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Nurse Led Progressive Muscle Relaxation and Slow Breathing for Home Blood Pressure in Adults with Hypertension

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Abstract

Background: Hypertension is one of the most common non-communicable diseases and remains a major global health problem. Uncontrolled blood pressure may increase the risk of cardiovascular complications. Non-pharmacological nursing approaches, including Progressive Muscle Relaxation (PMR) and Slow Deep Breathing (SDB), are commonly incorporated as complementary relaxation techniques in hypertension management.
Objective: This case study aimed to describe observed blood-pressure changes and patient responses during a four-week combined intervention of Progressive Muscle Relaxation (PMR) and Slow Deep Breathing (SDB) in a patient with hypertension.
Methods: This descriptive single-patient case study involved a 57-year-old patient with hypertension who was selected through purposive sampling. The patient receved a combined PMR and SDB intervention twice weekly for four weeks, resulting in eght sessions. Each combined intervention session lasted 30 minutes and was conducted at 4:00 PM. Blood pressure was measured before and after each session using a digital sphygmomanometer, with the patient in a sitting position after a 5-minute rest period. Measurements were performed at the same time of day for each session. The patient routinely took amlodipine 10 mg once daily at 9:00 PM and continued the medication throughout the intervention period.
Results: Across eght sessions, systolic blood pressure decreased by 5–22 mmHg and diastolic blood pressure decreased by 3–15 mmHg between pre- and post-session measurements, with mean reductions of 11.4 mmHg and 7.0 mmHg, respectively. The magnitude of blood-pressure changes varied across sessions. The patient reported feeling more relaxed and comfortable after the intervention sessions and continued routine antihypertensive medication throughout the intervention period.
Conclusion: This case demonstrated repeated short-term reductions in blood pressure following combined PMR and SDB sessions in one patient with hypertension. However, the absence of a comparator or untreated period, together with continued antihypertensive medication, limits attribution of the observed blood-pressure changes to the combined intervention. Further studies with larger controlled samples, standardized blood-pressure measurement, medication and lifestyle monitoring, and longer follow-up are needed to evaluate sustained blood-pressure changes.

Keywords: Progressive Muscle Relaxation, Slow and Deep Breathing, Hypertension.

INTRODUCTION

Hypertension is a noncommunicable disease that remains a major global health problem (1). This condition is known as the "silent killer" because it often presents without specific symptoms, so many patients are unaware that they have hypertension until complications arise that cause organ damage (2). Hypertension is a condition characterized by persistently elevated blood pressure, defined as a systolic blood pressure of ≥140 mmHg and a diastolic blood pressure of ≥90 mmHg (3).

Hypertension remains a major global health problem. Global and Indonesian surveillance data indicate a substantial burden, but prevalence estimates vary by age group, survey method, and year. Accordingly, national and local estimates should be reported with the exact source population and survey year rather than combined as directly comparable prevalence figures.

If not properly managed, hypertension can increase the risk of stroke, coronary heart disease, kidney failure, and other cardiovascular complications that significantly contribute to morbidity and mortality rates (6,7). This condition occurs because persistently high blood pressure can damage the endothelium of blood vessels, increase the heart's workload, and impede blood flow to vital organs; consequently, over the long term, it can lead to organ dysfunction such as myocardial ischemia, reduced kidney function, and even stroke (8).

Non-pharmacological management of hypertension is increasingly being implemented, one of which involves the use of relaxation techniques. These techniques may stimulate the parasympathetic nervous system and are associated with changes in blood pressure, heart rate, respiratory rate, and muscle tension (9). One commonly used technique is Progressive Muscle Relaxation (PMR), relaxation exercise that involves tensing and then gradually relaxing muscles to promote a calmer and more relaxed state of the body and mind (10). When relaxation is performed calmly and regularly for approximately 30 minutes, the production of stress hormones such as adrenaline and norepinephrine decreases, causing the heart rate to slow, blood vessels to dilate, and blood pressure to drop. Additionally, increased levels of endorphins and serotonin provide a soothing and calming effect on the body (11).

Slow deep breathing (SDB) is a structured relaxation technique that uses slow, regular respiratory cycles. It may influence autonomic regulation and baroreflex function, but the present case did not directly measure these mechanisms. Prior studies have reported blood-pressure changes after slow-breathing interventions in patients with hypertension (12–15).

Although previous studies have examined PMR and SDB individually in relation to blood pressure, evidence describing their combined application remains limited. The researchers' observations revealed that patients with hypertension who regularly visited community health centers and took antihypertensive medication could still have elevated blood pressure. These patients had not previously engaged in structured exercise or relaxation therapy. Therefore, this case study described the observed blood-pressure changes and patient responses during a four-week combined Progressive Muscle Relaxation (PMR) and Slow Deep Breathing (SDB) intervention in a patient with hypertension.

METHODS

Study Design

This study used a descriptive single-patient case study with repeated quantitative blood-pressure observations. The study observed changes in blood pressure before and after a combined Progressive Muscle Relaxation (PMR) and Slow Deep Breathing (SDB) intervention. The intervention was conducted twice weekly for four weeks, resulting in eight sessions. The study was conducted in the service area of Arjuno Community Health Center, Malang City, from April to May 2026.

Participants

The case involved one 57-year-old female patient with a four-year history of hypertension. The patient had no reported comorbidities and routinely received amlodipine 10 mg once daily at 9:00 PM, with reported adherence to the prescribed medication. The patient also reported a dietary habit of consuming foods high in salt. She was selected for this case because she continued to have elevated blood pressure despite routine antihypertensive treatment and had not previously practiced structured relaxation techniques.

Intervention protocol

The intervention consisted of a combined Progressive Muscle Relaxation (PMR) and Slow Deep Breathing (SDB) session. Eiach session lasted a total of approximately 30 minutes and was conducted twice weekly for four weeks, resulting in eight sessions. All sessions were conducted at 4:00 PM with the patient in a comfortable sitting position.

PMR was performed by instructing the patient to close her eyes and focus on the relaxation process. The patient was instructed to tense each muscle group for approximately 5–10 seconds and then gradually relax it for approximately 10–20 seconds. The exercises were performed sequentially, beginning with the dominant hand by making a fist without involving the upper arm, followed by the dominant arm, non-dominant arm, face, neck, shoulders, abdomen, dominant leg, and non-dominant leg. Facial muscle exercises included raising the eyebrows, closing the eyes and wrinkling the nose, and bringing the teeth together while pulling the corners of the mouth backward. Neck and shoulder exercises involved tensing the neck muscles and pulling the shoulders backward. The abdominal muscles were tensed by tightening the abdomen. For the legs, the patient was instructed to tense the thigh muscles by pressing the knees, followed by plantar flexion and dorsiflexion of the feet. The exercises were continued sequentially until all muscle groups had been completed (11).

SDB was incorporated into the relaxation session by instructing the patient to maintain a comfortable sitting position with the knees slightly flexed and the feet supported. The patient placed her hands below the anterior ribs over the diaphragm to feel the movement of breathing. She was instructed to inhale slowly through the nose while keeping the shoulders relaxed and allowing the abdomen to expand slightly, followed by slow exhalation through the mouth. The breathing rhythm was maintained at approximately six breaths per minute. The patient was instructed to breathe slowly and regularly throughout the relaxation exercise.

The intervention was delivered through direct demonstration and guided practice, supported by handouts and instructional videos. Patient responses were observed throughout the session, including the presence of dizziness, shortness of breath, or discomfort. The patient was instructed to maintain slow and regular breathing during the exercise. The combined PMR and SDB intervention was implemented according to the same procedure across the eight sessions.

Instrument

The instruments used in this case study were a blood-pressure observation sheet and an Omron HEiM-7130 digital sphygmomanometer. Blood pressure was measured once before and once after each intervention session. Before the pre-intervention measurement, the patient was positioned comfortably in a sitting position and rested for 5 minutes. The combined Progressive Muscle Relaxation (PMR) and Slow Deep Breathing (SDB) intervention was then conducted for a total of 30 minutes. After completion of the intervention, the patient rested for 5 minutes before the post-intervention blood-pressure measurement was performed. All blood-pressure measurements were conducted at 4:00 PM. The patient routinely took amlodipine 10 mg once daily at 9:00 PM and reported adherence to the prescribed medication. Therefore, the intervention and blood-pressure measurements were conducted approximately five hours before the scheduled evening dose of amlodipine. Systolic and diastolic blood-pressure values were recorded for each pre- and post-intervention assessment across the eight sessions.

The patient reported a habitual intake of salty or high-sodium foods, which was considered as part of the patient's lifestyle characteristics during the case study. The patient continued her usual dietary habits and antihypertensive medication throughout the four-week intervention period. Blood-pressure changes were described based on the recorded pre- and post-intervention measurements across the eight sessions.

Data Collection procedure

Data were collected through patient interviews, observations, physical examinations, and nursing implementation and evaluation records. Documentation included blood pressure measurements taken before and after each PMR and SDB session. The intervention was administered over four weeks, with a total of eight sessions—two sessions per week. Patient response was evaluated based on subjective complaints, vital signs, changes in blood

pressure, ability to follow instructions, and the patient's condition and comfort during and after the intervention.

Data Analysis

Data were analyzed descriptively by comparing systolic and diastolic blood pressure before and after each intervention session. Changes across the eight sessions were presented as individual pre- and post-intervention values and summarized using the range and mean change in blood pressure. No inferential statistical tests were performed because this was a single-patient case study. The observed changes were not interpreted as being solely attributable to PMR and SDB because the patient continued antihypertensive medication and routine care during the intervention period. Therefore, the findings describe blood-pressure changes observed during the intervention rather than establish a cause-and-effect relationship.

Ethical Considerations

Research ethics principles were applied throughout the research process. Respondents were provided with an explanation of the study's objectives, procedures, benefits, and implementation process before the intervention took place. Informed consent was obtained from respondents prior to their participation. The researchers also maintained the confidentiality of the participants' identities by not including personal data and by allowing participants the freedom to withdraw at any time without consequences. All research procedures were conducted in accordance with nursing care standards for patients with hypertension, while observing the principles of confidentiality, beneficence, and non-maleficence.

RESULTS

The results of this case study focused on changes in blood pressure before and after the administration of a combination of Progressive Muscle Relaxation (PMR) and Slow Deep Breathing (SDB). Patient characteristics are briefly presented in Table 1 to provide an overview of the study subjects. Furthermore, Table 2 presents the results of systolic and diastolic blood pressure measurements taken before (pre-test) and after (post-test) the intervention during eight sessions over four weeks. The measurement results show a decrease in blood pressure after each intervention session.

Blood pressure decreased between pre- and post-intervention measurements across all eight sessions, although the magnitude of change varied. The mean reduction was 11.4 mmHg for systolic blood pressure (range: 5–22 mmHg) and 7.0 mmHg for diastolic blood pressure (range: 3–15 mmHg). The initial nursing assessment showed a blood pressure of 141/92 mmHg, whereas the first pre-intervention measurement was 160/98 mmHg. The initial measurement was obtained during the nursing assessment, while the first pre-intervention measurement was obtained at 4:00 PM after a 5-minute rest period. Thus, the two measurements were obtained at different assessment points and under different measurement contexts.

The observed pre- to post-intervention changes were described across the eight sessions. Because the patient continued routine antihypertensive medication throughout the intervention period, the observed changes cannot be attributed solely to the combined PMR and SDB intervention.

Table 1. Patient Characteristics and Initial Clinical Findings

Variable	Finding
Initials	Mrs. U
Age and sex	57 years old, female
Education and occupation	High school graduate, housewife
Admission diagnosis	Hypertension
History hypertension	About 4 years
Main complaints	Their bodies feel tense and stiff, uncomfortable, and it is difficult for them to relax; they often experience tingling in their extremities
Vital signs at assessment	BP 141/92 mmHg; pulse 63/min; temperature 36 ºC; RR 20/min; SpO_2 99%

Note: BP = blood pressure; RR = respiratory rate; SpO_2 = peripheral oxygen saturation.

Table 2. Nursing Problems and Supporting Data

Nursing Diagnosis	Main Supporting Data	Nursing Target
Ineffective Peripheral Perfusion	The patient reports a tingling sensation in the extremities, BP 141/92 mmHg, extremities feel cold to the touch	Increased peripheral perfusion; reduced complaints of tingling
Comfort Disturbance	The patient reports feeling tensed, uncomfortable, and having difficulty relaxing	A sense of comfort increased, as indicated by patients reporting that their bodies felt more comfortable and relaxed
Anxiety	The patient reports feeling tense and having difficulty relaxing	Anxiety levels decreased, as indicated by patients appearing calmer and more relaxed

Table 3. Pre-test and Post-test Blood Pressure Measurements Following the Intervention

Week	Day	Blood Pressure Measurements (mmHg)	
		Pre-Test	Post-Test
Week 1	Day 1	160/98 mmHg	138/90 mmHg
	Day 2	152/91 mmHg	135/87 mmHg
Week 2	Day 3	146/97 mmHg	141/90 mmHg
	Day 4	146/92 mmHg	141/88 mmHg
Week 3	Day 5	147/96 mmHg	133/86 mmHg
	Day 6	151/99 mmHg	135/84 mmHg
Week 4	Day 7	139/92 mmHg	133/87 mmHg
	Day 8	147/95 mmHg	141/92 mmHg

Note: Initial blood pressure was 141/92 mmHg. The patient regularly takes anti-hypertensive medication.

DISCUSSION

Based on the research findings, it can be observed that Progressive Muscle Relaxation (PMR) and Slow Deep Breathing (SDB) sessions were followed by decreases in blood pressure in the patient with hypertension. These observed changes may be related to the relaxation response associated with both techniques, which may help decrease sympathetic nervous system activity and increase parasympathetic nervous system activity, thereby promoting relaxation, reducing heart rate, and supporting vasodilation (16). The results of this study are consistent with the research by Pathan et al. (11), which stated that PMR and SDB therapy administered over 4 weeks is effective in helping to control blood pressure in patients with hypertension. Furthermore, this study aligns with the research by Asyari et al. (17), which reported changes in blood pressure following the combination of Progressive Muscle Relaxation (PMR) and Slow Deep Breathing (SDB) in patients with hypertension. However, these findings should be interpreted cautiously because the present study was a single-patient case without a comparison condition.

The study results indicate that Mrs. Ui experienced repeated decreases in blood pressure between pre- and post-intervention measurements over 8 sessions (twice a week for 4 weeks). Progressive Muscle Relaxation (PMR) therapy involves gradual muscle relaxation that may enhance bodily relaxation and reduce sympathetic nervous system activity. This physiological response may contribute to vasodilation and changes in peripheral vascular resistance (18). The results of this study are consistent with the research by Andriani et al. (19), which reported changes in blood pressure following Progressive Muscle Relaxation (PMR) therapy over a 4-week period. Nevertheless, the observed changes in the present case cannot be attributed solely to PMR because PMR was administered together with SDB and the patient continued routine antihypertensive medication and usual care.

Slow Deep Breathing (SDB) involves a slow and deep breathing pattern that may promote relaxation and influence cardiovascular responses. Regular slow breathing may support changes in heart rate and vascular responses, contributing to a more relaxed state (20). Research by Widarti et al. (21) reported changes in blood pressure following Slow Deep Breathing (SDB) among elderly women with hypertension. In the present case, the patient also reported feeling more relaxed and comfortable after the intervention sessions. However, the observed blood-pressure changes may have been influenced by several factors, including the 5-minute rest period before measurement, repeated measurement, day-to-day blood-pressure variability, regression to the mean, medication effects, and attention or expectancy during the intervention.

Limitation

This case study has several limitations. It involved one patient and no comparator or untreated observation period, precluding causal attribution and generalization. The patient continued amlodipine and usual care, while diet, physical activity, sleep, stress, caffeine, and other blood-pressure determinants were not systematically controlled. PMR and SDB were delivered as a combined intervention, so their separate contributions cannot be estimated. Only one pre- and one post-session blood-pressure reading were obtained per session, and no post-intervention follow-up assessed persistence of the observed changes.

CONCLUSION

This single-patient case study documented repeated short-term reductions in systolic and diastolic blood pressure after combined PMR and SDB sessions over four weeks. The patient also reported feeling more relaxed and comfortable. However, the patient continued routine antihypertensive medication, no comparator period was used, and only single pre- and post-session measurements were obtained. The findings therefore describe feasibility and temporal blood-pressure changes rather than establishing effectiveness.

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Conflict of Interest

The conduct of this study did not involve any conflicts of interest among the researchers or other parties involved

Author Contributions

Study conception and design: LAS, ZU
Data collection: LAS
Data analysis and interpretation: LAS, ZU
Drafting of the article: LAS
Critical revision of the article: ZU.

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