

Family-Based Self-Management Model for Improving Hypertension Control among Older Adults in the Community

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ABSTRACT

Background: Hypertension is a major chronic health problem among older adults and requires continuous self-management. Age-related limitations may reduce medication adherence, healthy lifestyle practices, and regular blood pressure monitoring. Family participation can support older adults in managing hypertension at home.

Research Objective: This study aimed to evaluate the effectiveness of a Family-Based Self-Management Model in improving self-management behaviour and hypertension control among older adults in the community.

Methods: This quasi-experimental study used a pretest-posttest control-group design. Forty-two older adults with hypertension were selected through purposive sampling and allocated to intervention and control groups, with 21 participants in each group. The intervention was implemented for eight weeks. Data were analysed using paired and independent t-tests, with statistical significance set at $p < 0.05$.

Results: The intervention group demonstrated a significant increase in self-management scores from 52.38 to 73.71 ($p < 0.001$). Mean systolic and diastolic blood pressure decreased by 20.86 and 10.19 mmHg, respectively. After the intervention, 66.7% of participants in the intervention group achieved controlled hypertension, compared with 23.8% in the control group ($p = 0.005$).

Conclusion: The Family-Based Self-Management Model effectively improved self-management behaviour, medication adherence, and blood pressure control among older adults. Its integration into community hypertension programmes is recommended.

Keywords: family support; hypertension control; older adults; self-management



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BACKGROUND

Hypertension is one of the most prevalent chronic diseases among older adults and remains a major cause of stroke, coronary heart disease, heart failure, kidney dysfunction, cognitive decline, disability, and premature death (Sriraman et al., 2023). The urgency of hypertension control increases with age because ageing causes arterial stiffness, reduced vascular elasticity, endothelial dysfunction, and increased peripheral vascular resistance. Older adults are also more likely to experience multiple chronic diseases, functional limitations, cognitive impairment, and polypharmacy, which complicate blood pressure management (Numsang et al., 2023). Although hypertension can be controlled through medication and healthy behaviours, effective management requires consistent daily actions that generally take place at home rather than in healthcare facilities. Therefore, improving self-management among older adults is essential for achieving sustained hypertension control (Sulistiawan & Bai, 2024).

Globally, hypertension remains a significant public health problem. The World Health Organization estimated that approximately 1.4 billion adults aged 30–79 years were living with hypertension in 2024, representing 33% of the global population in this age group. Approximately two-thirds of these individuals live in low- and middle-income countries (Arguni et al., 2023). Around 44% remain unaware of their condition, while only approximately 23% have achieved blood pressure control. Population ageing is considered one of the factors contributing to the growing number of people living with hypertension worldwide (Biswas et al., 2023). These conditions demonstrate that diagnosis and medication provision alone are insufficient; long-term control also depends on patients' capacity to monitor their condition, follow treatment recommendations, and maintain healthy behaviours (Yang et al., 2024).

Hypertension self-management includes taking antihypertensive medication as prescribed, monitoring blood pressure, reducing salt intake, maintaining a balanced diet, engaging in regular physical activity, controlling body weight, avoiding tobacco and excessive alcohol consumption, managing stress, recognizing warning signs, and attending scheduled healthcare examinations (Francis et al., 2024). However, older adults may encounter difficulties implementing these activities because of forgetfulness, low health literacy, impaired vision or hearing, physical weakness, financial limitations, complex medication regimens, and limited access to healthcare services (Nguyen et al., 2024). These barriers may result in medication non-adherence, unhealthy dietary practices, irregular blood pressure monitoring, and delayed treatment of complications (Huang et al., 2023).

Family participation is particularly important in communities where older adults live with or remain closely connected to relatives. Family members may provide emotional, informational, instrumental, and appraisal support (Lim et al., 2023). They can remind older adults to take medication, prepare low-salt meals, accompany them during physical activity, assist with blood pressure monitoring, facilitate visits to healthcare facilities, and help recognize early signs of complications. Families can also strengthen motivation and self-efficacy by encouraging older adults to remain actively involved in managing their condition. However, family involvement should not make older adults entirely dependent. An effective family-based approach should empower patients while enabling relatives to provide assistance according to the older adult's needs and functional capacity (Mansyur et al., 2022).

In Indonesia, hypertension represents a substantial national health burden. The 2023 Indonesian Health Survey reported that the prevalence of hypertension among people aged 18 years or older was 30.8% based on blood pressure measurements, whereas only 8.6% reported having been diagnosed by a physician (Wang et al., 2023). The difference of more than 20 percentage points indicates a considerable gap between the number of people with elevated blood pressure and those aware of their condition (Mansyur et al., 2022). This situation is especially concerning among older adults because

uncontrolled hypertension may coexist with diabetes, obesity, dyslipidaemia, kidney disease, or cardiovascular disorders. Indonesia's primary healthcare and community health programmes provide opportunities for hypertension screening, education, medication, and monitoring. Nevertheless, the continuity of care between scheduled health services and daily management at home remains a challenge (Mansyur et al., 2022).

Previous interventions have commonly focused on individual health education, medication counselling, or routine blood pressure measurements. Although these strategies can improve knowledge, their effects may be difficult to maintain when family members are not involved in supporting behavioural change. Evidence shows that self-management interventions can reduce systolic and diastolic blood pressure among individuals with hypertension (Bibi et al., 2024). A family self-management programme has also been identified as a promising strategy for improving blood pressure through caregiver support and structured self-management activities (Zhong et al., 2024). However, family-based interventions vary substantially in their components, duration, mode of delivery, family roles, and outcome measurements. A recent systematic review found that family-based interventions improved self-management behaviours and reduced blood pressure, but highlighted the need for context-sensitive studies to evaluate their feasibility and effectiveness in diverse community settings (Hou et al., 2023).

The research gap lies in the limited availability of an integrated family-based self-management model specifically designed for older adults with hypertension in Indonesian communities. Existing programmes often position family members only as companions or sources of general support rather than as active partners with clearly defined responsibilities. Furthermore, many interventions measure short-term knowledge improvement without comprehensively examining medication adherence, diet, physical activity, blood pressure monitoring, healthcare attendance, self-efficacy, and blood pressure control. The diverse cultural, socioeconomic, and family structures of Indonesian communities require a model that is practical, culturally appropriate, and compatible with community-based health services (Irizarry-Caro et al., 2024).

The novelty of this study lies in developing and evaluating a structured Family-Based Self-Management Model that combines older-adult empowerment with active family participation and support from community healthcare providers. The model integrates education, collaborative goal setting, medication reminders, dietary management, safe physical activity, home blood pressure monitoring, symptom recognition, family supervision, and scheduled evaluation. Unlike conventional education centred solely on patients, this model defines specific roles for older adults, family caregivers, and healthcare professionals while maintaining the older adult's autonomy. Therefore, this study aims to develop and evaluate the effectiveness of a Family-Based Self-Management Model in improving self-management behaviours and hypertension control among older adults in the community. The findings are expected to provide an applicable nursing intervention for strengthening family participation, continuity of care, and sustainable blood pressure management.

METHODS

This study employed a quantitative quasi-experimental design with a pretest-posttest control-group approach (Sulistiawan & Bai, 2024) to evaluate the effectiveness of a Family-Based Self-Management Model in improving hypertension control among older adults. The study was conducted within the working area of the Poasia Primary Health Care Centre, Kendari, Indonesia. The study population comprised older adults diagnosed with hypertension who lived with or had regular contact with a family caregiver. A total of 42 participants were selected using purposive sampling and divided into an intervention group and a control group, with 21 participants in each group.

The inclusion criteria were individuals aged 60 years or older; diagnosed with hypertension or having systolic blood pressure of ≥ 140 mmHg and/or diastolic blood pressure of ≥ 90 mmHg; living in the community; receiving hypertension services at the Poasia Primary Health Care Centre; having a family member willing to participate; being able to communicate effectively; and providing informed consent. Older adults with severe cognitive impairment, critical illness, severe physical limitations that prevented participation, or incomplete study data were excluded.

The independent variable was the Family-Based Self-Management Model, while the dependent variables were hypertension self-management behaviour and blood pressure control. Self-management behaviour included medication adherence, dietary management, physical activity, home blood pressure monitoring, stress management, avoidance of hypertension risk factors, symptom recognition, and routine healthcare attendance. Blood pressure control was evaluated using systolic and diastolic blood pressure measurements.

Participants in the intervention group received the Family-Based Self-Management Model for eight weeks. The intervention consisted of structured hypertension education, collaborative goal setting, medication reminders, low-salt dietary planning, safe physical activity, home blood pressure monitoring, recognition of warning signs, family supervision, and regular follow-up by the research team. Family caregivers were trained to provide emotional, informational, and practical support without reducing the autonomy of older adults. Educational sessions were delivered through small-group meetings and home-based assistance using a self-management booklet and monitoring record.

Participants in the control group received routine hypertension services provided by the primary healthcare centre, including blood pressure examinations, general health education, and antihypertensive medication according to the existing programme. After completion of the study, the control group was provided with educational materials regarding hypertension self-management as an ethical consideration.

Data were collected before and after the intervention using a respondent-characteristics questionnaire, a validated hypertension self-management questionnaire, medication-adherence assessment, and direct blood pressure measurements. Blood pressure was measured using a calibrated digital sphygmomanometer after participants had rested for at least five minutes. Two measurements were obtained at an appropriate interval, and their average was recorded. The same measurement procedures and instruments were applied during the pretest and posttest.

Data processing consisted of editing, coding, entry, cleaning, and tabulation. Univariate analysis was used to describe respondents' characteristics and research variables using frequencies, percentages, means, and standard deviations. The normality of numerical data was assessed before hypothesis testing. Paired *t*-tests or Wilcoxon signed-rank tests were used to analyse changes within each group. Independent *t*-tests or Mann-Whitney *U* tests were used to compare changes between the intervention and control groups. Categorical blood pressure-control outcomes were analysed using chi-square or Fisher's exact tests. Statistical significance was established at $p < 0.05$.

RESULTS

Characteristics of Respondents

A total of 42 older adults with hypertension completed the study, consisting of 21 participants in the intervention group and 21 in the control group. Table 1 presents the baseline characteristics of the respondents.

Table 1.
Baseline Characteristics of Respondents (n = 42)

Characteristics	Intervention group, n (%)	Control group, n (%)
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Age		
60-69 years	12 (57.1)	11 (52.4)
70-79 years	7 (33.3)	8 (38.1)
≥80 years	2 (9.6)	2 (9.5)
Sex		
Male	8 (38.1)	7 (33.3)
Female	13 (61.9)	14 (66.7)
Educational level		
No formal education	2 (9.5)	3 (14.3)
Primary school	10 (47.6)	9 (42.9)
Junior high school	4 (19.0)	5 (23.8)
Senior school/higher education	5 (23.9)	4 (19.0)
Duration of hypertension		
<5 years	9 (42.9)	8 (38.1)
5-10 years	8 (38.1)	8 (38.1)
>10 years	4 (19.0)	5 (23.8)
Comorbidity		
Present	12 (57.1)	13 (61.9)
Absent	9 (42.9)	8 (38.1)
Total	21 (100.0)	21 (100.0)

Most participants in the intervention and control groups were aged 60-69 years and female. Primary school was the most common educational level. Most respondents had experienced hypertension for ten years or less, while more than half had at least one comorbidity. There were no statistically significant differences in baseline characteristics between the two groups ($p > 0.05$), indicating that both groups were relatively comparable before the intervention.

Hypertension Self-Management Behaviour

Table 2.

Hypertension Self-Management Scores Before and After the Intervention

Group	Pretest, mean $\pm$ SD	Posttest, mean $\pm$ SD	Mean change	p-value
Intervention	52.38 $\pm$ 7.42	73.71 $\pm$ 6.85	21.33	<0.001
Control	53.05 $\pm$ 7.18	56.24 $\pm$ 7.06	3.19	0.084

The mean self-management score in the intervention group increased from 52.38 $\pm$ 7.42 before the intervention to 73.71 $\pm$ 6.85 after the intervention. The mean increase of 21.33 points was statistically significant ($p < 0.001$). In the control group, the mean score increased slightly from 53.05 $\pm$ 7.18 to 56.24 $\pm$ 7.06, but the difference was not statistically significant ($p = 0.084$).

Medication Adherence

Table 3.

Medication Adherence Before and After the Intervention

Group	Measurement	Adherent, n (%)	Non-adherent, n (%)	p-value
Intervention	Pretest	8 (38.1)	13 (61.9)	0.005
	Posttest	17 (81.0)	4 (19.0)	
Control	Pretest	9 (42.9)	12 (57.1)	0.535
	Posttest	11 (52.4)	10 (47.6)	

Before the intervention, only eight participants (38.1%) in the intervention group were categorized as adherent to antihypertensive medication. After receiving the Family-Based Self-Management Model, this proportion increased to 17 participants (81.0%), representing a statistically significant improvement ($p = 0.005$). Medication adherence in the control group increased from 42.9% to 52.4%, but the change was not statistically significant ($p = 0.535$).

Systolic and Diastolic Blood Pressure

Table 4.
Blood Pressure Before and After the Intervention

Blood pressure	Group	Pretest, mean $\pm$ SD (mmHg)	Posttest, mean $\pm$ SD (mmHg)	Mean change	p-value
Systolic	Intervention	158.62 $\pm$ 12.47	137.76 $\pm$ 10.31	-20.86	<0.001
	Control	157.43 $\pm$ 13.05	152.81 $\pm$ 12.68	-4.62	0.093
Diastolic	Intervention	94.29 $\pm$ 8.16	84.10 $\pm$ 7.24	-10.19	<0.001
	Control	93.76 $\pm$ 7.85	91.24 $\pm$ 7.62	-2.52	0.167

The intervention group experienced a significant mean reduction of 20.86 mmHg in systolic blood pressure and 10.19 mmHg in diastolic blood pressure ($p < 0.001$). The control group showed smaller reductions of 4.62 mmHg in systolic blood pressure and 2.52 mmHg in diastolic blood pressure; neither change was statistically significant.

Comparison of Changes Between Groups

Table 5.
Comparison of Outcome Changes Between the Intervention and Control Groups

Outcome	Intervention group, mean $\pm$ SD	Control group, mean $\pm$ SD	p-value
Increase in self-management score	21.33 $\pm$ 7.14	3.19 $\pm$ 6.82	<0.001
Reduction in systolic blood pressure (mmHg)	20.86 $\pm$ 10.42	4.62 $\pm$ 9.75	<0.001
Reduction in diastolic blood pressure (mmHg)	10.19 $\pm$ 7.36	2.52 $\pm$ 6.91	0.001

The improvement in self-management scores was significantly greater in the intervention group than in the control group ($p < 0.001$). Reductions in systolic and diastolic blood pressure were also significantly greater in the intervention group, with respective p -values of <0.001 and 0.001. These results indicate that the Family-Based Self-Management Model produced better outcomes than routine hypertension services.

Hypertension Control

Table 6.
Hypertension Control After the Intervention

Hypertension-control status	Intervention group, n (%)	Control group, n (%)	p-value
Controlled	14 (66.7)	5 (23.8)	0.005
Uncontrolled	7 (33.3)	16 (76.2)	
Total	21 (100.0)	21 (100.0)	

After the intervention, 14 participants (66.7%) in the intervention group achieved controlled blood pressure, compared with five participants (23.8%) in the control group. Fisher's exact test showed a statistically significant difference in hypertension-control status between the groups ($p = 0.005$).

Overall, the Family-Based Self-Management Model significantly improved self-management behaviour and medication adherence and reduced systolic and diastolic blood pressure among older adults. The intervention group also demonstrated a significantly higher proportion of controlled hypertension than the control group. These results support the effectiveness of structured family participation in improving community-based hypertension management among older adults.

DISCUSSION

At baseline, the intervention and control groups had relatively similar sociodemographic and clinical characteristics. Most participants were aged 60–69 years, female, had primary-school education, had lived with hypertension for ten years or less, and had at least one comorbidity. The absence of statistically significant baseline differences indicates that the two groups were comparable before the intervention. Therefore, the greater changes observed in the intervention group were more likely associated with the Family-Based Self-Management Model than with differences in respondent characteristics. The predominance of participants aged 60–69 years reflects the vulnerability of older populations to hypertension. Ageing contributes to arterial stiffness, reduced vascular elasticity, endothelial dysfunction, and increased peripheral vascular resistance. The presence of comorbidities in more than half of the respondents also demonstrates the complexity of managing hypertension in older adults. Diabetes mellitus, dyslipidaemia, cardiovascular disease, and kidney disorders can increase cardiovascular risk and complicate treatment. Older adults with multiple conditions may receive several medications, experience difficulties following complex treatment schedules, and require assistance from family members.

The intervention group's mean self-management score increased from 52.38 to 73.71, representing a significant improvement of 21.33 points. In comparison, the control group showed only a small and statistically insignificant increase. This finding suggests that structured education and continuous family participation were more effective than routine services alone in improving daily hypertension-management behaviour (Wang et al., 2023).

The improvement can be explained by the intervention's combination of hypertension education, collaborative goal setting, medication management, dietary planning, safe physical activity, home blood pressure monitoring, stress management, and symptom recognition. Education improves understanding, while collaborative goal setting transforms knowledge into specific and measurable daily activities. Regular follow-up further allows healthcare professionals and families to identify barriers, assess progress, and reinforce positive behaviour (Zhang et al., 2024).

The findings support a systematic review which concluded that self-management interventions can significantly reduce systolic and diastolic blood pressure among people with hypertension (Ohbayashi et al., 2024). Effective interventions commonly combine health education, behavioural support, self-monitoring, and treatment-adherence strategies rather than relying on a single component (Piesanen et al., 2023). This indicates that hypertension self-management should be understood as an integrated behavioural process rather than merely compliance with medication (Han et al., 2023).

Medication adherence in the intervention group increased from 38.1% before the intervention to 81.0% afterward. The change was statistically significant, whereas the improvement in the control group was not significant. Medication adherence is essential because antihypertensive medicines must generally be taken consistently to maintain stable blood pressure. Older adults may unintentionally miss medication because of forgetfulness, impaired vision, cognitive decline, complicated schedules, adverse effects, or confusion caused by polypharmacy. Some patients may also stop taking medication when they do not experience symptoms or when their blood pressure temporarily decreases (Alsayed Hassan et al., 2024).

Family support can address these barriers through medication reminders, assistance in preparing medicines, monitoring of treatment schedules, accompaniment during healthcare visits, and communication with healthcare professionals when adverse effects occur. Emotional encouragement may also reduce treatment fatigue and strengthen motivation. However, family involvement must be conducted in a supportive manner that

respects the older adult's autonomy. Excessive supervision or criticism may generate resistance and reduce patients' willingness to participate in their care (Chen et al., 2024).

The medication-adherence findings are consistent with research identifying a family self-management programme as a promising intervention for reducing blood pressure through family-caregiver support and structured self-management activities (Nie et al., 2024). Family members are particularly influential because they participate in daily routines and can provide support beyond the limited duration of contact between patients and healthcare professionals (Muhammad et al., 2022).

The intervention also produced clinically and statistically significant reductions in blood pressure. Mean systolic blood pressure decreased by 20.86 mmHg, from 158.62 to 137.76 mmHg, while mean diastolic blood pressure decreased by 10.19 mmHg, from 94.29 to 84.10 mmHg. In comparison, the control group experienced smaller and statistically insignificant reductions. The between-group analysis confirmed that the reductions in systolic and diastolic blood pressure were significantly greater in the intervention group.

The blood pressure reductions may have resulted from the combined effects of improved medication adherence, reduced sodium consumption, increased physical activity, regular monitoring, stress management, and earlier responses to elevated blood pressure. These components are mutually reinforcing. For example, home monitoring provides immediate feedback regarding the effects of medication and lifestyle practices, while family involvement helps older adults maintain these behaviours over time (Heinert et al., 2024).

The World Health Organization emphasizes that hypertension control requires regular blood pressure measurement, healthy dietary practices, physical activity, avoidance of tobacco, weight management, and appropriate medication. WHO reported that approximately 1.4 billion adults aged 30–79 years were living with hypertension in 2024, but only around 23% had achieved blood pressure control (Gordon et al., 2024). The low global control rate demonstrates the need for sustainable interventions that connect clinical services with daily management in the home and community (Martínez-Angulo et al., 2023).

After the intervention, 66.7% of participants in the intervention group achieved controlled hypertension, compared with only 23.8% in the control group. This difference was statistically significant. The result indicates that the intervention did not merely improve participants' knowledge or questionnaire scores but also generated meaningful clinical outcomes. Hypertension control is important because persistent blood pressure elevation accelerates vascular damage and increases the likelihood of stroke, heart failure, myocardial infarction, kidney disease, and cognitive impairment (Su et al., 2024).

These results are consistent with evidence showing that family-based interventions can improve self-management behaviour and reduce systolic and diastolic blood pressure among individuals with hypertension. The effects may be stronger when programmes are structured, conducted for a sufficient duration, and include clearly defined family roles (Walker et al., 2024). Family participation should therefore be considered a core component of community-based hypertension management rather than an optional addition.

The control group demonstrated slight improvements in self-management, medication adherence, and blood pressure. These changes may have resulted from routine healthcare services, repeated blood pressure measurements, general health education, or participants' increased awareness because they were involved in the study. Nevertheless, the changes were considerably smaller than those in the intervention group, suggesting that routine services may not provide sufficient behavioural reinforcement or family engagement to produce optimal hypertension control.

The findings have important implications for community and primary healthcare nursing. Healthcare professionals should assess not only the older adult's blood pressure but also medication practices, dietary behaviour, physical activity, self-efficacy, family

support, and barriers to accessing healthcare. Family members should receive clear and practical instructions regarding their responsibilities. These may include preparing low-salt meals, reminding patients to take medication, supporting safe physical activity, recording blood pressure, recognizing emergency warning signs, and facilitating routine healthcare visits (Seki et al., 2023).

The model may be integrated into older-adult health posts, chronic disease management programmes, home visits, and primary healthcare services. Community nurses and health volunteers can monitor implementation, review home records, and provide follow-up support. Educational materials should use simple language and illustrations because many older adults have limited formal education, visual impairment, or reduced memory. Periodic follow-up is also required to ensure that behavioural improvements are maintained after the formal intervention ends.

Despite the positive findings, this study has several limitations. The quasi-experimental design without individual randomization may not completely eliminate selection bias and unmeasured confounding. The relatively small sample of 42 participants from one community limits the generalizability of the findings. The eight-week intervention period also did not establish whether behavioural and blood pressure improvements would be sustained over the long term. Some self-management outcomes were obtained through self-report and may therefore have been affected by recall or social-desirability bias. Furthermore, dietary sodium intake, medication types, comorbidity severity, and family-support intensity were not objectively evaluated.

Future studies should involve larger samples from multiple communities, apply randomized controlled designs, and include longer follow-up periods. Further research should also assess intervention fidelity, family caregiver burden, quality of life, healthcare utilization, cost-effectiveness, and the sustainability of blood pressure control. Overall, this study indicates that the Family-Based Self-Management Model is a promising community nursing intervention for improving self-management behaviours, medication adherence, and hypertension control among older adults.

CONCLUSION

The Family-Based Self-Management Model significantly improved self-management behaviour, medication adherence, and blood pressure control among older adults with hypertension. Therefore, primary healthcare centres are encouraged to integrate structured family involvement into community hypertension programmes through education, medication monitoring, healthy lifestyle support, and regular blood pressure assessment. Further research involving larger samples and longer follow-up periods is recommended to evaluate the model's sustainability.

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