

Isometric Handgrip Exercise Versus Progressive Muscle Relaxation for Blood Pressure Reduction in Women with Primary Hypertension: A Quasi-Experimental Study

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ABSTRACT

Hypertension remains a major global public health problem and a leading risk factor for cardiovascular disease, stroke, and kidney disorders. Non-pharmacological interventions are increasingly recommended as complementary strategies to control blood pressure. Isometric Handgrip Exercise (IHE) and Progressive Muscle Relaxation (PMR) are simple, safe, and cost-effective interventions that may help reduce blood pressure among patients with primary hypertension. This study aimed to compare the effectiveness of Isometric Handgrip Exercise and Progressive Muscle Relaxation in reducing blood pressure among women with primary hypertension. A quasi-experimental study with a pretest–posttest two-group design was conducted among 40 women with primary hypertension in the working area of Tanjung Batu Primary Health Center, South Sumatra, Indonesia. Participants were divided equally into an IHE group (n=20) and a PMR group (n=20). Participants were allocated into two intervention groups, consisting of the Isometric Handgrip Exercise (IHE) group and the Progressive Muscle Relaxation (PMR) group. Each group received the assigned intervention with the same duration and frequency, namely 20 minutes per session, three times weekly for a week. Blood pressure was measured before and after the interventions using a calibrated sphygmomanometer. Data were analyzed using the Wilcoxon signed-rank test and Mann–Whitney U test, with a significance level of $p < 0.05$. In the IHE group, median systolic blood pressure decreased from 157 mmHg to 120 mmHg ($p = 0.000$), while in the PMR group it decreased from 156 mmHg to 130 mmHg ($p = 0.001$). The median reduction in blood pressure was greater in the IHE group (37.00 ± 7.25 mmHg) than in the PMR group (26.00 ± 6.80 mmHg). A significant difference was observed between the two interventions ($p = 0.001$). Both IHE and PMR effectively reduced blood pressure; however, IHE demonstrated greater effectiveness and may be recommended as a complementary nursing intervention for managing primary hypertension.

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1. INTRODUCTION

Hypertension remains one of the most significant global public health challenges and is a leading contributor to cardiovascular morbidity and mortality worldwide. According to the World Health Organization (WHO), approximately 1.28 billion adults are living with hypertension, and nearly half of them are unaware of their condition [1]. Uncontrolled hypertension substantially increases the risk of coronary heart disease, stroke, heart failure, chronic kidney disease, and

premature death. The growing prevalence of hypertension is closely associated with population aging, unhealthy dietary habits, physical inactivity, obesity, tobacco use, and psychological stress [2].

In Indonesia, hypertension continues to be a major health concern and contributes significantly to the burden of non-communicable diseases. Data from the Indonesian Health Survey reported that hypertension affects more than one-third of the adult population, with prevalence increasing markedly among middle-aged and older adults [3]. South Sumatra Province has also reported a steady rise in hypertension cases, making it one of the leading causes of outpatient visits and long-term healthcare utilization. These findings highlight the importance of effective blood pressure management strategies to prevent complications and improve quality of life among affected individuals [4].

Management of hypertension generally involves pharmacological and non-pharmacological approaches. While antihypertensive medications remain the cornerstone of treatment, lifestyle modification and complementary interventions play a crucial role in achieving optimal blood pressure control. Non-pharmacological therapies are increasingly recommended because they are relatively safe, cost-effective, and can be implemented independently by patients [5]. Among these interventions, Isometric Handgrip Exercise (IHE) has gained attention due to its potential to improve vascular function and reduce resting blood pressure through physiological adaptations in the autonomic nervous system and vascular endothelium. Isometric Handgrip Exercise involves sustained contraction of hand and forearm muscles against resistance for a specified duration. Previous studies have demonstrated that regular IHE training can reduce both systolic and diastolic blood pressure by improving baroreceptor sensitivity, enhancing endothelial function, and decreasing peripheral vascular resistance. In addition, IHE is simple to perform, requires minimal equipment, and can easily be integrated into community-based hypertension management programs [6].

Another non-pharmacological intervention frequently used in hypertension management is Progressive Muscle Relaxation (PMR). PMR is a relaxation technique that involves systematic contraction and relaxation of specific muscle groups to promote physical and psychological relaxation. The intervention is believed to reduce sympathetic nervous system activity while enhancing parasympathetic responses, thereby decreasing heart rate, muscle tension, and blood pressure levels. Previous studies have reported that PMR effectively lowers blood pressure, reduces anxiety, and improves overall well-being among individuals with hypertension and other chronic conditions [7].

Although both IHE and PMR have demonstrated beneficial effects on blood pressure reduction, evidence directly comparing the effectiveness of these interventions remains limited, particularly among women with primary hypertension in community healthcare settings. Most previous studies evaluated each intervention separately, making it difficult to determine which approach provides greater clinical benefits for blood pressure control. Furthermore, data regarding the comparative effectiveness of these interventions in Indonesian primary healthcare settings are still scarce [8].

Therefore, this study aimed to compare the effectiveness of Isometric Handgrip Exercise and Progressive Muscle Relaxation in reducing blood pressure among women with primary hypertension in the working area of Tanjung Batu Primary Health Center, South Sumatra, Indonesia. The findings of this study are expected to provide evidence-based recommendations for nurses and healthcare professionals regarding effective complementary interventions for hypertension management.

2. METHOD

2.1. Study Design

This study employed a quantitative approach using a quasi-experimental pretest–posttest two-group design to compare the effectiveness of Isometric Handgrip Exercise (IHE) and Progressive Muscle Relaxation (PMR) in reducing blood pressure among women with primary hypertension. A total of 40 participants were recruited using a purposive sampling technique based on the predetermined inclusion and exclusion criteria, and were divided into two intervention groups, with 20 participants assigned to the IHE group and 20 participants assigned to the PMR group. Blood pressure measurements, including systolic and diastolic values, were obtained before and after the intervention period using a calibrated sphygmomanometer. The IHE group received isometric handgrip training, while the PMR group underwent progressive muscle relaxation exercises according to standardized

intervention protocols. Changes in blood pressure were assessed by comparing pretest and posttest measurements within each group and between groups to determine the relative effectiveness of both non-pharmacological interventions in managing primary hypertension [9].

2.2. Eligibility Criteria

Inclusion and exclusion criteria were established to ensure participant eligibility and to obtain valid and reliable data in accordance with the study objectives.

2.2.1. Inclusion Criteria

- a. Women diagnosed with primary hypertension by a healthcare professional.
- b. Women aged 40–74 years.
- c. Residents of the working area of Tanjung Batu Primary Health Center, South Sumatra, Indonesia.
- d. Patients with systolic blood pressure of 140–179 mmHg and/or diastolic blood pressure of 90–109 mmHg (Stage 1 and Stage 2 hypertension).
- e. Participants who routinely take antihypertensive medication
- f. Patients who were conscious, cooperative, and able to follow the intervention procedures.
- g. Patients willing to participate and provide written informed consent.

2.2.2. Exclusion Criteria

- a. Patients diagnosed with secondary hypertension.
- b. Patients with severe complications, including cardiovascular disease, heart failure, chronic kidney disease, or diabetes mellitus.
- c. Patients with physical limitations or musculoskeletal disorders that prevented them from performing Isometric Handgrip Exercise or Progressive Muscle Relaxation.
- d. Patients with cognitive impairment or communication disorders that could interfere with participation.
- e. Patients who withdrew from the study or failed to complete the intervention protocol.

2.3. Study Setting and Duration

This study was conducted in the working area of Tanjung Batu Primary Health Center, Ogan Ilir Regency, South Sumatra, Indonesia. The study setting was selected due to the high prevalence of primary hypertension and the limited implementation of structured non-pharmacological interventions for blood pressure management in the community. Data collection was carried out from December 2025 to January 2026 and included participant recruitment, baseline blood pressure assessment, intervention implementation, post-intervention evaluation, and data analysis. All intervention sessions and blood pressure measurements were conducted by the researcher following standardized procedures to ensure consistency and reliability throughout the study period.

2.4. Population and Sample

The population of this study consisted of women with primary hypertension residing in the working area of Tanjung Batu Primary Health Center, Ogan Ilir Regency, South Sumatra, Indonesia. According to health center records, the hypertensive population in the study area was substantial, making it an appropriate setting for investigating non-pharmacological interventions for blood pressure management. The sample size was determined using the Slovin formula, resulting in a total sample of 40 participants. A probability sampling technique with simple random sampling was employed to ensure that each eligible individual had an equal opportunity to participate in the study. The selected participants met the established inclusion and exclusion criteria and were equally assigned to two intervention groups, consisting of 20 participants in the Isometric Handgrip Exercise (IHE) group and 20 participants in the Progressive Muscle Relaxation (PMR) group.

2.5. Intervention Procedures

Eligible participants who met the inclusion criteria were recruited and provided written informed consent prior to participation. Baseline blood pressure measurements were obtained using a calibrated sphygmomanometer. Participants were then allocated into either the Isometric Handgrip Exercise (IHE) group or the Progressive Muscle Relaxation (PMR) group. The IHE group performed supervised

handgrip exercises consisting of repeated isometric contractions and relaxation periods, while the PMR group underwent guided relaxation sessions involving systematic contraction and relaxation of major muscle groups. Both intervention groups received the intervention for 20 minutes per session for three times per week for one week. Following completion of the intervention period, post-intervention blood pressure measurements were recorded using the same standardized procedures. All interventions were supervised by the researcher to ensure protocol adherence and consistency throughout the study.

2.6. Outcome Measures

The primary outcome of this study was the reduction in systolic and diastolic blood pressure among women with primary hypertension following the intervention. Blood pressure measurements were obtained before (pretest) and after (posttest) the intervention period using a calibrated sphygmomanometer. Systolic and diastolic blood pressure values were recorded in millimeters of mercury (mmHg) and served as indicators for evaluating the effectiveness of the interventions.

In addition to blood pressure measurements, demographic characteristics including age were collected to describe the study population. The effectiveness of Isometric Handgrip Exercise (IHE) and Progressive Muscle Relaxation (PMR) was determined by comparing changes in blood pressure values within each group and between groups after the intervention period. A greater reduction in blood pressure was interpreted as a more effective intervention for managing primary hypertension.

2.7. Data Analysis

Data were analyzed using IBM SPSS Statistics version 25. Descriptive statistics were used to summarize participants' demographic characteristics and blood pressure measurements, including frequency distributions, percentages, medians, standard deviations, minimum and maximum values, and 95% confidence intervals. The results were presented in tables to provide a clear description of the study population and blood pressure changes before and after the interventions.

Inferential statistics were performed to evaluate the effectiveness of the interventions. The Wilcoxon signed-rank test was used to assess differences in blood pressure before and after the intervention within each group, while the Mann-Whitney U test was employed to compare blood pressure reductions between the Isometric Handgrip Exercise (IHE) and Progressive Muscle Relaxation (PMR) groups. Statistical significance was determined at a p-value of less than 0.05. <0.05 [10].

2.8. Ethical Considerations

This study was conducted in accordance with the ethical principles for human research, including respect for autonomy, beneficence, non-maleficence, confidentiality, and justice. Prior to data collection, all participants received a detailed explanation regarding the study objectives, procedures, potential benefits, and their rights as research participants. Written informed consent was obtained from all participants before their enrollment in the study. Participants were informed that their participation was voluntary and that they could withdraw from the study at any time without any consequences.

Ethical approval for this study was obtained from the Health Research Ethics Committee of Universitas Muhammadiyah Ahmad Dahlan Palembang with Ethical Clearance Number: 003972/Universitas Muhammadiyah Ahmad Dahlan Palembang/2026. All personal information and research data were kept confidential and used solely for research purposes.

3. RESULTS AND DISCUSSION

3.1 Result

3.1.1 Sociodemographic Characteristics

The sociodemographic characteristics of the participants are presented in Table 1. Variables analyzed included age and sex to provide an overview of the study population and to describe the distribution of respondents involved in the study.

Table 1. Sociodemographic Characteristics of Participants (n = 40)

Variables	Frequency (n)	Percentage (%)
Age		
Late Adulthood (40–59 years)	28	70.0
Early Elderly (60–74 years)	12	30.0
Sex		
Female	40	100.0
Male	0	0
Total	40	100.0

A total of 40 women with primary hypertension participated in this study and were included in the final analysis. The respondents were categorized based on age and sex. As presented in Table 1, the majority of participants were in the late adulthood group (40–59 years), accounting for 28 respondents (70.0%), while 12 respondents (30.0%) were categorized as early elderly (60–74 years). All participants in this study were female (100.0%). These findings indicate that primary hypertension was more commonly observed among middle-aged and older women in the study setting.

3.1.2 Blood Pressure Before Intervention

Baseline blood pressure measurements were obtained prior to the implementation of the interventions to assess the initial blood pressure status of participants in both groups. The pre-intervention systolic and diastolic blood pressure values of the Isometric Handgrip Exercise (IHE) and Progressive Muscle Relaxation (PMR) groups are presented in Table 2.

Table 2. Pre-Intervention Blood Pressure Measurements of Participants in the IHE and PMR Groups (n = 40)

Variables	Median (mmHg)	SD	Min–Max	95% CI
IHE Group (n = 20)				
Systolic Blood Pressure	157.00	8.45	145–175	153.45–161.35
Diastolic Blood Pressure	96.00	5.87	90–110	93.55–99.05
PMR Group (n = 20)				
Systolic Blood Pressure	156.00	9.12	142–176	152.20–160.75
Diastolic Blood Pressure	90.00	6.05	82–102	87.45–93.15

As presented in Table 2, the median pre-intervention systolic blood pressure in the IHE group was 157.00 mmHg (SD = 8.45), with values ranging from 145 to 175 mmHg. The median diastolic blood pressure was 96.00 mmHg (SD = 5.87), ranging from 90 to 110 mmHg. In the PMR group, the median pre-intervention systolic blood pressure was 156.00 mmHg (SD = 9.12), with a range of 142 to 176 mmHg, while the median diastolic blood pressure was 90.00 mmHg (SD = 6.05), ranging from 82 to 102 mmHg. Overall, participants in both groups exhibited elevated blood pressure levels prior to the implementation of the interventions, indicating comparable baseline conditions between the IHE and PMR groups.

3.1.3 Blood Pressure After Intervention

Post-intervention blood pressure measurements were obtained following the completion of the intervention period to evaluate changes in blood pressure among participants in both groups. The post-intervention systolic and diastolic blood pressure values of the Isometric Handgrip Exercise (IHE) and Progressive Muscle Relaxation (PMR) groups are presented in Table 3.

Table 3. Post-Intervention Blood Pressure Measurements of Participants in the IHE and PMR Groups (n = 40)

Variables	Median (mmHg)	SD	Min–Max	95% CI
IHE Group (n = 20)				
Systolic Blood Pressure	120.00	7.32	105–135	117.10–123.95
Diastolic Blood Pressure	75.00	4.76	68–85	73.20–77.65
PMR Group (n = 20)				
Systolic Blood Pressure	130.00	8.10	118–145	126.85–134.45
Diastolic Blood Pressure	84.00	5.32	76–94	81.95–86.95

As shown in Table 3, the median post-intervention systolic blood pressure in the IHE group decreased to 120.00 mmHg (SD = 7.32), while the median diastolic blood pressure decreased to 75.00 mmHg (SD = 4.76). In the PMR group, the median post-intervention systolic blood pressure was 130.00 mmHg (SD = 8.10), and the median diastolic blood pressure was 84.00 mmHg (SD = 5.32). These findings indicate a reduction in both systolic and diastolic blood pressure following the interventions, with lower post-intervention blood pressure values observed in the IHE group compared with the PMR group.

3.1.4 Effectiveness of Isometric Handgrip Exercise on Blood Pressure

The effectiveness of Isometric Handgrip Exercise (IHE) in reducing blood pressure was assessed by comparing pre-intervention and post-intervention blood pressure measurements using the Wilcoxon signed-rank test. The results of the analysis are presented in Table 4.

Table 4. Effectiveness of Isometric Handgrip Exercise on Blood Pressure (n = 20)

Blood Pressure	Median ± SD (mmHg)	p-value
Pre-intervention	157.00 ± 8.45	
Post-intervention	120.00 ± 7.32	0.000*

As presented in Table 4, the median systolic blood pressure in the IHE group decreased from 157.00 ± 8.45 mmHg before the intervention to 120.00 ± 7.32 mmHg after the intervention. The Wilcoxon signed-rank test revealed a statistically significant difference between pre-intervention and post-intervention blood pressure measurements ($p = 0.000$). These findings indicate that Isometric Handgrip Exercise was effective in reducing blood pressure among women with primary hypertension.

3.1.5 Effectiveness of Progressive Muscle Relaxation on Blood Pressure

The effectiveness of Progressive Muscle Relaxation (PMR) in reducing blood pressure was evaluated by comparing pre-intervention and post-intervention blood pressure measurements using the Wilcoxon signed-rank test. The results of the analysis are presented in Table 5.

Table 5. Effectiveness of Progressive Muscle Relaxation on Blood Pressure (n = 20)

Blood Pressure	Median ± SD (mmHg)	p-value
Pre-intervention	156.00 ± 9.12	
Post-intervention	130.00 ± 8.10	0.001*

As presented in Table 5, the median systolic blood pressure in the PMR group decreased from 156.00 ± 9.12 mmHg before the intervention to 130.00 ± 8.10 mmHg after the intervention. The Wilcoxon signed-rank test demonstrated a statistically significant difference between pre-intervention and post-intervention blood pressure measurements ($p = 0.001$). These findings indicate that Progressive Muscle Relaxation was effective in reducing blood pressure among women with primary

hypertension. Although a significant reduction was observed following the intervention, the magnitude of blood pressure reduction was lower than that observed in the Isometric Handgrip Exercise group.

3.1.5 Effectiveness of Progressive Muscle Relaxation on Blood Pressure

A comparison of blood pressure reduction between the Isometric Handgrip Exercise (IHE) and Progressive Muscle Relaxation (PMR) groups was conducted using the Mann–Whitney U test to determine the relative effectiveness of the two interventions. The results are presented in Table 6.

Table 6. Comparison of Blood Pressure Reduction Between the IHE and PMR Groups (n = 40)

Group	Median Reduction (mmHg)	SD	p-value
IHE (n = 20)	37.00	7.25	
PMR (n = 20)	26.00	6.80	0.001*

As shown in Table 6, the median reduction in blood pressure was 37.00 mmHg (SD = 7.25) in the IHE group and 26.00 mmHg (SD = 6.80) in the PMR group. The Mann–Whitney U test revealed a statistically significant difference in blood pressure reduction between the two intervention groups ($p = 0.001$). These findings indicate that both interventions were effective in lowering blood pressure; however, Isometric Handgrip Exercise produced a significantly greater reduction in blood pressure compared with Progressive Muscle Relaxation among women with primary hypertension. This result suggests that IHE may be a more effective non-pharmacological intervention for blood pressure management in this population.

3.2 Discussion

The results of this study showed that most participants were in the late adulthood age group (40–59 years), while the remaining participants were categorized as early elderly (60–74 years). All respondents were female. Increasing age is a well-established risk factor for hypertension due to structural and functional changes in the cardiovascular system, including reduced arterial elasticity, endothelial dysfunction, and increased peripheral vascular resistance, which contribute to elevated blood pressure levels. In women, the risk of hypertension further increases after menopause because of declining estrogen levels, which are associated with impaired vascular protection and increased sympathetic nervous system activity [11–14]. These physiological changes may explain the high prevalence of hypertension among middle-aged and older women observed in this study [15,16].

The findings before the intervention demonstrated that participants in both groups had elevated blood pressure levels, indicating uncontrolled hypertension. The median systolic blood pressure was 157 mmHg in the IHE group and 156 mmHg in the PMR group. Hypertension develops when peripheral vascular resistance increases, causing the heart to exert greater force to maintain blood circulation throughout the body. Persistent elevation of blood pressure may result in symptoms such as headache, fatigue, dizziness, sleep disturbances, and reduced quality of life. If left unmanaged, hypertension may increase the risk of cardiovascular complications, including stroke, coronary heart disease, heart failure, and chronic kidney disease [17,18].

The results after the intervention showed significant reductions in blood pressure in both the Isometric Handgrip Exercise and Progressive Muscle Relaxation groups. Participants who received IHE experienced a reduction in median systolic blood pressure from 157 mmHg to 120 mmHg, whereas participants who received PMR experienced a reduction from 156 mmHg to 130 mmHg. These findings indicate that both interventions were effective non-pharmacological strategies for blood pressure management [20]. The observed reductions suggest that regular physical and relaxation-based interventions can improve cardiovascular regulation and contribute to better blood pressure control among hypertensive patients [21–23].

The significant reduction in blood pressure observed in the IHE group may be explained by several physiological mechanisms. Isometric handgrip exercise stimulates repeated muscular contractions that enhance endothelial function, increase nitric oxide bioavailability, and improve vascular responsiveness [24]. These adaptations promote vasodilation and reduce peripheral vascular resistance, thereby lowering blood pressure. In addition, regular isometric exercise has been shown to

improve autonomic nervous system balance by reducing sympathetic activity and enhancing baroreflex sensitivity, resulting in better cardiovascular regulation. These findings are consistent with previous studies reporting that isometric exercise effectively reduces systolic and diastolic blood pressure among adults with hypertension [25].

Similarly, Progressive Muscle Relaxation significantly reduced blood pressure among study participants. PMR works by systematically contracting and relaxing major muscle groups, thereby inducing a relaxation response throughout the body. This relaxation response suppresses sympathetic nervous system activity and enhances parasympathetic activity, leading to reductions in heart rate, muscle tension, and vascular resistance. Psychological benefits such as reduced anxiety, stress, and emotional tension may also contribute to lower blood pressure levels. Several participants reported feeling calmer and more relaxed following the intervention, which may have supported the physiological effects of PMR on blood pressure reduction. These findings are consistent with previous studies demonstrating the effectiveness of relaxation techniques in improving cardiovascular outcomes among hypertensive patients [25,27].

The comparative analysis revealed that Isometric Handgrip Exercise produced a significantly greater reduction in blood pressure than Progressive Muscle Relaxation. The median blood pressure reduction was 37 mmHg in the IHE group compared with 26 mmHg in the PMR group ($p = 0.001$). This finding suggests that although both interventions were effective, IHE provided superior blood pressure-lowering effects. The greater effectiveness of IHE may be attributed to its direct physiological impact on vascular function and cardiovascular adaptation, whereas PMR primarily influences blood pressure through stress reduction and autonomic relaxation mechanisms. Consequently, IHE may induce stronger hemodynamic changes and greater improvements in vascular health over a relatively short intervention period [28,29].

The findings of this study are supported by previous evidence indicating that isometric exercise is one of the most effective exercise modalities for reducing resting blood pressure. While Progressive Muscle Relaxation remains beneficial as a complementary intervention for reducing stress and promoting psychological well-being, Isometric Handgrip Exercise appears to provide greater physiological benefits for blood pressure control. Therefore, both interventions may be recommended as safe, inexpensive, and non-pharmacological nursing strategies for hypertension management, with IHE demonstrating superior effectiveness among women with primary hypertension in community settings.

The findings of this study have important implications for nursing practice, particularly in the management of primary hypertension through non-pharmacological interventions. Both Isometric Handgrip Exercise (IHE) and Progressive Muscle Relaxation (PMR) were found to significantly reduce blood pressure, indicating that these interventions can be incorporated into routine nursing care as complementary strategies alongside pharmacological treatment. As safe, low-cost, and easy-to-administer interventions, IHE and PMR can be implemented in community health centers, outpatient clinics, and home-based care settings to support blood pressure control among hypertensive patients.

The results further suggest that nurses play a crucial role in promoting self-management behaviors and empowering patients to actively participate in hypertension management. Through health education and regular monitoring, nurses can teach patients how to perform IHE and PMR independently, thereby enhancing adherence to lifestyle modifications and improving cardiovascular health outcomes. Given its greater effectiveness in reducing blood pressure, Isometric Handgrip Exercise may be prioritized as a nursing intervention for patients with primary hypertension, while Progressive Muscle Relaxation may serve as an additional strategy for reducing stress and promoting psychological well-being. The integration of these evidence-based interventions into nursing practice may contribute to improved hypertension management, prevention of cardiovascular complications, and enhancement of patients' quality of life.

This study has several limitations that should be considered when interpreting the findings. First, the study was conducted in a single primary healthcare setting with a relatively small sample size, which may limit the generalizability of the results to broader populations. Second, all participants were female, preventing the findings from being generalized to male patients with primary hypertension. Third, the intervention period was relatively short, and only immediate post-intervention

outcomes were assessed; therefore, the long-term effectiveness of Isometric Handgrip Exercise (IHE) and Progressive Muscle Relaxation (PMR) could not be determined.

In addition, the study focused solely on blood pressure outcomes and did not evaluate other factors that may influence hypertension management, such as medication adherence, dietary habits, physical activity levels, psychological stress, and quality of life. Future studies are recommended to include larger and more diverse populations, longer follow-up periods, and additional clinical and behavioral outcomes to provide a more comprehensive understanding of the effectiveness of these interventions in hypertension management.

4. CONCLUSION

This study demonstrated that both Isometric Handgrip Exercise (IHE) and Progressive Muscle Relaxation (PMR) were effective in reducing blood pressure among women with primary hypertension. Significant reductions in systolic and diastolic blood pressure were observed following the implementation of both interventions. However, the comparative analysis revealed that IHE produced a greater reduction in blood pressure than PMR, indicating its superior effectiveness as a non-pharmacological intervention for hypertension management.

These findings suggest that IHE and PMR can be considered safe, practical, and cost-effective complementary nursing interventions to support blood pressure control in patients with primary hypertension. Given its greater effectiveness, Isometric Handgrip Exercise may be recommended as a preferred intervention in community and primary healthcare settings. Future studies involving larger and more diverse populations, as well as longer follow-up periods, are needed to further evaluate the long-term benefits and clinical applicability of these interventions.

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6. CONFLICT OF INTEREST

The authors declare that they have no competing interest

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