherapy can reduce sympathetic nerve activity, increase parasympathetic responses, reduce stress, and help stabilize blood pressure (Toussaint et al., 2021). However, previous studies have generally used only single interventions and have focused more on short-term physiological outcomes without considering a holistic approach.

Based on these problems, non-pharmacological interventions that are comprehensive, safe, easy to apply, and based on a holistic approach are needed to help control hypertension in the elderly. Multimodal Relaxation Therapy (MRT) is an intervention innovation that integrates Progressive Muscle Relaxation (PMR), mindfulness therapy, and ylang-ylang aromatherapy in one integrated therapy

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protocol. PMR helps reduce muscle tension and lower blood pressure, mindfulness therapy plays a role in improving emotional regulation and controlling stress, while ylang-ylang aromatherapy provides a physiological relaxation effect through stimulation of the nervous system. The integration of the three therapies is expected to provide a synergistic effect in improving body homeostasis, improving quality of life based on physical, psychological, social, and environmental domains, and reducing the risk of hypertension complications in the elderly. This approach is also relevant to the bio-psycho-socio-spiritual-based holistic nursing paradigm and has the potential to be a model of effective and sustainable community nursing interventions.

METHODS

This study used a quasi-experimental design with a pre-test and post-test approach with control group design. The study involved two groups, namely the intervention group that received Multimodal Relaxation Therapy (MRT) and the control group that received standard services from the Elderly Posyandu. Measurements were taken before and after the administration of the intervention to assess changes in quality of life and cardiovascular risk scores based on the Framingham Risk Score (FRS) in the elderly with hypertension.

The research was carried out at the Posyandu Elderly RW VI Village, Surabaya, during the period of February-August 2026. The research population is all elderly people with hypertension registered in the Posyandu Elderly RW VI Village. The selection of respondents was carried out using a simple random sampling technique based on a list of hypertensive elderly who meet the inclusion and exclusion criteria of the study. The selected respondents were then divided into intervention groups and control groups in accordance with the service groups that had been determined in the research implementation.

The intervention group was given Multimodal Relaxation Therapy (MRT), while the control group continued to receive standard services of the Elderly Posyandu without MRT during the study period. The sample size was calculated using the G*Power application with an independent t-test, significance level $\alpha=0.05$, and power of 80%, so that the sample needs of 60 respondents were obtained in each group.

Inclusion criteria included the elderly aged ≥60 years with grade 1 hypertension, receiving stable antihypertensive therapy for at least one month, able to follow the intervention instructions, not participating in other relaxation therapies in the past month, and willing to participate through informed consent. Exclusion criteria included blood pressure ≥180/110 mmHg, a history of cardiovascular or severe target organ complications (stroke, heart failure, myocardial infarction, or advanced chronic kidney disease), psychiatric disorders that inhibit participation, and severe mobility disorders. Respondents who did not participate in ≥2 intervention sessions were categorized as dropouts and excluded from the final analysis.

The research instrument used the WHOQOL-BREF to measure quality of life and the Framingham Risk Score (FRS) to assess the risk of cardiovascular complications. The WHOQOL-BREF consisted of physical, psychological, social, and environmental domains with scores transformed into a range of 0-100. Meanwhile, the FRS was used to predict the risk of heart disease in 10 years based on age, gender, blood pressure, smoking status, blood sugar levels, HDL, and total cholesterol.

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The research procedure began with pre-test measurements in the intervention and control groups using WHOQOL-BREF and Framingham Risk Score (FRS), then the intervention group was given Multimodal Relaxation Therapy (MRT) in the form of a combination of Progressive Muscle Relaxation (PMR), mindfulness, and ylang-ylang aromatherapy for 2 times/week in 16 weeks with a duration of 45-60 minutes/session. The implementation of MRT included a 5-minute preparation stage, PMR ±20 minutes through gradual muscle contraction and relaxation techniques, mindfulness ±15-20 minutes through breathing focus and body awareness exercises, and ylang-ylang aromatherapy using a diffuser during the session according to the MRT protocol developed by the researcher. The intervention was carried out by the researcher and the team using observation sheets to monitor the participants' compliance and response, while the control group received routine activities of the Elderly Posyandu in the form of elderly gymnastics; after 16 weeks the two groups were post-tested using the same instrument.

Data analysis was carried out using SPSS through univariate and bivariate analysis. Univariate analysis was used to describe the characteristics of respondents in the form of frequency and percentage. Bivariate analysis was conducted to determine the influence of MRT on quality of life and risk of hypertension complications using the Wilcoxon Signed Rank Test and the Mann Whitney U Test with a significance level of 5%. This study has obtained ethical approval from the Health Research Ethics Committee of STIKes William Booth Surabaya, with ethics certificate number No. 01/STIKES-WB/ETIK-DOSEN/II/2026.

RESEARCH RESULTS

Respondent Characteristics

Table 1. Characteristics of Elderly Respondents with Hypertension Based on Research Group

Features	Intervention (n = 60)	Control (n = 60)	*p value*
Age (years)			
Mean ± SD	67,33 ± 10,21	66,27 ± 9,89	0.957[1]
Gender			
Male	14 (23,3%)	20 (33,3%)	0.000[2]
Women	46 (76,7%)	40 (66,7%)	
Education			0.000[2]
SD	12 (20,0%)	8 (13,3%)	
SMP	11 (18,3%)	10 (16,7%)	
SMA	31 (51,7%)	34 (56,7%)	
College	6 (10,0%)	8 (13,3%)	
Jobs			0.000[2]
Not working	40 (66,7%)	42 (70,0%)	
Entrepreneurship	6 (10,0%)	6 (10,0%)	
Private employees	3 (5,0%)	3 (5,0%)	
Retirees	11 (18,3%)	9 (15,0%)	
Revenue			0.000[2]
< UMR	28 (46,7%)	22 (36,7%)	
≥ LIFESPAN	32 (53,3%)	38 (63,3%)	
Long Suffering from Hypertension			0.000[2]
< 5 years	12 (20,0%)	6 (10,0%)	

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5–10 years	28 (46,7%)	26 (43,3%)	
> 10 years	20 (33,3%)	28 (46,7%)	
History of Comorbidities			0.000[2]
Diabetes Melitus	23 (38,3%)	30 (50,0%)	
Coronary Heart Disease	7 (11,7%)	7 (11,7%)	
Stroke	6 (10,0%)	9 (15,0%)	
Others	24 (40,0%)	14 (23,3%)	
Status Merokok			0.000[2]
Ya	14 (23,3%)	20 (33,3%)	
No	46 (76,7%)	40 (66,7%)	
Hypertension Medication Compliance			0.000[2]
Obedient	23 (38,3%)	15 (25,0%)	
Non-compliant	37 (61,7%)	45 (75,0%)	

Description:
[1] *Independent t-test/Mann–Whitney U Test*
[2] *Chi-square Test/Fisher's Exact Test*

Table 1. shows the characteristics of respondents in the intervention group and the control group. The average age of respondents in the intervention group was 67.33 ± 10.21 years, while in the control group it was 66.27 ± 9.89 years, with no significant difference between the two groups (p = 0.957). Most of the respondents in both groups were female, had a high school education, were not working, had an income ≥ UMR, had suffered from hypertension for 5-10 years, did not smoke, and did not comply in taking antihypertensive drugs. A comparison of basic characteristics showed significant differences in gender distribution, education level, occupation, income, length of hypertension, history of comorbidities, smoking status, and medication adherence (p < 0.001).

Description of Quality of Life in Elderly Hypertension

Table 2. Description of Quality of Life in Elderly Hypertension Before and After Intervention

Quality of Life	Intervention (n=60)		Control (n=60)	
	Pre-test	Post-test	Pre-test	Post-test
Height (≥95)	13 (21,7%)	37 (61,7%)	13 (21,7%)	17 (28,3%)
Medium (60–95)	35 (58,3%)	19 (31,7%)	35 (58,3%)	28 (46,7%)
Low (≤60)	12 (20,0%)	4 (6,7%)	12 (20,0%)	15 (25,0%)
Total	**60 (100%)**	**60 (100%)**	**60 (100%)**	**60 (100%)**

Table 2 shows that before the intervention, the distribution of quality of life in the intervention group and the control group was relatively the same. In both groups, most of the respondents had a moderate quality of life**,** namely 35 respondents (58.3%**),** followed by the high category of 13 respondents (21.7%) and the low category of 12 respondents (20.0%). After the administration of *Multimodal Relaxation Therapy* (MRT), there was a change in the distribution of quality of life in the intervention group. The number of respondents with high quality of life increased from 13 respondents (21.7%) to 37 respondents (61.7%), while the quality of life in the medium category decreased to 19 respondents (31.7%) and the low category decreased to 4 respondents (6.7%**).** In the control group, the change in the distribution of quality of life was not as large as the

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intervention group. Respondents with high quality of life increased to 17 respondents (28.3%), **medium** category to 28 respondents (46.7%), while low category increased to 15 respondents (25.0%) after the observation period

Description of Risk of Complications in Elderly Hypertension

Table 3. Distribution of Cardiovascular Risk Categories Based on Framingham Risk Score (FRS) in Elderly Hypertension Before and After Intervention (n=120)

Risk of Complications	Intervention Group (n=60)		Control Group (n=60)	
	Pre-test n (%)	Post-test n (%)	Pre-test n (%)	Post-test n (%)
Low Risk	11 (18,3)	31 (51,7)	10 (16,7)	13 (21,7)
Medium Risk	22 (36,7)	16 (26,7)	24 (40,0)	22 (36,7)
High Risk	27 (45,0)	13 (21,7)	26 (43,3)	25 (41,7)
Total	**60 (100)**	**60 (100)**	**60 (100)**	**60 (100)**

Table 3. shows the distribution of complication risk levels based on the Framingham Risk Score (FRS) in the intervention group and the control group before and after the study. In the intervention group, before the administration of *Multimodal Relaxation Therapy* (MRT), most of the respondents were in the high-risk category as many as 27 respondents (45.0%). After the intervention, the proportion of respondents in the low-risk category increased to 31 respondents (51.7%). In the control group, before the study, most respondents were also in the high-risk category as many as 26 respondents (43.3%). After the study period, the distribution of risk categories showed a relatively small change, namely the high-risk category of 25 respondents (41.7%). The change in the distribution of cardiovascular risk categories based on *the Framingham Risk Score* (FRS) before and after the intervention. In the intervention group, after 16 weeks of *Multimodal Relaxation Therapy* (MRT), there was a shift in risk category, characterized by an increase in the proportion of low risk and a decrease in the proportion of high risk. Meanwhile, the control group showed a relatively minimal change in risk distribution during the study period.

Influence Analysis *Multimodal Relaxation Therapy* (MRT) on Quality of Life in Elderly Hypertension

Table 4. Analysis of the Effect of Multimodal Relaxation Therapy (MRT) on the Quality of Life of the Elderly with Hypertension

Groups	***Pre-test (Mean ± SD)***	***Post-test (Mean ± SD)***	***Z***	***Within Groupp-value***
Intervention (n=60)	81,85 ± 18,34	98,78 ± 15,19	-6,227	<0.001
Control (n=60)	81,22 ± 18,14	79,28 ± 18,86	-1,581	0,114
Between Groupp-value	*Pre-test: 0,8112*	*Post-test: <0,0012*		

Description : Wilxcon[1 Test], Whitney U2 Mann Test

The results of *the Wilcoxon Signed Rank Test* showed that there was a significant improvement in quality of life in the intervention group after the administration of *Multimodal Relaxation Therapy* (MRT), with the average score increasing from 81.85 ± 18.34 to 98.78 ± 15.19 ($Z = -6.227$; $p < 0.001$). On the

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other hand, no significant change in quality of life was found in the control group, with an average score of 81.22 ± 18.14 in the pre-test and 79.28 ± 18.86 in the post-test (Z = -1.581; p = 0.114). Furthermore, the results of *the Mann Whitney U Test* showed that before the intervention there was no difference in quality of life between the intervention group and the control group (p = 0.811). However, after the intervention there was a significant difference between the two groups (p < 0.001), which showed that *Multimodal Relaxation Therapy* (MRT) was more effective in improving the quality of life of the elderly with hypertension compared to standard treatment.

Analysis of the Effect *of Multimodal Relaxation Therapy* (MRT) on the Risk of Complications in Hypertensive Elderly

Table 5. Analysis of the Effect *of Multimodal Relaxation Therapy* (MRT) on the Risk of Complications in Hypertensive Elderly

Groups	Pre-test (Mean ± SD)	Post-test (Mean ± SD)	Z	p-value
Intervention (n=60)	24,25 ± 18,50	14,97 ± 12,65	-5,989	<0.001[1]
Control (n=60)	30,45 ± 26,16	30,50 ± 25,49	-0,119	0,906[2]
Between Groupp-value	*Pre-test: p=0,4932*	*Post-test: p<0,0012*		

Description : Wilxcon[1 Test], Whitney U Mann Test[2]

Analysis using *the Wilcoxon Signed Rank Test* showed that the intervention group experienced a significant reduction in complication risk score after administration of *Multimodal Relaxation Therapy* (MRT) (Z = -5.989; p < 0.001), while the control group showed no significant change (Z = -0.119; p = 0.906). The results of *the Mann Whitney U test* showed that there was no difference in complication risk scores between the two groups at the pre-test time (*p = 0.493*), but there was a significant difference in the post-test (*p < 0.001*), indicating that MRT was effective in lowering the risk of complications in the hypertensive elderly compared to the control group.

DISCUSSION

The Effect of *Multimodal Relaxation Therapy* (MRT) on Quality of Life in Hypertensive Elderly

This study showed that the administration of *Multimodal Relaxation Therapy* (MRT) during the intervention period was able to significantly improve the quality of life of the hypertensive elderly. The results of the analysis showed an increase in the average quality of life score in the intervention group from 81.85 ± 18.34 to 98.78 ± 15.19 (*p<0.001),* while the control group did not experience a significant change (*p=0.114). In addition*, the proportion of respondents with high quality of life increased almost threefold, from 21.7% to 61.7%, accompanied by a decrease in the proportion of low quality of life from 20.0% to 6.7%. In contrast, in the control group the change in the distribution of quality of life was relatively small and there was still an increase in respondents with low quality of life after the observation period. The findings show that the improvement in quality of life in the intervention group was not only seen in the average score, but was also reflected in the change in the distribution of quality of life categories.

The findings of this study are in line with various studies that report that relaxation interventions can improve the quality of life in people with hypertension (Webster et al., 2025). Beberapa *systematic review* and *meta-analysis* shows that

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relaxation exercises, including *progressive muscle relaxation*, breathing exercises, meditation, and *mindfulness*, contribute to improvements in the physical and psychological domains of quality of life through lowering blood pressure, reducing psychological stress, as well as improving an individual's ability to manage chronic illnesses. Relaxation-based interventions have also been reported to improve sleep quality, reduce anxiety, and improve daily functioning, which are important components in assessing quality of life in hypertensive older adults (Toussaint et al., 2021).

The effectiveness of MRT in this study is likely due to a multimodal approach that integrates several relaxation techniques in one intervention program. In contrast to the use of only one relaxation method, the multimodal approach provides more comprehensive stimulation to physiological and psychological aspects. Respiratory relaxation and progressive muscle relaxation are known to increase the activity of the parasympathetic nervous system and suppress sympathetic activity, resulting in a decrease in heart rate, peripheral vascular resistance, and blood pressure (Azizah et al., 2021; Remuja et al., 2026). This physiological response contributes to a reduction in the physical complaints that hypertensive elderly often experience, such as headaches, muscle tension, fatigue, and sleep disturbances (Basya & Lisiyorini, 2026). The reduction of physical symptoms further allows the elderly to carry out daily activities more comfortably, thus having an impact on improving the physical domain of quality of life (Lumbantoruan, 2024; Mailita et al., 2025).

In addition to affecting physiological aspects, MRT also provides benefits to the psychological dimension. Hypertension is a chronic disease that is often accompanied by anxiety about complications, dependence on drugs, and limited activity (Najuha, 2025). Relaxation exercises help lower the stress response through decreased cortisol and catecholamine secretion and improve emotional regulation (Shchaslyvyi et al., 2024). A more stable psychological state will improve an individual's perception of his or her health, improve confidence in managing the disease (*self-management*), and increase satisfaction with life (Ibrahim et al., 2025). These changes contribute to improved quality of life scores, especially in the psychological domain and overall perception of health.

The improvement in quality of life found in this study can also be explained through the characteristics of MRT which are implemented in a structured and repetitive manner. The implementation of regular interventions allows respondents to develop relaxation habits as part of daily activities. Adaptations that occur gradually have the potential to improve coping ability to chronic stress, improve sleep quality, and increase participation in social activities (El Hajal et al., 2026). In the elderly, these changes are important because the quality of life is not only determined by physical conditions, but also influenced by the ability to maintain independence, social relationships, and psychological well-being (El Hajal et al., 2026).

Conversely, the absence of meaningful changes in quality of life in the control group suggests that standard care alone was not sufficient to result in improvements in quality of life in the study period. Although some of the respondents in the control group experienced an improvement in quality of life, the change was not large enough to achieve statistical significance. This condition indicates that without interventions that specifically target psychological and physiological aspects simultaneously, the quality of life of hypertensive elderly people tends to remain constant or experience only minimal changes. This is

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consistent with the characteristics of hypertension as a chronic disease that requires a long-term management approach, focusing not only on blood pressure control but also on improving overall well-being.

The findings of this study have important implications for gerontic nursing practices and community nursing. MRT can be considered as a non-pharmacological intervention that complements pharmacological therapy in the management of hypertensive elderly. The integration of relaxation techniques into the Posyandu Elderly program or chronic disease management services in primary health care facilities has the potential to improve the quality of life while strengthening the ability of the elderly to manage diseases independently. This approach is in line with the nursing paradigm that emphasizes improving well-being, function, and quality of life as the main outcomes in the care of patients with chronic diseases.

The Effect of *Multimodal Relaxation Therapy* (MRT) on the Risk of Complications in Hypertensive Elderly

The results of this study showed that the administration *of Multimodal Relaxation Therapy* (MRT) significantly reduced the risk of cardiovascular complications in hypertensive elderly as measured using the Framingham Risk Score (FRS). The decrease in the mean FRS score in the intervention group from 24.25 ± 18.50 to 14.97 ± 12.65 showed that the intervention not only provided a statistically significant change, but was also followed by a shift in the distribution of risk categories. After the intervention, the proportion of respondents with low risk increased from 18.3% to 51.7%, while the high-risk category decreased from 45.0% to 21.7%. In contrast, the control group showed no significant changes in either the FRS score or the distribution of risk categories. These findings suggest that MRT contributes to a reduced risk of cardiovascular complications in hypertensive older adults.

The results of this study are consistent with various studies that report that relaxation interventions are part of effective nonpharmacological therapies in helping to control cardiovascular risk factors in people with hypertension (Berliana et al., 2025; El Hajal et al., 2026). Studies have shown that regular relaxation exercises can lower systolic and diastolic blood pressure, reduce sympathetic activity, improve the regulation of the autonomic nervous system, and improve the endothelial function of blood vessels (Verma et al., 2021). The improvement in these physiological parameters contributes to a reduced risk of cardiovascular disease calculated through various risk prediction models, including the Framingham Risk Score (Amiri et al., 2025). Thus, the decrease in FRS scores obtained in this study reflects an improvement in cardiovascular risk profile after MRT administration.

The effectiveness of MRT in reducing the risk of complications may be related to an intervention approach that integrates several relaxation techniques so that it provides a more comprehensive effect than the use of a single relaxation method alone. Activation of the parasympathetic nervous system during relaxation exercises leads to a decrease in the release of catecholamines and cortisol, resulting in a decrease in heart rate, peripheral vascular resistance, and blood pressure (Goldstein, 2013). Such physiological responses reduce the workload of the heart and improve tissue perfusion, which ultimately contributes to a reduced risk of cardiovascular complications (Zheng et al., 2026). In addition, repetitive relaxation exercises can improve baroreceptor sensitivity as well as improve the

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balance of the autonomic nervous system, a mechanism known to play an important role in the control of long-term hypertension.

The reduced risk of complications in this study can also be influenced by changes in health behaviors that occur during the implementation of the intervention. The MRT program that is implemented in a structured manner provides an opportunity for the elderly to better recognize the body's response to stress and develop a more adaptive coping strategy (Cempaka, 2025; Khoirunnisa et al., 2025). Better psychological conditions have the potential to increase adherence to medication, physical activity, sleep patterns, and adherence to healthy lifestyle recommendations. Although these factors were not analyzed as mediators in this study, various studies have shown that behavioral improvements *self-management* is one of the mechanisms that contribute to a reduction in the risk of complications in hypertensive patients.

Conversely, the absence of meaningful changes in the control group suggests that standard care during the study period has not been able to significantly reduce the risk of cardiovascular complications. The risk of complications in hypertension is an accumulation of various factors that develop over a long period of time, so meaningful changes generally require interventions that can affect physiological aspects as well as health behaviors simultaneously. Therefore, an approach that focuses only on routine therapy without relaxation interventions may not be sufficient to produce changes in FRS scores in a relatively limited study time.

The findings of this study have important implications for gerontic nursing practices and primary health services. The risk of cardiovascular complications is one of the important indicators in the management of hypertension because it is related to the incidence of coronary heart disease, stroke, and death due to cardiovascular disease. The results of this study show that MRT has the potential to be a non-pharmacological nursing intervention that can be integrated into the hypertension management program at the Elderly Posyandu and the Chronic Disease Management Program (Prolanis). The integration of MRT as part of routine services is expected not only to help control blood pressure, but also reduce the risk of long-term complications and improve health outcomes in the hypertensive elderly.

Research Limitations

This study has several limitations that need to be considered in the interpretation of the results. First, the *quasi-experimental* design used has not allowed optimal control of all confounding factors, so that changes in quality of life and cardiovascular risk scores based on *the Framingham Risk Score* (FRS) cannot be fully ascertained only due to the administration of *Multimodal Relaxation Therapy* (MRT). Second, the study was conducted at one location of the Elderly Posyandu with specific respondent characteristics, so the generalization of the results of the study to the broader population of hypertensive elderly needs to be carried out carefully. Third, outcome measurement using WHOQOL-BREF and FRS instruments which are indirect measurements of clinical conditions, so this study has not evaluated actual cardiovascular events such as stroke, heart failure, or coronary heart disease. Fourth, although participants' adherence to MRT implementation was monitored through the attendance of each session, this study has not in-depth evaluated other factors that may affect outcomes, such as adherence to antihypertensive drug consumption, physical activity patterns, diet, and lifestyle changes during the study period. Further research is recommended

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to use experimental designs with wider site coverage, longer follow-up periods, and additional biomarker or clinical indicator measurements to strengthen the evidence of MRT's effectiveness in hypertensive elderly.

CONCLUSION

Multimodal Relaxation Therapy (MRT) provides significant benefits in the management of hypertensive elderly by improving quality of life and lowering the risk of cardiovascular complications compared to standard treatment. The integration of various relaxation techniques in MRT allows for improvements in physical and psychological aspects that simultaneously contribute to improved quality of life as well as a reduction in the risk of complications based on *the Framingham Risk Score* (FRS). Therefore, MRT can be considered as a complementary nursing intervention that is feasible to be implemented in hypertension management programs in primary health services, especially in gerontic services and Posyandu Seniors, to support the achievement of more optimal health outcomes.

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REFERENCES

Aliffia, P. (2024). *Self-efficacy of the elderly in the treatment of hypertension at the wire health center, tuban regency*. 366–375.

Amiri, M., Mousavi, M., Noroozzadeh, M., Azizi, F., & Ramezani Tehrani, F. (2025). Cardiovascular disease risk prediction by Framingham risk score in women with polycystic ovary syndrome. *Reproductive Biology and Endocrinology : RB&E*, *23*(1), 19. https://doi.org/10.1186/s12958-025-01346-7

Azizah, C. O., Hasanah, U., & Pakarti, A. T. (2021). *IMPLEMENTATION OF PROGRESSIVE MUSCLE RELAXATION Results of the Basic Health Services report*. *1*, 502–511.

Basya, I. V., & Lisiyorini, M. W. (2026). *Application of Progressive Muscle Relaxation to Lowering Blood Pressure in the Elderly : A Case Study*. *5*(November 2025), 326–335.

Berliana, R., Fari, A. I., Frisca, S., Catholic, U., Charitas, M., No, J. B., Ilir, K., Ii, T., & Indonesia, S. S. (2025). *Application of Benson Relaxation Therapy to Blood Pressure Changes in Hemodialysis Patients at Palembang Hospital*. *2*(September).

Cempaka, A. A. (2025). HEALTH EDUCATION ABOUT ADAPTIVE COPING AND GUIDED IMAGERY FOR THE ELDERLY. *JOURNAL OF COMMUNITY SERVICE CREATIVITY (PKM), 8*, 2901–2909.

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Cheraghi, Z., Azmi-Naei, B., Cheraghi, P., & Doosti-Irani, A. (2025). The global prevalence of uncontrolled hypertension: a systematic review and meta-analysis. *BMC Public Health*, *25*(1), 4259. https://doi.org/10.1186/s12889-025-25553-4

Chinnakali, P., Mohan, B., Upadhyay, R. P., Singh, A. K., Srivastava, R., & Yadav, K. (2012). Hypertension in the elderly: prevalence and health seeking behavior. *North American Journal of Medical Sciences*, *4*(11), 558–562. https://doi.org/10.4103/1947-2714.103314

Dai, X., Hummel, S. L., Salazar, J. B., Taffet, G. E., Zieman, S., & Schwartz, J. B. (2015). Cardiovascular physiology in the older adults. *Journal of Geriatric Cardiology : JGC*, *12*(3), 196–201. https://doi.org/10.11909/j.issn.1671-5411.2015.03.015

El Hajal, C., Sejaan AlAchkar, M., Sakr, F., Habre, M., & Akiki, Z. (2026). Stress, coping, and other determinants of poor sleep quality among healthcare students in a conflict region: a cross-sectional study. *Medical Education Online*, *31*(1), 2639215. https://doi.org/10.1080/10872981.2026.2639215

Gokul, M., Arun Kumar, N., Narayanam, H., Kini, R. D., Anupama, N., & Ananya, A. K. (2025). The neurobiology of stress: Implications for health and emerging interventions. *Medical Journal Armed Forces India*. https://doi.org/https://doi.org/10.1016/j.mjafi.2025.09.008

Goldstein, D. S. (2013). Concepts of scientific integrative medicine applied to the physiology and pathophysiology of catecholamine systems. *Comprehensive Physiology*, *3*(4), 1569–1610. https://doi.org/10.1002/cphy.c130006

Goorani, S., Zangene, S., & Imig, J. D. (2024). Hypertension: A Continuing Public Healthcare Issue. *International Journal of Molecular Sciences*, *26*(1). https://doi.org/10.3390/ijms26010123

Hayati, S. (2026). *The Relationship between Nutritional Intake, Physical Activity, and Nutritional Status with Blood Pressure of the Elderly in Bekasi, West Java*. *5*(1), 365–372.

Ibrahim, R. H., Hamarash, M. Q., Ahmed, A. J., Al Mukhtar, S. H., & Yaas, M. H. (2025). The role of self-perception in mental health: current insights on self-esteem and self-schemas. *Frontiers in Psychiatry*, *16*, 1683194. https://doi.org/10.3389/fpsyt.2025.1683194

Khairani, E. (2025). *Analysis of Factors Affecting Hypertension in the Elderly (LANSIA) in the Working Area of the Dabun Gelang Health Center, Aceh City*. *September*.

Khoirunnisa, H. I., Saputri, S., Aulia, A. E., & Al, A. (2025). *Coping Strategies for the Elderly in Adjusting in the Semarang City Orphanage*. *September*.

Leszczak, J., Czenczek-Lewandowska, E., Asif, M., Baran, J., Mazur, A., & Wyszyńska, J. (2024). Risk factors and prevalence of hypertension in older adults from south-eastern Poland: an observational study. *Scientific Reports*, *14*(1), 1450. https://doi.org/10.1038/s41598-024-52009-3

Lionakis, N., Mendrinos, D., Sanidas, E., Favatas, G., & Georgopoulou, M. (2012). Hypertension in the elderly. *World Journal of Cardiology*, *4*(5), 135–147. https://doi.org/10.4330/wjc.v4.i5.135

Lumbantoruan, N. A. M. (2024). *THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND QUALITY OF LIFE OF THE ELDERLY IN THE WORK AREA OF THE FREQUENT HEALTH CENTER IN MEDAN*. *2*(1), 40–47.

Mailita, W., Suci, H., & Hidup, K. (2025). Physical Activity Education for Improving the Quality of Life of the Elderly at the Andalas Padang Health Center. *JPIK*

Article History:
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(Journal of Health Science Service), 4(1), 49–55.

Najuha, N. (2025). Anxiety in the Elderly with Hypertension in the Tuntang Health Center Area. *Journal of Holistics and Health Sciences*, *7*(1), 144–154.

Nurul, I. (2025). Transforming the Health of the Elderly Through the Combination of Hatha Yoga and Chayote Juice for Mental Health and Blood Pressure. *Nursing Sciences Journal.*, *9*(2), 196–206.

Remuja, A., Rizkullah, M. R., Fahrezy, A. H., & Sigit, Y. (2026). *The Effect of Progressive Muscle Relaxation Therapy on Blood Pressure Reduction in Hypertensive Elderly in Banua Anyar Village, Bakumpai District, Barito Kuala Regency*. 528–534.

Sari, A. R., & Susanti, N. (2026). *Analysis of Lifestyle Risk Factors in Elderly Hypertension Patients in the Bromo Community Health Center Work Area, Medan Denai District Publisher : University of Muhammadiyah Palu*. *9*(1), 656–667. https://doi.org/10.56338/jks.v9i1.9613

Shchaslyvyi, A. Y., Antonenko, S. V, & Telegeev, G. D. (2024). Comprehensive Review of Chronic Stress Pathways and the Efficacy of Behavioral Stress Reduction Programs (BSRPs) in Managing Diseases. *International Journal of Environmental Research and Public Health*, *21*(8). https://doi.org/10.3390/ijerph21081077

Toussaint, L., Nguyen, Q. A., Roettger, C., Dixon, K., Offenbächer, M., Kohls, N., Hirsch, J., & Sirois, F. (2021). Effectiveness of Progressive Muscle Relaxation, Deep Breathing, and Guided Imagery in Promoting Psychological and Physiological States of Relaxation. *Evidence-Based Complementary and Alternative Medicine : ECAM*, *2021*, 5924040. https://doi.org/10.1155/2021/5924040

Turana, Y., Tengkawan, J., Chia, Y. C., Shin, J., Chen, C.-H., Park, S., Tsoi, K., Buranakitjaroen, P., Soenarta, A. A., Siddique, S., Cheng, H.-M., Tay, J. C., Teo, B. W., Wang, T.-D., & Kario, K. (2021). Mental health problems and hypertension in the elderly: Review from the HOPE Asia Network. *Journal of Clinical Hypertension (Greenwich, Conn.)*, *23*(3), 504–512. https://doi.org/10.1111/jch.14121

Verma, N., Rastogi, S., Chia, Y.-C., Siddique, S., Turana, Y., Cheng, H.-M., Sogunuru, G. P., Tay, J. C., Teo, B. W., Wang, T.-D., Tsoi, K. K. F., & Kario, K. (2021). Non-pharmacological management of hypertension. *Journal of Clinical Hypertension (Greenwich, Conn.)*, *23*(7), 1275–1283. https://doi.org/10.1111/jch.14236

Webster, K. E., Halicka, M., Bowater, R. J., Parkhouse, T., Stanescu, D., Punniyakotty, A. V., Savović, J., Huntley, A., Dawson, S., Clark, C. E., Johnson, R., Higgins, J. P., & Caldwell, D. M. (2025). Effectiveness of stress management and relaxation interventions for management of hypertension and prehypertension: systematic review and network meta-analysis. *BMJ Medicine*, *4*(1), e001098. https://doi.org/10.1136/bmjmed-2024-001098

Yu, Y., Wang, H., Li, W., Guo, H., & Chen, Y. (2025). Non-pharmacological interventions for sleep in older adults: an umbrella review and evidence map of randomized controlled trials. *Frontiers in Neurology*, *16*, 1655192. https://doi.org/10.3389/fneur.2025.1655192

Zheng, P., Yan, W., Ding, Y., Zhang, Y., Chen, Z., Qian, J., & Ge, J. (2026). Cardiovascular ageing: hallmarks, signaling pathways, diseases and therapeutic targets. *Signal Transduction and Targeted Therapy*, *11*(1). https://doi.org/10.1038/s41392-026-02630-7

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