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Effectiveness of a Family Empowerment Module in Reducing Blood Pressure among Elderly with Hypertension: A Community-Based Quasi-Experimental

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Family Empowerment;
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ABSTRACT

Introduction: Hypertension is a prevalent chronic condition among the elderly, often leading to cardiovascular complications. Family involvement in care has been identified as a potential strategy to improve hypertension control. This study aimed to evaluate the clinical impact of a family empowerment module on reducing systolic and diastolic blood pressure in elderly patients with hypertension.
Methods: A quasi-experimental design with a two-group pretest-posttest procedure was used. The study recruited elderly participant in Indonesia between the ages of 60 and 90 who had been diagnosed with hypertension. Families of participants received a structured family empowerment intervention and provided care for one month. Blood pressure was taken before and after the intervention with a digital sphygmomanometer. With SPSS version 27, the Wilcoxon signed-rank test was used to examine the data. Ethical permission was received from the Health Research Ethics Committee of Universitas Muhammadiyah Gombong
Results: There was a significant reduction in both systolic and diastolic blood pressure following the intervention. The mean systolic pressure decreased with a test statistic of $Z = -4.901$, $p < 0.001$, while diastolic pressure showed $Z = -4.938$, $p < 0.001$.
Conclusion: The family empowerment module demonstrated significant clinical effectiveness in lowering blood pressure among elderly hypertensive patients. This approach may serve as a valuable strategy in community-based hypertension management.

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INTRODUCTION

Blood pressure in elderly people tends to be higher than that of young people. Physiological aging in the elderly typically entails a progressive decline in organ function, exacerbated by both intrinsic and pathological factors. Some health disorders are felt by the elderly, such as the cardiovascular system. The prevalence of hypertension increases with age, regardless of gender, affecting 70% of the general population over the age of 80 (1). The aging process of the population certainly has an impact on various aspects of life, both social, economic, and especially health, because, with age, the function of body organs will decrease both due to natural factors and due to disease and an increase in the Old Age Ratio Dependency (2).

Family support has an important role in improving the quality of life of the elderly with hypertension, especially in maintaining adherence to treatment, optimal blood pressure control, and daily diet. The family is a system in which if one family member has a problem, it will affect the systems of other family members (3). Individual problems in the family are solved through family invention and resolved through the active involvement of other family members. Thus, family intervention, namely a healthy family, will make the community or society healthy because the family is a subsystem of the community (3, 4).

METHOD

This study employs a clear and systematic approach to ensure the reliability and validity of the findings. Below are the components of the methodology:

Research Type

The research methodology employed in this study is a quantitative approach aimed at exploring the influence of family empowerment module on reduce blood pressure elderly with hypertension. The design used in this study is quasi-experiment with two group pre-test-post test. This design uses 2 groups, namely the control group and the intervention group. The Intervention Group received a structured family empowerment module specifically designed for elderly hypertension management. The module was developed based on the Family-Centered Empowerment Model (FCEM), which emphasizes improving family knowledge, self-efficacy, and problem-solving skills in health management.

The content of the module included four main components: (1) health education on hypertension and its complications, (2) training in blood pressure monitoring and lifestyle modification (diet, physical activity, and medication adherence), (3) skills for emotional and motivational support to elderly family members, and (4) guidance in recognizing danger signs and seeking timely medical care. The intervention was delivered through structured face-to-face sessions, followed by one month of supervised implementation at home. Families were provided with educational materials and checklists to support daily monitoring and adherence. The theoretical mechanism of action is that by enhancing the family's knowledge, self-efficacy, and caregiving skills, the intervention strengthens adherence, reduces psychological stress in the elderly, and promotes healthier lifestyle behaviors. These combined effects are expected to result in improved blood pressure control.

Population and Sample/Informants

The research population consists of older people with hypertension in Indonesia aged 60 to 90 years. Inclusion requirements include elderly persons with hypertension living in the same residence as their families, elderly people over the age of 60, families over the age of 18, the elderly, and families that can communicate effectively. The sample was chosen using a purposive sampling method, as this approach enabled the recruitment of elderly participants with hypertension who met specific inclusion criteria, such as living with family members and being able to communicate effectively. This method was appropriate to ensure that participants were directly relevant to the intervention. However, the use of purposive sampling may limit external validity and introduce potential sampling bias, as the findings may not be fully generalizable to all elderly populations with hypertension.

Research Location

The study was conducted in Sempor City Indonesia, a culturally diverse area with a mix of urban and semi-urban populations.

Instruments

The instruments used are digital sphgnomanometer brand "One Med" to determine systole and diastole blood pressure in the elderly with hypertension. The decrease in blood pressure was measured before and after the intervention of the family empowerment module for 1 month. The measurement results will be recorded on the observation sheet.

Data Collection Procedures

Quantitative data were collected over a three-month period from August to October 2024. The researcher explained the module to families caring for the elderly with hypertension The module was applied for 1 month to the intervention group, while the control group was not given an intervention with the module.

Data Analysis

The collected data were analyzed using the Wilcoxon signed-rank test and the Mann–Whitney U test with SPSS software version 27. The Wilcoxon test was chosen because it was suitable for comparing two groups of paired samples, samples with an interval data scale, and the number of samples in both groups being the same. Mann Whitney test to compare between the control group and the intervention group

Ethical Approval

The study has obtained ethical clearance with number 132.6/II.3.AU/F/KEPK/V/2023 and received permission from the local health authorities. All information provided by respondents is kept confidential.

RESULTS

Table 1. Characteristic Respondent (n=56)

	Intervention group (n=56)		Control Group (n=56)	
	n	**%**	**n**	**%**
Family Respondent				
Sex				
Male	4	7.1	3	5.4
Female	52	92.9	53	94.6
Education				
Elementary School	14	25	5	8.9
Junior High School	13	23.2	9	16.1
Senior High School	26	46.4	39	69.6
College	3	5.4	3	5.4
Length of care elderly				
1-3 years	48	85.7	44	78.6
4-6 years	8	14.3	12	21.4
Relationship with elderly				
Husband	4	7.1	3	5.4
Wife	22	39.3	2	3.6
Child	30	5.36	51	91.1
Elderly Respondent				
Sex				
Male	2	3.6	3	5.4
Female	54	96.4	53	94.6
Age				
60-74 years Old	52	92.9	50	89.3
75-90 years old	4	7.1	6	10.7

In table 1, the demographic distribution shows that the majority of family caregivers were women, predominantly wives or children of the elderly. Most caregivers had a middle to senior high school education and had been providing care for one to three years. Among the elderly participants, the majority were female and between 60 and 74 years old. This profile suggests that caregiving responsibilities in hypertension management are primarily undertaken by women within the household. The results demonstrate a noticeable reduction in both systolic and diastolic blood pressure following the family empowerment intervention. The average systolic blood pressure decreased from 172.48 mmHg to 164.84 mmHg, while the diastolic blood pressure reduced from 97.29 mmHg to 93.73 mmHg. These findings indicate that the intervention produced a clinically meaningful improvement in blood pressure control among elderly participants, shown in table 2.

Table 2. Blood Pressure of the elderly with hypertension before and after being given family empowerment module (n=56)

	Systole		**Diastolic**	
	Pre	**Post**	**Pre**	**Post**
Average Grade	172.48 mmHg	164.84 mmHg	97.29 mmHg	93.73 mmHg
Minimum value	151 mmHg	150 mmHg	76 mmHg	76 mmHg
Maximum value	217 mmHg	189 mmHg	117 mmHg	101 mmHg

Table 3. Blood Pressure of the elderly with hypertension before and after control group (n=56)

	Systole		**Diastolic**	
	Pre	**Post**	**Pre**	**Post**
Average Grade	159.89 mmHg	159.18 mmHg	88.68 mmHg	88.43 mmHg
Minimum value	150 mmHg	150 mmHg	60 mmHg	60 mmHg
Maximum value	190 mmHg	193 mmHg	110 mmHg	110 mmHg

In the control group, minimal changes were observed between pre- and post-observation blood pressure values. The mean systolic blood pressure decreased slightly from 159.89 mmHg to 159.18 mmHg, and the mean diastolic blood pressure from 88.68 mmHg to 88.43 mmHg. These negligible differences suggest that the reduction in blood pressure in the intervention group was attributable to the family empowerment module rather than to natural variation over time, shown in table 3. In table 4, the Wilcoxon signed-rank test indicated a significant reduction in systolic blood pressure ($Z = -4.901$, $p < 0.001$, $r = 0.46$) and diastolic blood pressure ($Z = -4.938$, $p < 0.001$, $r = 0.47$). The effect sizes suggest a moderate-to-large clinical impact of the intervention, confirming not only statistical significance but also practical relevance in blood pressure reduction. These findings confirm the effectiveness of the intervention in lowering blood pressure among elderly participants with hypertension.

Table 4. quasi-experimental Wilcoxon analysis test results (n=56)

	Z	**Asymp.Sig.(2-tailed)**
Systole Blood Pressure of Elderly after being given family empowerment – Systole Blood Pressure of Elderly before being given family empowerment	-4.901	.000
Diastolic Blood Pressure of Elderly after being given family empowerment – Systole Blood Pressure of Elderly before being given family empowerment	-4.938	.000

Table 5. quasi-experimental Mann Whitney analysis test results (n=56)

	Mann Whitney test	Z	Asymp.Sig.(2-tailed)
systole blood pressure of the elderly with hypertension in the intervention group and control group after 1 month	917.000	-3.823	.000
diastolic blood pressure of the elderly with hypertension in the intervention group and control group after 1 month	991.000	-3.459	.001

The Mann–Whitney U test results indicated significant differences in post-intervention blood pressure between the intervention and control groups. Specifically, systolic blood pressure was significantly lower in the intervention group ($U = 917.000$, $Z = -3.823$, $p < 0.001$), as was diastolic blood pressure ($U = 991.000$, $Z = -3.459$, $p = 0.001$). These results further strengthen the evidence that the family empowerment module was effective in reducing blood pressure compared to standard care, as shown in table 5. These findings demonstrate that the family empowerment module produced not only statistically significant but also clinically meaningful reductions in blood pressure among elderly participants with hypertension. The observed decreases in systolic and diastolic values, supported by moderate-to-large effect sizes, suggest that the intervention has substantial potential for real-world application in community settings.

DISCUSSION

Prior to inferential testing, data distribution was examined using the Shapiro–Wilk test, which indicated that the blood pressure data were not normally distributed. This justified the use of non-parametric methods (Wilcoxon signed-rank and Mann–Whitney U tests) for the analysis. In addition to mean values, the results were also described using medians and interquartile ranges (IQRs) to provide a more accurate representation of central tendency and variability. The consistency between the non-parametric statistical outcomes and the descriptive patterns (median reductions in both systolic and diastolic blood pressure) reinforces the robustness of the intervention's observed effect.

Data shows that women play a greater role in the care of the elderly who suffer from hypertension. Research conducted (5) elucidates that gender significantly influences the caregiving of the elderly by family members. Women frequently assume the position of primary carers for older relatives, and their experiences in this capacity typically differ from those of males. Men engaged in aging care typically employ a more systematic and task-orientated methodology.

The study's data indicates that the majority of older individuals with hypertension are women. Research conducted by (6) in the American Journal of Hypertension indicates that women are more susceptible to hypertension, particularly postmenopause, due to substantial hormonal alterations. Reducing the hormone estrogen significantly impacts the preservation of blood vessel flexibility. Before menopause, males often have a greater incidence of hypertension. However, in post-menopause, the incidence in women escalates more rapidly than in males, resulting in a heightened danger for women in advanced age. These hormonal fluctuations also influence blood pressure management and the susceptibility to cardiovascular disease in women.

The results of this study showed a significant decrease in systolic and diastolic blood pressure in the hypertensive elderly group after the intervention, which supported the effectiveness of the In addition, minimal changes in systolic and diastolic blood pressure values highlight the need for a holistic approach that not only focuses on lowering blood pressure but also consistent control of hypertension. This approach is relevant to the study (7) which suggests that interventions involving health education and increased family knowledge about hypertension can improve care behaviour, both in older people and supportive family members. This intervention not only reduces blood pressure, but also improves the ability intervention program in controlling blood pressure. The decrease in

mean systolic pressure from 172.48 mmHg to 164.84 mmHg, and diastolic from 97.29 mmHg to 93.73 mmHg, indicates the success of the intervention that can be attributed to social support and family involvement in the management of hypertension in the elderly. According to (8), Family-based empowerment models can improve families' ability to support the self-care of older people with hypertension, which contributes to their blood pressure control.

Furthermore, changes in maximum and minimal blood pressure values in the intervention group also reflected the effect of the intervention that could reduce extreme variations in blood pressure in hypertensive elderly people. Study by (9)found that family social and functional support plays an important role in maintaining blood pressure stability, especially among the elderly. A decrease in maximum blood pressure from 217 mmHg to 189 mmHg indicates a reduction in the risk of hypertension complications, such as stroke and heart disease, which are often associated with extreme blood pressure of families to recognize the danger signs of hypertension, thereby improving the quality of life of the elderly.

Based on table 4, the results of the hypothesis test used a statistical program with the Wilcoxon Signed RankTes test processed with SPSS 27 software to determine the effect of family empowerment on systolic blood pressure in the elderly with hypertension in the intervention group; The result is $\rho = 0.000$ with $\alpha = 0.05$ which means $\rho < \alpha$ so Ho is rejected. This shows the effect of family empowerment on systolic blood pressure in the elderly with hypertension in the intervention group. Meanwhile, the results of the hypothesis test to determine the effect of family empowerment on the blood pressure of the elderly with hypertension in the intervention group, the result was $\rho = 0.000$ with $\alpha = 0.05$ which means $\rho < \alpha$ so Ho was rejected. This shows the effect of family empowerment on diastolic blood pressure of the elderly with hypertension in the intervention group.

The results of the hypothesis test that show the significant influence of family empowerment on systolic and diastolic blood pressure in the elderly with hypertension support various previous studies that highlight the role of the family in the management of hypertension. Family empowerment has proven to be effective not only in improving the adherence of the elderly to treatment, but also in reducing blood pressure through increased more intensive family support (10). This support allows family members to play an active role in blood pressure monitoring and the adoption of a healthy lifestyle, which significantly affects the long-term reduction of blood pressure (9).

The family empowerment approach also increases the motivation of the elderly to maintain a healthy lifestyle, such as appropriate diet and physical activity. Research by Susanna (11) revealed that active family support and involvement are closely related to better blood pressure control in hypertensive patients. Effective family involvement allows the elderly to feel ongoing support, especially in adhering to non-pharmacological treatments, such as lifestyle changes suggested for hypertension control (12). The study also reflects that family support in empowerment programs can strengthen the effectiveness of self-care in the elderly with hypertension. The development of family skills in health monitoring allows them to help the elderly to manage symptoms and prevent risky increases in blood pressure (13). In addition, this approach encourages the elderly to be more independent in taking care of themselves with guidance from family members who have better knowledge of how to prevent hypertension complications (9)

Overall, family empowerment not only contributes to blood pressure control, but also improves the quality of life of the elderly who are at high risk of hypertension complications. This family-based intervention has proven to be an effective measure in reducing the health burden on the elderly with hypertension, which has an impact on significantly reducing systolic and diastolic blood pressure. Family empowerment is one of the aspects that must be considered in community health management programs, especially in the elderly population living with hypertension (10,11). Study by (11) It found that families who provided emotional and physical support on a regular basis were able to significantly influence blood pressure control in older adults with hypertension. Families that play an active role in helping the elderly in implementing self-care practices, such as healthy diets and medication supervision, also increase the independence of the elderly in managing hypertension, which ultimately improves their quality of life.

Other studies by (10) It shows that training programs for families in hypertension care skills play a major role in lowering blood pressure and lipid levels in the elderly. Through family empowerment, the elderly feel more supported and motivated to comply with medical treatment and recommendations. This support not only functions as a physical aspect of caring for the elderly but also has psychological benefits, such as increased sense of security and confidence in the elderly who receive family support in managing their hypertension conditions.

The Family-Centered Empowerment Model (FCEM) applied through health education, such as through the WeChat digital platform, has proven to be effective in increasing the elderly's adherence to medication and lowering their blood pressure (14) . This approach allows families to be more actively involved in the management of elderly health, strengthening aspects of social support and the ability of families to support hypertension care in an ongoing manner. Our findings are consistent with prior evidence that family-centered interventions significantly enhance adherence, promote healthier lifestyle practices, and improve blood pressure control in elderly populations. Systematic reviews and meta-analyses have confirmed that structured family involvement has a substantial impact on both clinical and behavioral outcomes.

Other studies by (15) Demonstrating that empowerment strategies, such as self-training for hypertension management, have a positive impact on blood pressure control and improve overall treatment effectiveness. This meta-analysis found that an empowerment-based approach not only improved medication adherence but also strengthened the elderly's self-confidence to manage their own disease. This confirms that family empowerment not only functions as a social intervention but also as a tool that improves clinical control of hypertension. In addition, research (16) in Indonesia, it was revealed that hypertension management programs involving families in sodium consumption control and blood pressure monitoring helped in reducing blood pressure in the elderly. Programs that involve families in daily monitoring allow for early identification of unstable blood pressure, allowing for faster and more targeted interventions. These findings suggest that family education about healthy dietary practices and adherence to medication is essential in managing hypertension in the elderly.

Research by (17) provides important empirical evidence regarding the effectiveness of the family empowerment model in improving dietary adherence and lowering blood pressure in elderly people with hypertension. This finding is very relevant considering the urgency of treating hypertension in Indonesia which requires multidimensional support, especially from the smallest unit in society, namely the family. Cross-sectional study in Brazil by (18) also emphasized the importance of the role of the family in hypertension management. They found that families who better understood the condition of hypertension in the elderly could provide better emotional and physical support, which contributed to a decrease in blood pressure. The study concluded that intervention models that facilitate communication and family involvement in care can help create a supportive environment for older adults to manage hypertension more effectively and sustainably.

Other studies by (19), shown one of the most significant findings of this study is the association between weight management adherence and BP control, as well as the impact of cohabitation status. Patients who were not living alone demonstrated better BP control, suggesting that family presence contributes positively to health behaviors and adherence. The randomized controlled trial by (20), provides robust empirical evidence on the effectiveness of a patient-family (carer) partnership intervention in enhancing blood pressure (BP) control, self-care behaviors, and psychosocial well-being among hypertensive individuals and their family caregivers in rural China. The findings demonstrate that integrating family members into hypertension management can yield substantial clinical and psychological benefits for both patients and carers. Randomized controlled trials conducted in community settings further reinforce that integrating family caregivers into hypertension management leads to measurable reductions in blood pressure and improved self-care behaviors.

The study by (21), systematically synthesized findings from 11 high-quality studies, using PRISMA guidelines and critical appraisal tools from the Joanna Briggs Institute (JBI). The review confirms that involving family members in structured educational interventions can significantly influence clinical, behavioral, and psychosocial outcomes among elderly individuals living with hypertension. Other studies by (22), The findings of this study underscore the pivotal role of family support in effective hypertension management at home. The statistically significant relationship ($p = 0.000$) and the remarkably high odds ratio ($OR = 18.889$) indicate that hypertensive patients whose families are involved in their care are nearly 19 times more likely to manage their condition effectively compared to those without family support.

In addition, research (23), The results of the study showed a significant finding, namely that there was a strong positive correlation between family support and self-care management in hypertensive patients. This is evidenced by a p-value of 0.0001, which is statistically much smaller than the established alpha value (α) (≤ 0.05). The presence of a significant correlation between family support and self-care management suggests that when hypertensive patients receive adequate support from their families, they tend to be more motivated, disciplined, and

effective in carrying out their self-care regimens. Evidence from Indonesian studies also highlights the cultural relevance of family-based interventions, given the strong role of intergenerational caregiving in health management. A literature review by (24), comprehensively strengthens the view that family support plays an essential role in blood pressure management in the elderly with hypertension. Families can be empowered to provide optimal support, resulting in better blood pressure control and a significant improvement in quality of life for seniors with hypertension.

Research conducted by (25), highlights the unique context of the COVID-19 pandemic in Banjarmasin and its impact on hypertension management in the elderly. The study found a significant association between family support and hypertension elderly adherence to blood pressure control in healthcare facilities, despite concerns about COVID-19 transmission. These findings confirm the crucial role of the family as a substitute for medical personnel who cannot be accessed optimally during the pandemic.

Other studies by (26), provides strong empirical evidence regarding the effectiveness of interventions that combine self-efficacy education and family support in stabilizing blood pressure in hypertensive patients. These findings are particularly relevant considering that hypertension is still the majority health problem in Indonesia, and its control efforts require a comprehensive approach, not only focusing on pharmacological therapy.

A systematic review conducted by (27) provides a synthesis of important evidence regarding factors that affect blood pressure control behavior in elderly people with hypertension. Given that hypertension is the leading cause of premature death worldwide and its prevalence increases with age, understanding these factors is crucial for effective management and prevention of complications. The results identified three main factors that influence blood pressure control behavior in elderly people with hypertension: economy, health literacy, and education.

Other studies by (28) offer strong evidence regarding the effectiveness of Community-Based Nursing Intervention (CBNI) in improving hypertension management in the elderly. Given the high prevalence of hypertension in the elderly and the potential for serious consequences for the cardiovascular system (such as heart failure, stroke, and myocardial infarction), the identification of effective interventions is crucial. This study conclusively shows the positive impact of CBNI on the knowledge, self-efficacy, and systolic and diastolic blood pressure values of the elderly with hypertension. A significant decrease in systolic and diastolic blood pressure objectively validates the effectiveness of this CBNI. This suggests that the increased knowledge and self-efficacy triggered by such interventions is not only limited to cognitive or psychological changes, but also successfully translates into real physiological improvements in blood pressure control.

This study contributes novel insights by situating family empowerment within the cultural context of Indonesia, where collectivist values and intergenerational caregiving traditions strongly influence health behaviors. In this setting, caregiving is not only a practical responsibility but also a moral and cultural expectation, particularly for women within the household. Such cultural norms may have amplified the effectiveness of the empowerment module, as family members were motivated by both emotional bonds and social obligations to actively participate in care.

Furthermore, the causal mechanisms underlying the observed blood pressure reduction can be explained through several pathways. First, structured family involvement enhances adherence to dietary and medication regimens. Second, consistent emotional support reduces stress, a known contributor to elevated blood pressure. Third, the transfer of health knowledge through the empowerment module strengthens family self-efficacy, leading to more effective hypertension management. By integrating cultural specificity with causal pathways, our study extends theoretical understanding of how family-centered interventions function in low- and middle-income country contexts.

CONCLUSION

The findings of this study provide a deeper understanding of the comparison of the blood pressure of the elderly who suffer from hypertension before and after being given family empowerment module. These findings are relevant in the context of public health and have practical implications for the planning and implementation of more effective hypertension treatment programs for the elderly.

AUTHOR'S CONTRIBUTION STATEMENT

Conceptualization, H.T.Y and S.S.B.S.A.R.; Methodology, S.S.B.S.A.R. and M.F.M; Software, X.X.; Validation, H.T.Y and S.S.B.S.A.R.; Formal Analysis, S.S.B.A.R.; Investigation, M.F.M.; Resources, H.T.Y.; Data Curation, S.S.B.S.A.R.; Writing – Original Draft Preparation, H.T.Y. and P.A.W.S.; Writing – Review & Editing, S.S.B.S.A.R.; Visualization, H.T.Y. and P.A.W.S.; Supervision, S.S.B.S.A.R.

CONFLICTS OF INTEREST

All authors declare to have no conflict of interest

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The author uses Grammarly to assist in language refinement during the manuscript preparation process

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