

Intervention to Reduce Stress and Blood Pressure in Hypertension Patients

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Abstract

Hypertension cases at the Mulyorejo Community Health Center, Deli Serdang Regency, continue to rise. The stress experienced by hypertensive patients with high blood pressure requires appropriate management. The community health center has implemented various health initiatives, but further efforts are needed. Therefore, efforts to reduce stress and blood pressure in hypertensive patients were crucial. This community service activity used a Participatory Action Research (PAR) approach to empower hypertensive patients through a progressive muscle relaxation intervention with classical music. Topics covered included understanding hypertension, stress, the relationship between stress and blood pressure, and the implementation of the progressive muscle relaxation intervention with classical music, packaged in a booklet. Before and after the intervention, community service personnel measured stress using the Subjective Units of Distress Scale (SUDS) and blood pressure using an Omron digital sphygmomanometer. The activity was conducted from June to July 2025. The target group was 40 adult hypertensive patients, divided into two groups of 20 participants each from Pujimulyo and Payageli Villages. Results: The Wilcoxon test showed a p-value of 0.0001 for stress and blood pressure, both systolic and diastolic. Participants responded positively to this intervention and will continue it at home. It can be concluded that progressive muscle relaxation intervention with classical music can significantly reduce stress and systolic and diastolic blood pressure in hypertensive patients. These findings indicate the need to integrate this intervention into routine programs at community health centers.

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INTRODUCTION

Mulyorejo Community Health Center is one of three community health centers in Sunggal District, Deli Serdang Regency. This community health center is located on Jalan Pembangunan, Mulyorejo Village, Sunggal District, Deli Serdang Regency. The boundaries of Mulyorejo Community Health Center are: to the north, Hamparan Perak District; to the south, Pancur Batu District; to the west, Binjai Municipality; and to the east, Medan Sunggal District. The Mulyorejo Community Health Center's working area is a residential area with significant industrial activity, including some densely populated areas with factories employing large numbers of laborers (Based on the 2021 Mulyorejo Community Health Center Profile).

Non-communicable diseases were increasing in frequency in the Mulyorejo Community Health Center's work area, necessitating attention. One of the non-communicable diseases

trending upward was hypertension (Based on the 2021 Mulyorejo Community Health Center Profile). Based on interviews with health workers, hypertension was the tenth most common disease at this Community Health Center in 2024.

The Mulyorejo Community Health Center has implemented various efforts to improve the health of patients with hypertension. These efforts include teaching patients about a hypertension diet and physical activity. However, interviews with several hypertensive patients with elevated blood pressure still revealed that some still experience stress in their daily lives and work. During stressful situations, individuals not only experience emotional discomfort but also experience bodily reactions, including the release of stress hormones such as adrenaline and cortisol into the bloodstream, which cause the heart to beat faster, constrict blood vessels, and increase blood pressure ([Balwan & Kour2, 2021](#)). Symptoms of psychosocial stress or tension can affect blood pressure ([Munakata, 2018](#)).

Hypertensive patients with high blood pressure are considered dangerous if not properly managed because it can lead to various serious complications. Studies have consistently shown benefits from lowering blood pressure. An intervention lowering systolic blood pressure by 10 mmHg is associated with a 22% reduction in coronary heart disease, a 41% reduction in stroke, and a reduction in deaths from metabolic cardiac causes ([WHO, 2014](#)). The results of interviews with several hypertension patients also found that there was still a lack of efforts to manage blood pressure through stress management through progressive muscle relaxation interventions and classical music.

Based on this situational analysis, the community service program is designed to involve education on progressive muscle relaxation interventions with classical music. This activity was based on previous research suggesting that progressive muscle relaxation techniques with classical music by Johann Sebastian Bach can help manage stress and blood pressure in hypertensive patients ([Gultom & Batubara, 2021a](#)). The community service activities aimed to help hypertension patients reduce their stress and blood pressure through this educational intervention.

METHODS

This community service project uses a Participatory Action Research (PAR) approach to empower hypertensive patients to utilize progressive muscle relaxation interventions accompanied by classical music in their daily lives as a non-medicinal measure. The community service project, titled "Intervention to Reduce Stress and Blood Pressure in Hypertension Patients," is divided into three stages: preparation, implementation, and monitoring.

This activity used a quantitative, quasi-experimental design without a control group. The community service team conducted fieldwork from June to July 2025 in two villages within the Mulyorejo Community Health Center (Puskesmas) working area in Deli Serdang Regency: Pujimulyo Village and Payageli Village. The sample consisted of 40 patients with hypertension who agreed to participate. Participants who agreed to participate signed a consent form.

The community service team divided the participants into two groups, each receiving one day of education about progressive muscle relaxation interventions with classical music. Initially, the team conducted a pre-test on characteristics and stress using the SUDS (Subjective Units of Distress Scale) and measured blood pressure using an Omron digital

sphygmomanometer.

The team designed the activity based on previous studies on the development of progressive muscle relaxation techniques and accompanied it with classical music by Johann Sebastian Bach. The program included lectures, questions and answers, demonstrations, and re-demonstrations. A booklet served as a medium to convey information about hypertension, stress, the relationship between stress and blood pressure, and progressive muscle relaxation with classical music. This activity brings together trainers from the community service itself and students, and receives support from partners and field assistants, including health workers and cadres.

After the intervention was completed, the community service provider continued reassessment of the variables using the same tool. The community service provider then conducted an analysis using SPSS software with a t-test.

RESULTS AND DISCUSSION

In the implementation phase, the community service team conducted a PMR intervention education activity using traditional music in Pujimulyo Village and Payageli Village with a total of 40 participants. The team, along with health workers and cadres, began the activity by providing participants with information. Then, the team conducted a pre-test covering characteristics, stress, and blood pressure using a questionnaire and a digital sphygmomanometer as planned. After that, the team conducted the education as planned. Then, the team conducted a post-test on the variables using the same method as the pre-test. After that, the team conducted a monitoring phase by asking participants for their responses to the educational activity. Overall, participants reported that the intervention made them feel more comfortable and willing to continue the intervention at home. The team analyzed the activity using the Wilcoxon test.

The goal of community service is to help people with hypertension reduce stress and blood pressure through educational interventions, such as PMR with a classical feel. Findings from the community service activities indicate that PMR with a classical feel significantly reduces stress and blood pressure in hypertensive patients.

The characteristics of hypertension patients included gender, age, marital status, income, education, occupation, and duration of hypertension. Table 1 describes the participants in their uniqueness, including the majority being female, married, having low income, having a high school education, working as a housewife, and having suffered from hypertension for 0–1 years.

Table 1 Participant characteristics (n=40)

No.	Participant characteristics	f	%
1.	<u>Gender</u>		
	Male	1	2.5
	Female	39	97.5
2.	<u>Age (Years)</u>		
	21-30	1	2.5
	31-40	4	10.0
	41-50	6	15.0
	51-60	20	50.0
	61-70	7	17.5
	71-80	2	5.0
3.	<u>Marital Status</u>		
	Married	30	75.0
	Widower	10	25.0

No.	Participant characteristics	f	%
4.	<u>Income</u>		
	< 2.500.000	30	75.0
	2.500 – 5.000.000	9	22.5
	>5.000.000	1	2.5
5.	<u>Education</u>		
	Elementary	8	20.0
	Junior high	7	17.5
	Senior High	23	57.5
	College	2	5.0
6.	<u>Category of Work</u>		
	Homemaker	33	82.5
	Private sector employees	5	12.5
	Public Servants/State Enterprises	1	2.5
	Self-employed	1	2.5
7.	<u>Long-term hypertension (Years)</u>		
	0 - < 1	17	42.5
	1 -< 5	13	32.5
	5 - < 10	2	5.0
	10 - < 15	5	12.5
	15 - < 29	2	5.0
	30 - < 35	1	2.5

Most of the participants in community service activities are women. Previous studies have shown a similar trend: the prevalence of hypertension tends to be higher in women ([Song et al., 2020](#); [Zhou et al., 2021](#)). The age range for most hypertension patients is 51 to 60 years. Previous studies have shown the same thing ([Kori et al., 2022](#)). However, previous studies differ from this activity in that most hypertension patients are young adults, when hypertension typically occurs ([Woodiwiss et al., 2023](#)).

More participants were married than not at all. Previous studies have shown a suitability for this activity ([Weare et al., 2023](#)). The majority of participants in this community service activity were from low-income backgrounds. Previous studies have shown that in recent decades, both low- and high-income countries have been more likely to experience high blood pressure ([Schutte et al., 2021](#)). The majority of participants had a high school education. These results are similar to previous studies that found that those with a high school education or less were more likely to experience hypertension than those with a bachelor's degree ([Zacher, 2023](#)).

The majority of participants were housewives. This finding aligns with previous studies showing that the highest prevalence of hypertension patients was among housewives ([Sarkar et al., 2019](#)). In this activity, the duration of hypertension for most participants was less than one year. This result is similar to previous studies, which found that more hypertension patients had the disease for less than two years than for more than two years. After education, there was a decrease in stress and both systolic and diastolic blood pressure. Table 2 explains these results.

Table 2 Stress and blood pressure scores

Score	Minimum	Maximum	Mean	Std.Deviasi
Stress score before education	10	80	41.25	16.82
Stress score after education	0	60	23.75	18.49
Systolic score before education	140	221	148.63	13.10
Systolic score after education	120	210	142.78	14.91

Score	Minimum	Maximum	Mean	Std.Deviasi
Diastolic score before education	90	146	93.50	9.49
Diastolic score after education	70	103	87.13	6.61

Stress universally refers to an individual's adaptive response, both physiological and psychological, to a perceived challenge, to mobilize resources to cope with the demands placed on them ([Labrague, 2024](#)). Responses to stressors are strongly influenced by how the stressor is appraised, particularly by its cognitive mediation, including a primary appraisal of the stressor's significance and a secondary appraisal of whether the individual can cope. The situation influences responses to stressors, whether the environment is crowded or quiet, and whether the context involves many people or a one-on-one situation. Coping strategies allow individuals to modify feelings of stress.

The Subjective Units of Distress Scale (SUDS) is a single-item measure of subjective stress intensity. It is scored from 0 to 100, with 10 to 40 mild, 50 to 60 moderate, and 70 to 100 severe. ([Morrow et al., 2019](#)). The results of the community service activities showed that the stress levels of hypertensive patients before the intervention ranged from mild to severe, but, on average, were mild. After the intervention, stress levels ranged from mild to moderate, with the average being mild.

Stress scores decreased by 17.50 before and after the intervention. Previous research on the same intervention with 50 D III nursing students showed that stress decreased to 8.96 ([Arsilia et al., 2025](#)). Hypertension can be divided based on systolic/diastolic in mmHg, including pre-hypertension 120-139/80-89, grade 1 140-159/90-99, grade 2 160-179/100-109, grade 3 ≥ 180 mmHg/ ≥ 110 ([Elsevier, 2022](#)). The results of activities before intervention education showed systolic blood pressure in the hypertension category level 1 to 3, with an average of level 1. However, after intervention, education showed a pre- to level 3 category, with an average of level 1. Meanwhile, diastolic blood pressure showed before intervention education in the hypertension category levels 1 to 3, with an average of level 1. After intervention, education showed it was in the pre- to level 3 category, with an average of pre-hypertension.

Immediately after the procedure, the systolic and diastolic scores decreased by 5.85 mmHg and 6.38 mmHg. Previous research using classical gamelan music with PMR for 8 weeks in 31 hypertensive patients, conducted twice a week, showed a reduction in mmHg, systolic by 18.87 and diastolic by 14.45 in the treatment group ([Rahmawati et al., 2023](#)). The use of booklets as a secondary source of information after the service team has delivered the initial information has the potential to reduce stress and systolic and diastolic scores significantly. Previous studies have shown that using the booklet to train participants resulted in significant skill improvements and that when participants encountered difficulties, we could identify those experiencing them and provide timely, effective remediation ([Chozas & Cuenca, 2022](#)).

PMR is a non-drug therapy with many advantages, such as reducing blood pressure by having the patient focus on the activity, which can cause the muscles to relax. This feeling of relaxation can influence the process of inhibiting sympathetic nerve activity; the result is that heart rate, blood pressure, breathing rhythm, muscle tension, and body metabolism all decrease. This relaxation decreases the production of hormones like epinephrine and cortisol, which impacts cardiac function and output. Furthermore, acetylcholine released by the parasympathetic nervous system affects heart function, causing vasodilation and improving circulation, which can lead to a decrease in blood pressure. On the other hand, the impact of PMR causes a decrease in the work of the sympathetic nervous system so that

the catecholamines produced decrease, resulting in a decrease in blood pressure ([Bahri et al., 2023](#); [Sari et al., 2025](#); [Ubaidillah et al., 2023](#)).

Music influences the brain, affecting mood through the release of neurotransmitters like dopamine. Magnetic resonance imaging shows that dopamine release peaks during emotional arousal while listening to music. Individual musical tastes and preferences vary and can influence how a person responds to certain pieces of music ([Darki et al., 2022](#)). Classical music calms by reducing the range of impulses to the brain, which provides further evidence of the involvement of impulses in the brain network response in the emotional realm with the reactivity ([Siragusa et al., 2020](#)). This type of music can reduce aortic stiffness and wave reflection; the effect is not only when classical music is played but also has a continuous effect on wave reflection ([Vlachopoulos et al., 2015](#)). Cardiovascular gets increased recovery from stress when patients listen to this type of music ([Chafin et al., 2004](#)).

The community service team wanted to assess the effect of the PMR intervention with classical music immediately after the intervention education was delivered, through bivariate analysis. Previously, the community service provider conducted a Shapiro-Wilk normality test and found that the stress and blood pressure data, both before and after, were not normally distributed. Therefore, the community service provider used the Wilcoxon test. Table 3 shows the significant effect of PMR intervention education with ancient music on blood pressure and stress in hypertensive patients. Table 3 The Effect of pmr intervention education with classical music

Impact	Average Difference	P
Stress before and after intervention	17.50	0.0001
Systolic before and after intervention	5.85	0.0001
Diastolic before and after intervention	6.38	0.0001

Figures 1 and 2 showed education activities at the two locations.



Figure 1 Implementation of the first group activity in Pujimulyo village, and (b) Activities in the Payageli village group related to PMR demonstrations with classical music

This activity demonstrated a significant effect of the PMR intervention with classical music on stress, systolic, and diastolic blood pressure, with p-values of 0.0001 for each. In a previous similar study, the treatment group received health and PMR information twice a week for 8 weeks, while the control group received only health information. The results showed significant effects with p-values of 0.001 for systolic blood pressure and 0.0001 for diastolic blood pressure ([Ermayani et al., 2020](#)). Another study examined the effects of Bach's classical music on young adult participants to determine several indicators,

including blood pressure. Each participant listened to an 8-minute piece of music three times. Electrocardiograms were measured continuously from beginning to end. The results showed that classical music can suppress sympathetic nervous system activity, thus affecting blood pressure ([Hoshi et al., 2023](#)).

Community service activities involving PMR intervention combined with classical music revealed significant results on stress and systolic and diastolic blood pressure. This intervention offers the potential for greater changes in the relaxation experience than progressive muscle relaxation or classical music alone ([Robb, 2000](#)). It has potential in controlling stress and blood pressure ([Gultom & Batubara, 2021b](#)).

CONCLUSION

A progressive muscle relaxation intervention with classical music can reduce stress and both systolic and diastolic blood pressure in hypertensive patients. Findings from this activity suggest the need to incorporate this intervention into routine programs for managing non-infectious patients, particularly those with hypertension, both inside and outside the Mulyorejo Community Health Center in Deli Serdang Regency.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS STATEMENT

ABG, AB & NHS contributed to the development of the community service proposal, the implementation of the activities, and the preparation of the results and the final manuscript.

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