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Application of Isometric Handgrip Exercise For The Management Of Hypertension In The Family: A Case Report

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ABSTRACT

Background. Hypertension, often referred to as the “silent killer,” is a major risk factor for stroke, kidney disease, and heart disease. One approach to managing familial hypertension involves the incorporation of physical activity through the Isometric Handgrip Exercise. This study aimed to evaluate the application of the Isometric Handgrip Exercise intervention in reducing blood pressure.
Methods. This study employed a case report design using a family nursing approach, focusing specifically on the Isometric Handgrip Exercise intervention. The intervention was administered over seven sessions between 23 September and 7 October 2024 to a family unit, targeting members with hypertension. Participants performed the exercise once daily, and blood pressure measurements were recorded before and after each session to assess the intervention’s impact.
Results. The intervention resulted in a reduction in blood pressure in both Client I and Client II, with an average decrease of 5 mmHg in systolic pressure and 3 mmHg in diastolic pressure.
Conclusion. The findings indicate that the Isometric Handgrip Exercise is an effective intervention for lowering blood pressure among family members with hypertension

Keywords: *Hypertension; Isometric Handgrip Exercise; Blood Pressure*

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Backgound: Non-communicable diseases (NCDs) refer to conditions that are not transmitted from one individual to another, meaning these illnesses do not originate from bacteria, viruses, or other living organisms. Among these conditions, hypertension is one of the most prevalent within families. According to the World Health Statistics report (2018), NCDs account for 71% of global mortality, and hypertension contributes to 45% of deaths related to these diseases (WHO, 2018). Hypertension is defined as a systolic blood pressure exceeding 140 mmHg and a diastolic blood pressure exceeding 90 mmHg; higher blood pressure levels are associated with an increased risk of various complications (Widiastuti, Ulkhasanah, and Irawan, 2021). Commonly known as the "silent killer," hypertension is a leading cause of stroke, kidney disease, and heart disease. Moreover, one in five hypertensive patients faces a high risk of premature death, and approximately 50% of the elderly population suffers from hypertension, which, if inadequately managed, may lead to long-term health issues (Mukhlis et al., 2020).

The prevalence of hypertension in West Java is 39.8% among residents aged 18 and older. According to the Garut Regency Health Office, the number of hypertension cases in Garut Regency was recorded as 146,668 in 2021 and 159,435 in 2022. Based on these data, the incidence of hypertension in Garut Regency has increased significantly, with various factors influencing the occurrence of the condition, particularly among the elderly (Dinkes, 2020). Hypertension is classified according to systolic and diastolic blood

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pressure levels. According to the latest guidelines from the American College of Cardiology (ACC) and the American Heart Association (AHA) published in 2017, blood pressure is categorized as follows: normal (systolic ≤ 120 mmHg and diastolic ≤ 80 mmHg), pre-hypertension (systolic 121–139 mmHg and diastolic 80–89 mmHg), stage 1 hypertension (systolic 140–159 mmHg and diastolic 90–99 mmHg), and stage 2 hypertension (systolic ≥ 160 mmHg or diastolic ≥ 100 mmHg) (Widiati and Wulandari, 2024).

Controlling hypertension necessitates the active participation of family members, as the support provided by the family can greatly influence the successful management of the condition. Family support is not solely emotional; it also encompasses practical and material assistance. This support includes various forms of aid, such as providing motivation, offering useful information, and delivering effective advice to help family members suffering from hypertension (Yuliani et al., 2021). In this context, the family plays a crucial role in ensuring adherence to prescribed treatments, promoting healthy lifestyle changes, and facilitating necessary follow-up through regular visits to healthcare facilities. Consequently, family involvement is a key determinant in the successful management of hypertension and in preventing more serious health issues (Ina and Setyoningrum, 2023).

According to research conducted by (Veralia, Malini and Gusty, 2023), People with high blood pressure often feel discomfort and need proper care. To manage high blood pressure, treatment can include both medications and other methods that do not involve drugs. One helpful non-drug method is exercise, which boosts blood flow and makes people feel more comfortable. In Indonesia, Public Health centers have a program called Prolanis, where patients with high blood pressure receive both medicine and education on staying active. However, many patients still do not exercise enough because they are busy or lack time and easy access to sports facilities. Health guidelines in Europe and the USA even recommend using isometric handgrip exercises as a simple way to help lower blood pressure. This is in line with research conducted by Aidale (2023), various non-pharmacological therapeutic approaches can be employed to manage hypertension within the family. One such approach is the engagement in physical activity through the Isometric Handgrip Exercise. By performing this exercise, individuals can actively participate in controlling their blood pressure without relying exclusively on medication. The Isometric Handgrip Exercise involves a static contraction of the hand muscles without excessive movement of the associated muscles and joints. This exercise is executed by gripping a specialized isometric device designed specifically for this purpose. Not only does the exercise enhance hand strength, but it also fortifies the forearm muscles and improves overall hand endurance. Additionally, it may improve blood circulation, strengthen bones, and even reduce the risk of injuries to the hand and wrist (Prastiani, Rakhman, and Umaroh, 2023).

The Isometric Handgrip Exercise may reduce blood pressure through the stimulation of mechanoreceptors. When an individual contracts the hand muscles, specialized receptors within the muscles are activated and send signals to the central nervous system. These signals subsequently activate the autonomic nervous system. The muscle contraction during the handgrip exercise induces shear stress on the walls of the blood vessels, which in turn triggers the release of vasodilatory substances. These substances facilitate the dilation of the blood vessels by relaxing the smooth muscle cells within their walls. As the vessels dilate, blood flow improves and the pressure on the vessel walls decreases, ultimately leading to a reduction in blood pressure (Muliya, Hartutik, and Sutarto, 2023). Based on the aforementioned rationale, the objective of this study was to evaluate the effect of the Isometric Handgrip Exercise intervention on blood pressure among family members with hypertension..

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Methods. This study employed a case report design with a family nursing approach. The case subjects consisted of the family of Mr. U, wherein two family members were diagnosed with hypertension (Client I and Client II). The research was conducted at the subjects' residence from 14 September to 7 October 2024, located in RT 02 RW 08, Sukamentri Village, Garut, and comprised seven sessions as outlined in the predetermined plan. Prior to data collection, ethical principles were rigorously applied by providing the family with a comprehensive explanation of the study, followed by the distribution of informed consent forms. Participation was ensured to be completely voluntary and free from coercion. All information provided by the family was treated as confidential and was used exclusively for research purposes. The family retained the right to make decisions autonomously without any undue influence (Godskesen, Bjork, and Juth, 2023). The study commenced only after obtaining the family's informed consent, thereby confirming their participation as the research sample.

The mechanism of the Isometric Handgrip Exercise was implemented by first providing an explanation of its definition, benefits, and execution. Subsequently, the researcher measured each client's blood pressure prior to the exercise, followed by a demonstration of the proper technique. The researcher modeled the exercise by beginning with a warm-up and deep breathing relaxation performed three times, during which the arms were extended forward and held for 5 seconds per repetition, repeated three times. This was followed by instructing the client to grip a handgrip device with one hand for 45 seconds and then release the grip for 10 to 15 seconds. This sequence was repeated 3 to 4 times within a single session, followed by a rest period of 7 to 10 minutes before blood pressure was re-measured using a sphygmomanometer, with the results recorded in progress notes for subsequent evaluation (Widiati and Wulandari, 2024). Each client was afforded equal opportunity to perform the exercise alternately with the hand gripper device. The researchers, acting as facilitators, actively involved the family to help schedule regular exercise sessions, maintain exercise consistency, lead independent workouts, monitor the exercise process and its outcomes, and assist in managing the timing during the sessions. In this study, the exercise was conducted once a day with a frequency of every two days (Rodrigues et al., 2019).

***Figure* 1.** *Hand Gripper Device*

Results: Based on the assessment conducted within the client's family, the findings revealed that Client I has been diagnosed with hypertension and asthma since 2016, whereas Client II has a history of hypertension dating back to 2009. The family does not routinely seek healthcare services; instead, they independently obtain antihypertensive medications from pharmacies without consulting healthcare professionals or undergoing regular blood pressure monitoring at the nearest public health center. Additionally, the family habitually consumes amlodipine at a dose of 10 mg, although it is not taken daily due to the absence of symptoms. They also maintain a diet high in salt and refrain from engaging in regular physical exercise, as both clients experience fatigue and recurrent leg pain during extensive activities.

After seven sessions of the Isometric Handgrip Exercise intervention with Clients I and II, the evaluation results indicated that Mr. U's family adhered well to the prescribed activities, as evidenced by the health assessments conducted during the exercise sessions.The family demonstrated proficiency in performing the exercises, as they

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consistently prepared the necessary equipment and effectively led each session. Nursing evaluations, reflected in the variation of the family's blood pressure measurements during the implementation of the Isometric Handgrip Exercise, are presented in Table 1 below.

Table 1. Blood Pressure Monitoring Results

Exercise	Pre-post		Post-test	
	Systolic	Diastolic	Systolic	Diastolic
E - 1	150	78	146	76
E – 2	148	76	140	73
E – 3	150	76	145	73
E – 4	146	75	140	72
E – 5	140	73	137	70
E – 6	138	72	132	68
E - 7	138	70	134	66
Mean Reduction in Blood Pressure				
Systolic			5,1	
Diastolic			3	

Based on Table 1, the data indicate that there was a consistent reduction in blood pressure at each home visit. On average, systolic blood pressure decreased by 5 mmHg and diastolic blood pressure by 3 mmHg.

Table 2. Blood Pressure Monitoring Results

Exercise	Pre-post		Post-test	
	Systolic	Diastolic	Systoli c	Systolic
E - 1	186	88	181	84
E – 2	184	86	179	82
E – 3	178	85	174	81
E – 4	175	83	168	80
E – 5	164	80	160	78
E – 6	160	78	155	74
E - 7	155	72	150	70
Mean Reduction in Blood Pressure				
Systolic			5	
Diastolic			3,2	

Based on Table 2, the data indicate that there was a gradual reduction in blood pressure during each home visit. On average, the systolic pressure decreased by 5 mmHg, while the diastolic pressure decreased by 3 mmHg.

Based on the evaluation of blood pressure monitoring in Clients I and II, the implementation of the Isometric Handgrip Exercise proved effective in reducing blood pressure among family members with hypertension. This is evidenced by the comparative analysis of blood pressure readings taken before and after the exercise sessions, which demonstrated an immediate reduction. Therefore, this exercise may serve as a viable non-pharmacological alternative for controlling blood pressure in hypertensive patients.

Discussion. Hypertension, or high blood pressure, is a medical condition characterized by a significant increase in the pressure within the arterial walls. This condition can be attributed to various factors, including unhealthy lifestyles and genetic predispositions. Prolonged hypertension may lead to cardiovascular complications and cerebrovascular damage, which in turn can impair the nervous system (Mursudarinah, Patonengan, and Sunarno, 2021). In practice, patients with hypertension often struggle to consistently manage their condition in daily life, highlighting the crucial role of family support in maintaining effective hypertension management. This study implemented an intervention that combined educational components on hypertension management with a non-pharmacological therapy in the form of physical activity, specifically targeting family members to manage hypertension within the household. One such physical activity is the Isometric Handgrip Exercise, which offers several advantages, including ease of performance at home, minimal time requirements, safety for independent practice, and the potential to enhance family involvement in care (Karthikkeyan, Latha, and Gokulnathan, 2020).

In this study, the focus was on administering an intervention in the form of the Isometric Handgrip Exercise as a method for managing hypertension that can be implemented by families at home. The findings indicate that there were notable changes in hypertension management within the client's family, as evidenced by blood pressure measurements taken before and after seven exercise sessions. The family was

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able to routinely incorporate the Isometric Handgrip Exercise into their daily regimen, with session timings adjusted independently (Cohen *et al.*, 2023). The Isometric Handgrip Exercise involves muscle contraction without joint movement, whereby an individual exerts a specified force on a handgrip device for several seconds. Initially, this muscle contraction stimulates the sympathetic nervous system, leading to a temporary increase in blood pressure and heart rate during the session. Upon completion of the exercise, the body responds by activating the parasympathetic nervous system, which reduces heart rate and induces vasodilation. This vasodilation decreases vascular resistance, thereby facilitating smoother blood flow and lowering blood pressure (Sae Young, Eun Sun and Hyun Jeong, 2025).

With regular exercise, the body adapts to these physiological changes, resulting in a more sustained reduction in blood pressure over the long term. The Isometric Handgrip Exercise offers several advantages: it is simple, easily accessible, and can be performed at any time without the need for complex equipment. This makes it an effective and convenient option for controlling hypertension, particularly for individuals who struggle with more intense forms of physical exercise or who have physical limitations (Prastiani, Rakhman, and Umaroh, 2023). This finding is corroborated by research conducted by Riyanto et al. (2024) in Tenajar Village, Kertasemaya Subdistrict, Indramayu Regency, involving 30 respondents. The study demonstrated that the intervention group receiving the Isometric Handgrip Exercise experienced significant reductions in both systolic and diastolic blood pressure, underscoring the exercise's effectiveness in managing hypertension (Bertoletti *et al.*, 2022).

The implementation of the isometric handgrip exercise can also be performed concurrently with pharmacological therapy—namely, antihypertensive medication—to achieve a more optimal reduction in blood pressure. The isometric handgrip exercise comprises a regimen of muscle strengthening and relaxation through a gripping activity that involves the arms and hands. This activity has the potential to reduce both physical and emotional stress that adversely affects the cardiovascular system in patients with hypertension (Karthikkeyan, Latha, and Gokulnathan, 2020). The findings indicate that the isometric handgrip exercise not only provides immediate post-exercise benefits but also contributes to long-term improvements in cardiovascular health. In other words, the isometric handgrip exercise serves as an effective strategy for reducing both systolic and diastolic blood pressure through mechanisms that enhance vascular function and reduce sympathetic nervous system activity (Pinto, Dias and Garcia, 2025).

Isometric Handgrip Exercise is an exercise that involves muscle contraction without joint movement, where one squeezes the handgrip with a certain force for a few seconds. Initially, this muscle contraction increases the activity of the sympathetic nervous system, which works to increase blood pressure and heart rate. However, this blood pressure raising effect is temporary and lasts only during the exercise session. Upon completion of the exercise, the body responds by activating the parasympathetic nervous system, which reduces heart rate and causes vasodilation, or dilation, of blood vessels. This vasodilation process reduces vascular resistance, resulting in better blood flow and lower blood pressure.

In addition, Isometric Handgrip Exercise can improve endothelial function, which is the thin layer of blood vessels. Improved endothelial function helps increase blood vessel elasticity, which allows blood vessels to adapt to changes in blood flow more effectively. This can directly lower blood pressure, especially in people with hypertension. With regular exercise, the body will adapt to these changes, resulting in a more stable reduction in blood pressure in the long run (Baddeley-White *et al.*, 2019).

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These findings are consistent with the study conducted by Bani et al. (2023), which reported that respondents who received the Isometric Handgrip Exercise intervention experienced reductions of 11.2 mmHg in systolic blood pressure and 7.7 mmHg in diastolic blood pressure. The Isometric Handgrip Exercise intervention offers an innovative approach to managing hypertension in older adults. Its mechanism of action involves increasing blood flow through the vasodilation of the brachial arteries in response to the cyclic contraction and relaxation of muscles during the exercise, thereby effectively lowering blood pressure (Widiati and Wulandari, 2024). The grip strength exerted during the exercise directly influences the extent of blood pressure reduction. Moreover, the blood vessels become more flexible, resulting in vasodilation and decreased circulatory pressure due to nitric oxide oxidation. A reduction in sympathetic nerve impulse output leads to decreased epinephrine production, which subsequently affects the smooth muscle in the blood vessels, promoting further vasodilation. This vasodilation also reduces peripheral resistance, contributing to the overall decrease in blood pressure (Bani, Widhiyanto, and Salam, 2023).

In a literature review conducted by Widiastuti et al. (2021) on the effectiveness of the Isometric Handgrip Exercise in reducing blood pressure in individuals with hypertension, the findings indicated that regular training over a period of 6–8 weeks resulted in an average blood pressure reduction of approximately 3–8 mmHg. Another review by Mursudarinah, Patonengan, and Sunarno (2021), which examined the use of the Isometric Handgrip Exercise to control blood pressure in elderly patients with hypertension, reported an average reduction in blood pressure of 4–7 mmHg. These studies support the efficacy of the Isometric Handgrip Exercise as an effective alternative therapy for lowering both systolic and diastolic blood pressure, and it is clinically recommended for patients with hypertension.

Conclusion and Suggestions: Based on the results obtained in this study, the intervention using the Isometric Handgrip Exercise proved effective in reducing blood pressure in clients with hypertension. Consequently, the Isometric Handgrip Exercise may serve as a viable non-pharmacological alternative for managing hypertension within the family setting. This conclusion is supported by the comparative blood pressure monitoring conducted before and after the intervention.

This study was limited by the time constraints imposed by the family's availability and the research schedule for administering nursing care, as well as methodological limitations related to the sample size, which only included one family. Therefore, it is recommended that the family continue to perform the Isometric Handgrip Exercise regularly and independently at home to achieve optimal hypertension management. The family is also encouraged to maintain and enhance the quality of healthcare for hypertensive members so that the positive outcomes and benefits of this study can be sustained over the long term.

Recommendations for future research include conducting this exercise more frequently and for a longer duration, so that the reduction in blood pressure can be greater and more significant. In addition, further studies could explore the impact of Isometric Handgrip Exercise on the quality of life of hypertensive patients, such as its effects on anxiety levels and the benefits of this exercise in enhancing the well-being of families with hypertension.

References

Bani, P. N. B., Widhiyanto, A. and Salam, A. Y. (2023) ‘Pengaruh Isometric Handgrip Exercize Dan Terapi Nafas Dalam Terhadap Penurunan Tekanan Darah Pada Lansia Hipertensi’, *Jurnal Keperawatan Raflesia*, 5(2), pp. 65–76. doi: 10.33088/jkr.v5i2.973.

Baddeley-White, D. S. *et al.* (2019) ‘Blood pressure lowering effects of a novel isometric exercise device following a 4-week isometric handgrip intervention’,

Open Access Journal of Sports Medicine, 10, pp. 89–98. doi: 10.2147/OAJSM.S193008.

Bertoletti, O. A. *et al.* (2022) 'Isometric handgrip exercise impacts only on very short-term blood pressure variability, but not on short-term blood pressure variability in hypertensive individuals: A randomized controlled trial', *Frontiers in Physiology*, 13(September), pp. 1–9. doi: 10.3389/fphys.2022.962125.

Cohen, D. D. *et al.* (2023) 'Reductions in systolic blood pressure achieved by hypertensives with three isometric training sessions per week are maintained with a single session per week', *Journal of Clinical Hypertension*, 25(4), pp. 380–387. doi: 10.1111/jch.14621.

Godskesen, T., Bjork, J. and Juth, N. (2023) 'Challenges Regarding Informed Consent in Recruitment to Clinical Research: a Qualitative Study of clinical Research Nurses' Experiences.', *Trials*, (24). doi: 10.1186/s13063-023-07844-6.

Ina, N. L. T. and Setyoningrum, U. (2023) 'Hubungan Dukungan Keluarga dengan Perilaku Lansia dalam Pengendalian Hipertensi', *Jurnal Keperawatan Berbudaya Sehat*, 1(1), pp. 1–9. doi: 1035473/JKBS.v1i1.2148.

Karthikkeyan, K., Latha, K. and Gokulnathan, V. (2020) 'Effects of Isometric Handgrip Exercise on Blood Pressure and its role in Identifying Hypertensive Risk Individuals', *International Journal of Contemporary Medical Research [IJCMR]*, 7(2), pp. 1–4. doi: 10.21276/ijcmr.2020.7.2.4.

Mukhlis, H. *et al.* (2020) 'Cupping Therapy for Hypertensive Patiens : A quasi-Experimental Research', *Journal of Critical Review*, 7(14), pp. 1437–1443. doi: 10.31838/jcr.07.14.326.

Muliya, F. S., Hartutik, S. and Sutarto, A. (2023) 'Penerapan Isometric Handgrip Exercise Pada Lansia Penderita Hipertensi Di RSUD dr. Soediran Mangun Sumarso Wonogiri', *Jurnal Ventilator: Jurnal Riset Ilmu Kesehatan dan Keperawatan*, 1(3), pp. 155–163. doi: 10.59680/ventilator.v1i3.470.

Mursudarinah, M., Patonengan, G. S. and Sunarno, R. D. (2021) 'Isometric Handgrip Exercise Untuk Mengontrol Tekanan Darah Pada Lansia Dengan Hipertensi', *Jurnal Keperawatan Duta Medika*, 1(2), pp. 1–7. doi: 10.47701/dutamedika.v1i2.1591.

Pinto, D., Dias, N. and Garcia, C. (2025) 'Effect of Home-based Isometric Training on Blood Pressure in Older Adults with High Normal BP or Stage I Hypertension: A Randomized Controlled Trial', *Journal of the American Geriatry Society*, 73(2), pp. 574–582. doi: 10.1111/jgs.19213.

Prastiani, D. B., Rakhman, A. and Umaroh, S. (2023) 'Penerapan Isometric Handgrip Exercise Untuk Menurunkan Tekanan Darah Penderita Hipertensi Derajat 1', *SEHATMAS: Jurnal Ilmiah Kesehatan Masyarakat*, 2(2), pp. 447–454. doi: 10.55123/sehatmas.v2i2.1829.

Riyanto *et al.* (2024) 'Effectiveness of Isometric Handgrip Exercise on Blood Pressure in Hypertensive Patients in Tenajar Lor Village, Kertasemaya District, Indramayu Regency', *Journal of Medicine and Helath Sciences (Medisci)*, 2(2). doi: https://doi.org/10.62885/medisci.v2i2.495.

Sae Young, J., Eun Sun, Y. and Hyun Jeong, K. (2025) 'Isometric Handgrip versus Aerobic Exercise: A Randomized Trial Evaluating Central and Ambulatory Blood Pressure Outcomes in Older Hypertensive Participants', *Journal of Hypertension*, 2(43), pp. 351–358. doi: 10.1097/HJH.0000000000003919.

Veralia, V., Malini, H. and Gusty, R. P. (2023) 'Effect of Isometric Handgrip Exercise On Blood Pressure and Comfort Among Hypertensive Patients', *Jurnal Ners*, 18(1), pp. 25–30. doi: 10.20473/jn.v18i1.40942.

Widiastuti, A., Ulkhasanah, M. E. and Irawan, A. (2021) 'Isometric Handgrip Exercise Terhadap Tekanan Darah Dan Nadi Pada Hipertensi : Literature Review', *Coping: Community of Publishing in Nursing*, 9(6), p. 663. doi: 10.24843/coping.2021.v09.i06.p05.

Widiati, O. Y. and Wulandari, R. (2024) 'Pengaruh Isometric Handgrip Exercise

http://ejournal.poltekkes-smg.ac.id/ojs/index.php/MANR

p-ISSN: 2685-2020 ; e-ISSN: 2685-2012

terhadap Tekanan Darah pada Lansia dengan Hipertensi di Desa Gringging Kabupaten Sragen', *The Journal General Health and Pharmaceutical Sciences Research*, 2(3), pp. 12–22. doi: 10.57213/tjghpsr.v2i3.311.

Yuliani, N. *et al.* (2021) 'Pengembangan Teknik Relaksasi Napas Dalam Kombinasi Gerak Tangan Untuk Menstabilkan Tekanan Darah Penderita Hipertensi', *Jurnal Pendidikan Kesehatan*, 10(1), p. 55. doi: 10.31290/jpk.v10i1.2271.