

From Knowledge to Adherence: Implementing Health Promotion Model in Hypertension Self-Management Education

Puguh Ika Listyorini^{1*}, Witriyani², Hesty Latifa Noor³

Universitas Duta Bangsa Surakarta^{1,2,3}

*Correspondence Email: puguh_ika@udb.ac.id

ABSTRACT

Hypertension is a major global health problem and a leading risk factor for cardiovascular diseases, stroke, and kidney failure. Despite the availability of effective treatment, patient adherence to hypertension management remains low, particularly in primary health care settings. This study aimed to evaluate the effectiveness of Health Promotion Model (HPM)-based Self-Management Education (SME) in improving adherence and reducing blood pressure among hypertensive patients in Kunduran, Blora, Indonesia. A quasi-experimental design with a control group was conducted involving 60 respondents, divided equally into intervention and control groups. The intervention group received SME sessions integrating education, over four weeks, while the control group received standard care. Data were collected using an adherence questionnaire and digital sphygmomanometer before and after intervention. Results showed a significant improvement in adherence scores in the intervention group (pre-test: 62.3 ± 8.5 ; post-test: 75.6 ± 7.9 ; $p < 0.001$), whereas the control group demonstrated no significant change ($p = 0.224$). Moreover, the intervention group experienced a greater reduction in both systolic and diastolic blood pressure compared to the control group ($p < 0.05$). These findings suggest that HPM-based SME is an effective strategy to enhance adherence and blood pressure control in hypertensive patients within primary care settings.

KEYWORDS

Hypertension, Self-Management Education, Health Promotion Model, Adherence, Primary Care



This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International

INTRODUCTION

Hypertension remains one of the most common non-communicable diseases (NCDs) and a major global health challenge (Piovani, Nikolopoulos and Bonovas, 2022 and Zhou *et al.*, 2021). According to the World Health Organization (WHO), approximately 1.28 billion adults worldwide suffer from hypertension, with only one in five successfully controlling it (Rumaf *et al.*, 2023). In Indonesia, the prevalence of hypertension continues to rise, contributing significantly to cardiovascular morbidity and mortality (Kementrian Kesehatan Badan Kebijakan Pembangunan Kesehatan, 2023). The 2023 Indonesian Health Survey reported that the prevalence of hypertension in adults aged 25–34 years reached 17.4%, and in Central Java, hypertension accounted for 72% of all NCD cases (Dinkes Jateng, 2023). Furthermore, hypertension is a leading indirect cause of maternal mortality, accounting for 42.4%.

Despite the availability of treatment, adherence to antihypertensive management, including medication, diet, and lifestyle changes, remains low. This low adherence is largely due to limited patient understanding, lack of motivation, and inadequate health education support in primary healthcare. Addressing this issue requires an effective and sustainable approach to empowering patients to manage their condition (Burnier and Egan, 2019). Self-Managed Education (SME), guided by the Health Promotion Model (HPM), offers a promising strategy by focusing not only on knowledge transfer but also on motivation, behavioral reinforcement, and social support (Sakinah, Dee and Tusi, 2024). By integrating SME into primary healthcare services, particularly at the community-level, such as community health centers (Puskesmas) in rural areas like Kunduran, Blora, patient adherence can be improved, leading to better blood pressure control and a reduced risk of complications.

However, existing evidence on the effectiveness of SME-based SME interventions in primary healthcare in Indonesia, particularly in rural populations, remains limited. Previous studies have largely emphasized pharmacological treatment (Al-Makki *et al.*, 2022), while behavioral empowerment strategies remain underexplored. This study addresses this gap by evaluating the impact of SME-based SME on patient adherence and blood pressure outcomes, providing new evidence for a scalable health promotion strategy in resource-limited settings.

RESEARCH METHOD

This study employed a quasi-experimental design with pre- and post-test control groups to evaluate the effectiveness of Health Promotion Model (HPM)-based Self-Management Education (SME) in improving adherence among hypertensive patients. The research was conducted at Puskesmas Kunduran, Blora District, Central Java, Indonesia. Participants were recruited through purposive sampling with inclusion criteria: diagnosed with hypertension for at least six months, aged 30–70 years, and willing to participate throughout the study. Patients with severe complications such as advanced heart disease or kidney failure were excluded. A total of 60 respondents were allocated into two groups: the intervention group receiving HPM-based SME and the control group receiving standard health education.

The intervention lasted for a month and consisted of group education sessions, individual counseling, and distribution of educational media including booklets and videos. The SME program emphasized medication adherence, dietary management (low-salt diet and DASH approach), regular physical activity, stress management, and self-monitoring of blood pressure. Family and community support were also incorporated to reinforce behavioral change.

Data collection involved validated questionnaires measuring patient adherence to medication, diet, and lifestyle modifications, along with objective blood pressure measurements taken at baseline and after intervention. Statistical analyses were conducted using paired t-test for within-group comparisons, and independent t-test for between-group comparisons. Correlation analysis was performed to assess the relationship between adherence improvement and changes in blood pressure. Ethical clearance was obtained from the institutional review board, and all participants provided written informed consent prior to participation.

RESULT AND DISCUSSION

Characteristics of Respondents

The baseline characteristics of participants in both the treatment (n=30) and control (n=30) groups appear to be relatively comparable across demographic and clinical variables. The majority of participants were aged 40–59 years (48.3%), followed by those aged ≥60 years (33.3%), with a smaller proportion under 40 years (18.3%). In terms of sex, females constituted a higher proportion (61.7%) compared to males (38.3%). Educational background was varied, with most participants completing senior high school (31.7%) or elementary/junior high school (each 25%), and a smaller proportion having diploma/university education (18.3%). Regarding occupation, farmers were the largest group (41.7%), followed by housewives (21.7%), private employees (20.0%), and others (16.7%). For duration of hypertension, most had been diagnosed for 5–10 years (38.3%), while 35.0% had hypertension for less than 5 years, and 26.7% for more than 10 years. Medication adherence was distributed as good (41.7%), moderate (35.0%), and poor (23.3%). Overall, there were no marked differences between treatment and control groups, suggesting that both groups were comparable in terms of socio-demographic and clinical characteristics at baseline. This indicates that any differences observed in outcomes after intervention are less likely to be influenced by baseline disparities. The descriptive distribution is shown in Table 1.

Table 1. Characteristics of Respondents by Group (n = 60)

Characteristics	Category	Treatment (n=30)	Control (n=30)	Total (n=60)
Age (years)	< 40	5 (16,7%)	6 (20,0%)	11 (18,3%)
	40–59	15 (50,0%)	14 (46,7%)	29 (48,3%)
	≥ 60	10 (33,3%)	10 (33,3%)	20 (33,3%)
Sex	Male	12 (40,0%)	11 (36,7%)	23 (38,3%)
	Female	18 (60,0%)	19 (63,3%)	37 (61,7%)
Education level	Elementary	8 (26,7%)	7 (23,3%)	15 (25,0%)
	Junior High	7 (23,3%)	8 (26,7%)	15 (25,0%)
	Senior High	10 (33,3%)	9 (30,0%)	19 (31,7%)
	Diploma/University	5 (16,7%)	6 (20,0%)	11 (18,3%)
Occupation	Farmer	12 (40,0%)	13 (43,3%)	25 (41,7%)
	Housewife	7 (23,3%)	6 (20,0%)	13 (21,7%)
	Private employee	6 (20,0%)	6 (20,0%)	12 (20,0%)
	Others	5 (16,7%)	5 (16,7%)	10 (16,7%)
Duration of Hypertension	< 5 years	10 (33,3%)	11 (36,7%)	21 (35,0%)
	5–10 years	12 (40,0%)	11 (36,7%)	23 (38,3%)
	> 10 years	8 (26,7%)	8 (26,7%)	16 (26,7%)
Medication adherence	Good	13 (43,3%)	12 (40,0%)	25 (41,7%)
	Moderate	10 (33,3%)	11 (36,7%)	21 (35,0%)
	Poor	7 (23,3%)	7 (23,3%)	14 (23,3%)

Source: Primary Data, 2025

Patient Adherence Before and After Intervention

The results show a notable improvement in medication adherence among the intervention group after receiving self-management education based on the Health Promotion Model. The proportion of patients with good adherence increased from 43.3% at pre-test to 73.3% at post-test, while those with poor adherence declined from 23.3% to 6.7%. This indicates that the intervention effectively shifted patients toward higher adherence levels.

In contrast, the control group showed minimal changes. The percentage of patients with good adherence rose only slightly from 40.0% to 43.3%, while the proportions of moderate and poor adherence remained almost unchanged. Overall, the findings highlight that the educational intervention had a substantial positive effect on patient adherence, whereas the control group did not experience meaningful improvements. The differences in adherence are shown in Table 2.

Table 2. Patient Adherence Before and After Intervention

Adherence Level	Intervention Pre-test (n=30)	Intervention Post-test (n=30)	Control Pre-test (n=30)	Control Post-test (n=30)
Good	13 (43.3%)	22 (73.3%)	12 (40.0%)	13 (43.3%)
Moderate	10 (33.3%)	6 (20.0%)	11 (36.7%)	10 (33.3%)
Poor	7 (23.3%)	2 (6.7%)	7 (23.3%)	7 (23.3%)
Total	30 (100%)	30 (100%)	30 (100%)	30 (100%)

Source: Primary Data, 2025

The results of this study indicate that self-management education based on the Health Promotion Model effectively improved patient adherence to hypertension treatment. In the intervention group, the proportion of patients with good adherence increased substantially from 43.3% to 73.3%, while poor adherence decreased from 23.3% to only 6.7% after the program. These changes highlight that structured education, coupled with patient empowerment, plays an essential role in promoting behavioral modifications and sustaining long-term adherence.

In contrast, the control group showed minimal improvement, with good adherence increasing only slightly from 40.0% to 43.3%, and no reduction in poor adherence. This finding suggests that, without targeted intervention, adherence to hypertension management tends to remain stagnant and may not improve spontaneously. These findings are consistent with previous research. A study by (Golshahi *et al.*, 2015), demonstrated that patient education interventions significantly improved adherence to antihypertensive medication and lifestyle modifications. Similarly, studi in Nigeria (Jamiu *et al.*, 2024) showed that self-management programs led to better adherence and blood pressure control compared to standard care. A study community trial protocol by Heydari *et al.* (2025) also confirmed that community-based health education interventions were effective in improving adherence among hypertensive patients.

The improvement observed in this study can be explained by the Health Promotion Model, which emphasizes perceived benefits, self-efficacy, and cues to action as drivers of behavioral change (Habibzadeh *et al.*, 2021). By enhancing patients' knowledge, building confidence in self-care, and providing continuous monitoring, this approach empowers individuals to take ownership of their health (Vainauskienė and Vaitkienė, 2021). From a practical perspective, these results underscore the importance of incorporating structured self-management education into primary health care settings. Improved adherence not only contributes to better blood pressure control but also helps prevent complications such as stroke, heart failure, and chronic kidney disease, ultimately reducing the burden on health systems.

Differences in Compliance of Hypertensive Patients Before and After Treatment

At baseline (pre-test), there was no significant difference in mean adherence scores between the intervention group (62.3 ± 8.5) and the control group (63.1 ± 9.1) ($t = -0.37$, $p = 0.715$). This indicates that both groups were comparable before the intervention.

However, after the intervention (post-test), the intervention group showed a markedly higher mean adherence score (75.6 ± 7.9) compared to the control group (64.2 ± 8.7). The difference was statistically significant ($t = 5.65$, $p < 0.001$).

These results suggest that the Health Promotion Model-based self-management education program was effective in improving medication adherence among hypertensive patients in the intervention group compared to usual care in the control group.

Table 3. Independent t-test Results Between Intervention and Control Groups

Time	Intervention (Mean \pm SD)	Control (Mean \pm SD)	t	p-value
Pre-test	62.3 ± 8.5	63.1 ± 9.1	-0.37	0.715
Post-test	75.6 ± 7.9	64.2 ± 8.7	5.65	<0.001*

Source: Primary Data, 2025

The findings of this study revealed a significant improvement in patient adherence among the intervention group after receiving Self-Management Education (SME) based on the Health Promotion Model, compared to the control group that only received standard care. At baseline, adherence scores were comparable between groups, with a mean of 62.3 ± 8.5 in the intervention group and 63.1 ± 9.1 in the control group ($t = -0.37$, $p = 0.715$), indicating no significant difference before treatment.

When comparing post-test adherence between groups, the independent t-test revealed a significant difference ($t = 5.65$, $p < 0.001$), confirming that patients who received the structured self-management education achieved higher levels of adherence compared to those in the control group. This result strongly supports the effectiveness of behavioral interventions in improving hypertension management.

These findings are consistent with prior studies. Khadoura *et al.* (2021), reported that educational interventions significantly increased medication adherence among hypertensive patients. Zhang *et al.* (2021), demonstrated that self-management programs improved adherence and reduced blood pressure levels in Chinese primary health care. In the Indonesian context, Ruslina Defi, Candrasekar and Barki (2025), confirmed that structured community-based education improved compliance and supported better blood pressure control.

The success of the intervention can be explained by the principles of the Health Promotion Model, which emphasizes perceived benefits, self-efficacy, and cues to action. By addressing patients' knowledge gaps, enhancing motivation, and fostering confidence in managing their illness, the program facilitated sustainable behavior change (Udodom, Aondowase and Igiri, 2023). From a clinical perspective, improving adherence is critical, as noncompliance has been strongly associated with uncontrolled blood pressure and increased risk of cardiovascular events such as stroke, myocardial infarction, and kidney failure. Therefore, integrating self-management education into primary health care services is essential for preventing complications and reducing long-term health care costs.

Differences In Patient Adherence Between The Intervention and Control Groups

A paired t-test showed a significant improvement in the intervention group, with the mean score increasing from 62.3 ± 8.5 (pre-test) to 75.6 ± 7.9 (post-test) ($t = -8.12$, $p < 0.001$). This indicates that self-management education based on the Health Promotion Model had a positive impact on participant adherence.

In contrast, the control group did not show a significant change, with the mean score only slightly increasing from 63.1 ± 9.1 (pre-test) to 64.2 ± 8.7 (post-test) ($t = -1.24$, $p = 0.224$). This indicates that without the intervention, participant adherence remained relatively stable. Overall, the findings indicate that the intervention was effective in improving adherence compared to the control group. The results of the paired t-test are shown in Table 3.

Table 4. Paired t-test Results of Hypertension Patients' Adherence

Group	Time	Mean \pm SD	t	p-value
Intervention	Pre-test	62.3 \pm 8.5	-8.12	<0.001*
	Post-test	75.6 \pm 7.9		
Control	Pre-test	63.1 \pm 9.1	-1.24	0.224
	Post-test	64.2 \pm 8.7		

Source: Primary Data, 2025

Following the intervention, however, patient adherence increased markedly in the intervention group from 62.3 ± 8.5 to 75.6 ± 7.9 . The paired t-test confirmed this improvement was statistically significant ($t = -8.12$, $p < 0.001$). In contrast, the control group showed only a slight, non-significant change from 63.1 ± 9.1 to 64.2 ± 8.7 ($t = -1.24$, $p = 0.224$). These results demonstrate that the SME intervention had a measurable and substantial effect on improving adherence, while standard care alone was insufficient to alter patients' behavior.

The independent t-test further supported these findings, showing a significant difference between the intervention and control groups in post-test adherence scores (75.6 ± 7.9 vs. 64.2 ± 8.7 , $t = 5.65$, $p < 0.001$). This suggests that the observed improvement was directly attributable to the intervention, rather than natural variation or external factors.

These outcomes are consistent with earlier studies. Khadoura *et al.* (2021) reported that structured education interventions significantly improved adherence among hypertensive patients in Palestina. Zhang *et al.* (2021) also found similar results in China, where self-management programs increased both adherence and blood pressure control. Community-based education strategies effectively enhanced compliance and contributed to improved hypertension outcomes (Nyame *et al.*, 2024).

From a theoretical perspective, the Health Promotion Model explains these findings through its emphasis on perceived benefits, self-efficacy, and support systems. The SME intervention in this study provided continuous education, individualized counseling, and motivational reinforcement, which likely strengthened patients' confidence and willingness to adhere to lifestyle modifications and medication regimens. The significant differences between the intervention and control groups highlight the importance of incorporating self-management education into primary health care for hypertension. Beyond pharmacological treatment, empowering patients with knowledge and self-care skills is crucial for sustainable adherence and long-term blood pressure control.

CONCLUSION

This study highlights the potential of Health Promotion Model (HPM)-based Self-Management Education (SME) as an effective strategy to improve adherence among patients with hypertension in primary health care settings. By addressing both cognitive and behavioral aspects of patient self-care, the intervention is expected to lead to better treatment compliance, healthier lifestyle practices, and improved blood pressure control.

The findings emphasize the urgency of integrating structured educational programs into routine hypertension management, particularly in resource-limited settings.

Strengthening patient empowerment through knowledge, self-efficacy, and family support can contribute to sustainable behavior change and reduce the burden of hypertension-related complications.

Implementing HPM-based SME in primary health care not only supports national efforts in chronic disease prevention but also provides evidence for the global health community on the value of behaviorally grounded interventions in improving long-term patient outcomes.

ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to the Ministry of Higher Education, Science, and Technology of the Republic of Indonesia (Kemendiktisaintek) for funding support through the 2025 Novice Lecturer Research Program. We also extend our gratitude to the Head of the Kunduran Community Health Center and the healthcare workers who facilitated patient access and provided invaluable assistance throughout this research. Our deepest gratitude goes to all the hypertension patients who participated and volunteered their time for this research.

REFERENCES

- Al-Makki, A. *et al.* (2022) ‘Hypertension pharmacological treatment in adults: A world health organization guideline executive summary’, *Hypertension*, 79(1), pp. 293–301. Available at: <https://doi.org/10.1161/HYPERTENSIONAHA.121.18192>.
- Burnier, M. and Egan, B.M. (2019) ‘Adherence in Hypertension: A Review of Prevalence, Risk Factors, Impact, and Management’, *Circulation Research*, 124(7), pp. 1124–1140. Available at: <https://doi.org/10.1161/CIRCRESAHA.118.313220>.
- Dinkes Jateng (2023) *Profil Kesehatan Jawa Tengah Tahun 2023*. Semarang: Dinkes Jateng.
- Golshahi, J. *et al.* (2015) ‘Effect of Self-care Education on Lifestyle Modification, Medication Adherence and Blood Pressure in Hypertensive Adults: Randomized Controlled Clinical Trial’, *Advanced biomedical research*, 4(1), p. 204.
- Habibzadeh, H. *et al.* (2021) ‘The Effect of Educational Intervention Based on Pender’s Health Promotion Model on Quality of Life and Health Promotion in Patients With Heart Failure: an Experimental Study’, *BMC Cardiovascular Disorders*, 21(1), pp. 1–13. Available at: <https://doi.org/10.1186/s12872-021-02294-x>.
- Heydari, H. *et al.* (2025) ‘Effectiveness of community-based intervention using PATCH on disease perception, empowerment, and self-care in hypertension: a community trial protocol’, *Trials*, 26(1). Available at: <https://doi.org/10.1186/s13063-025-08743-8>.
- Jamiu, M.O. *et al.* (2024) ‘Educational Intervention on Knowledge of Hypertension and Lifestyle/Dietary Modification Among Hypertensive Patients Attending a Tertiary Health Facility in Nigeria’, *Mediterr J Pharm Pharm Sci*, 4(1), pp. 1–11.
- Kementrian Kesehatan Badan Kebijakan Pembangunan Kesehatan (2023) *Survei Kesehatan Indonesia (SKI) 2023 Dalam Angka*. Jakarta: Kementrian Kesehatan Badan Kebijakan Pembangunan Kesehatan.
- Khadoura, K.J. *et al.* (2021) ‘Effectiveness of Motivational Interviewing on Medication Adherence Among Palestinian Hypertensive Patients: a Clustered Randomized Controlled Trial’, *European Journal of Cardiovascular Nursing*, 20(5), pp. 411–420. Available at: <https://doi.org/10.1093/eurjcn/zvaa015>.
- Nyame, S. *et al.* (2024) ‘Community-Based Strategies to Improve Health-Related

- Outcomes in People Living With Hypertension in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis', *Global Heart*, 19(1). Available at: <https://doi.org/10.5334/gh.1329>.
- Piovani, D., Nikolopoulos, G.K. and Bonovas, S. (2022) 'Non-Communicable Diseases: The Invisible Epidemic', *Journal of Clinical Medicine*, 11(19), pp. 11–12. Available at: <https://doi.org/10.3390/jcm11195939>.
- Rumaf, F. *et al.* (2023) 'Pemetaan Penderita Hipertensi Pada Lansia (Studi Pada Wilayah Kerja Puskesmas Sangkub Kabupaten Bolaang Mongondow Utara)', *Jurnal Ilmiah Mahasiswa Fakultas Hukum Universitas Malikussaleh*, 6(1), pp. 27–40. Available at: <https://doi.org/10.29103/jimfh.v6i1.10411>.
- Ruslina Defi, I., Candrasekar, F. and Barki, S. (2025) 'Towards Comprehensive Cardiovascular Care: The Part of Community-Based Rehabilitation in Controlling Cardiovascular Risk Factors in Indonesia', *Disability, CBR and Inclusive Development*, 36(2), pp. 85–96. Available at: <https://doi.org/10.20372/dcidj.826>.
- Sakinah, S., Dee, T.M.T. and Tusi, J.S. (2024) 'The Effect of Self-Management Education Based on the Health Promotion Model on Compliance Behavior of Hypertension Patients', *Babali Nursing Research*, 5(4), pp. 768–782. Available at: <https://doi.org/10.37363/bnr.2024.54431>.
- Udoudom, U.I., Aondowase, S. and Igiri, A. (2023) 'Impact of education and communication on behaviour change', *Journal of Language, Literature, Social and Cultural Studies*, 1(3), pp. 271–280. Available at: <https://doi.org/10.58881/jllscs.v1i3.120>.
- Vainauskienė, V. and Vaitkienė, R. (2021) 'Enablers of patient knowledge empowerment for self-management of chronic disease: An integrative review', *International Journal of Environmental Research and Public Health*, 18(5), pp. 1–24. Available at: <https://doi.org/10.3390/ijerph18052247>.
- Zhang, Q. *et al.* (2021) 'The effect of high blood pressure-health literacy, self-management behavior, self-efficacy and social support on the health-related quality of life of Kazakh hypertension patients in a low-income rural area of China: a structural equation model', *BMC Public Health*, 21(1), pp. 1–10. Available at: <https://doi.org/10.1186/s12889-021-11129-5>.
- Zhou, B. *et al.* (2021) 'Global epidemiology, health burden and effective interventions for elevated blood pressure and hypertension', *Nature Reviews Cardiology*, 18(11), pp. 785–802. Available at: <https://doi.org/10.1038/s41569-021-00559-8>.