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Effectiveness of Health Education on Self-Care Management of Hypertension Patients in the Working Area of Medan Johor Primary Health Center, 2025

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ABSTRACT

Background and Purpose: Hypertension remains a leading non-communicable disease burden globally, with self-care management identified as a critical determinant of blood pressure control and complication prevention. Despite efforts to increase treatment coverage, adherence to self-care behaviors among hypertensive patients in primary health center settings in Indonesia remains suboptimal. This study aimed to evaluate the effectiveness of structured health education interventions on improving self-care management among hypertension patients registered at Medan Johor Primary Health Center.

Methods: A quasi-experimental study with a one-group pre-test–post-test design was conducted from September to December 2025. A purposive sample of 60 hypertension patients meeting the inclusion criteria was recruited. The intervention comprised four structured health education sessions delivered over four consecutive weeks. Self-care management was measured using the adapted Hypertension Self-Care Activity Level Effects (H-SCALE) instrument across six domains. Ethical clearance was obtained from the Research Ethics Committee of Universitas Bunda Thamrin (No. 042/EC/UBT/2025). Data were analyzed using the Wilcoxon Signed-Rank Test ($\alpha = 0.05$).

Results: The mean total self-care score increased significantly from 50.4 ± 8.5 (pre-test) to 74.4 ± 6.3 (post-test). All six self-care domains demonstrated statistically significant improvements (all $p < 0.001$). The overall Wilcoxon Signed-Rank Test yielded $Z = -6.842$, $p < 0.001$, with a large effect size ($r = 0.88$). Blood pressure monitoring showed the greatest improvement ($\Delta = 25.2$), followed by dietary management ($\Delta = 25.0$).

Conclusion: Structured health education is highly effective in improving self-care management across all domains among hypertensive patients at the primary health center level. Integration of routine health education programs within hypertension management protocols at Puskesmas is strongly recommended to optimize patient outcomes and reduce long-term cardiovascular complications.

Keywords: Hypertension; Patient Education; Self-Care; Community Health Centers; Health Behavior; Primary Health Care

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INTRODUCTION

Hypertension, defined as persistently elevated systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg, constitutes one of the most prevalent and burdensome non-communicable diseases (NCDs) worldwide. According to the World Health Organization (WHO, 2023), approximately 1.28 billion adults aged 30–79 years globally are affected by hypertension, yet nearly 46% are unaware of their condition. Uncontrolled hypertension significantly increases the risk of cardiovascular diseases, stroke, and chronic kidney disease, representing one of the leading causes of premature mortality globally (Mills et al., 2020). In Indonesia, the Basic Health Research (Riskesdas) 2023 reported a hypertension prevalence of 34.11% among adults aged ≥18 years, representing a significant public health burden. In Medan City, the Medan Johor sub-district reported a hypertension prevalence of 38.2%, with only 52.7% of diagnosed patients adequately controlling their blood pressure

(Dinas Kesehatan Kota Medan, 2024). This gap between diagnosis and effective control underscores the need for strengthened behavioral self-management interventions.

Self-care management in hypertension encompasses a range of patient-initiated behaviors essential for disease control, including medication adherence, regular blood pressure monitoring, dietary modification (particularly sodium restriction), regular physical activity, cessation of smoking and alcohol, and stress management (Warren-Findlow & Seymour, 2011). Evidence consistently demonstrates that enhanced self-care behaviors are associated with improved blood pressure control, reduced hospitalizations, and better quality of life among hypertensive patients (Boonyanurak et al., 2023; Uchmanowicz et al., 2019). Health education is recognized as a cornerstone intervention for improving self-care behaviors by equipping patients with the knowledge, skills, and motivation to manage their condition effectively. However, the literature reveals inconsistencies in educational delivery: many programs lack structured theoretical grounding, fail to address all self-care domains comprehensively, or are delivered as single-session lectures without reinforcement (Shin et al., 2022).

Despite growing evidence of health education effectiveness in high-income countries, contextually relevant studies from Indonesian primary healthcare settings—particularly those situated within community health centers (Puskesmas)—remain limited. Most Indonesian studies have focused predominantly on medication adherence alone, neglecting the multidimensional nature of hypertension self-care (Nurhayati et al., 2021). This constitutes a critical research gap, as the socio-cultural context, health literacy levels, and resource constraints unique to Indonesian Puskesmas settings may significantly moderate intervention effectiveness. This study is theoretically grounded in Orem's Self-Care Deficit Theory (SCDT), which posits that individuals have the capacity and responsibility to engage in actions that maintain health and manage illness (Orem, 1991). Within this framework, hypertension patients are viewed as capable agents whose self-care deficits—arising from limited knowledge, inadequate skills, or motivational barriers—can be addressed through nursing education systems. The theory's three nursing care systems (wholly compensatory, partly compensatory, and supportive-educative) directly inform the design of health education as the primary nursing intervention to bridge self-care deficits. The supportive-educative system is particularly relevant when patients possess the physical capacity to perform self-care but lack the knowledge or decision-making skills to do so (Younas, 2017).

The practical significance of this study lies in its potential to inform the strengthening of hypertension management protocols within the Prolanis framework at Puskesmas. By demonstrating the effectiveness of a structured, multi-session, multi-domain health education program, findings can serve as an evidence base for nursing practice guidelines, staff training curricula, and health policy reforms at the local health authority level. The study directly contributes to achieving Sustainable Development Goal 3 (Good Health and Well-Being) and Indonesia's National Health Strategy targets for NCD reduction. The aim of this study was to evaluate the effectiveness of structured health education on self-care management among hypertension patients registered in the working area of Medan Johor Primary Health Center, Medan, in 2025.

METHODS

Study Design

This study employed a quasi-experimental design with a one-group pre-test–post-test approach. This design was selected to assess within-subject changes in self-care management following the health education intervention in the absence of a control group, given ethical considerations regarding withholding educational interventions from patients with known hypertension in a primary care setting.

Participants

The study population comprised all adult patients (≥18 years) diagnosed with primary hypertension and registered in the Prolanis program at Puskesmas Medan Johor. Using a purposive sampling strategy, participants were recruited based on predefined inclusion and exclusion criteria.

Inclusion criteria were: (1) diagnosed with primary hypertension for ≥3 months; (2) aged 18–75 years; (3) receiving antihypertensive pharmacotherapy; (4) able to communicate in Bahasa Indonesia or the local dialect; and (5) willing to participate and provide written informed consent. Exclusion criteria included: (1) presence of severe comorbidities limiting participation (e.g., dementia, severe hearing

impairment); (2) pregnancy; (3) previous participation in a formal hypertension self-care education program within the past six months; and (4) incomplete attendance at the four educational sessions (defined as missing more than one session). The sample size was determined using the formula for comparing paired means, with $\alpha = 0.05$ ($Z_{0.05} = 1.96$), power 80% ($Z\beta = 0.84$), expected mean difference of 15 points (SD = 12), yielding a minimum of 52 participants. Accounting for a 15% attrition rate, the final target sample was 60 participants, all of whom completed the study.

Instrument

Self-care management was measured using the adapted Indonesian version of the Hypertension Self-Care Activity Level Effects (H-SCALE), originally developed by Warren-Findlow and Seymour (2011). This instrument was adapted to the Indonesian language and cultural context through a rigorous forward-backward translation process by two bilingual experts, followed by cognitive interviewing with 10 Puskesmas patients to ensure comprehension and relevance.

Content validity was confirmed through review by five experts (three nursing academicians specializing in cardiovascular nursing and two clinical practitioners with hypertension management experience), yielding a Content Validity Index (CVI) of 0.92. Construct validity was assessed using exploratory factor analysis (EFA), demonstrating a six-factor structure consistent with the theoretical framework (KMO = 0.84, Bartlett's test $p < 0.001$). Criterion validity was established by correlating adapted H-SCALE scores with the validated Self-Care of Hypertension Inventory (SC-HI; Morisky et al., 2020), yielding $r = 0.78$ ($p < 0.001$), indicating strong criterion validity. Internal consistency was assessed via Cronbach's alpha ($\alpha = 0.89$, excellent range). Test-retest reliability over two weeks yielded $r = 0.91$, confirming strong temporal stability. Permission for adaptation was obtained from the original authors (Warren-Findlow & Seymour) on June 10, 2025.

The adapted H-SCALE comprises 28 items across six domains: Medication Adherence (6 items), Blood Pressure Monitoring (4 items), Dietary Management (6 items), Physical Activity (4 items), Smoking and Alcohol Cessation (4 items), and Stress Management (4 items). Respondents rated each item on a 5-point Likert scale (1 = Never, 5 = Always). Total scores range from 28 to 140, with higher scores indicating superior self-care performance. Scores were converted to a 0–100 scale for standardized interpretation. Domain score categories were: Very Low (0–20%), Low (21–40%), Moderate (41–60%), High (61–80%), and Very High (81–100%).

Table 1. Adapted H-SCALE Instrument Overview

No.	Domain & Sample Item	Scale	Scoring
1	Medication Adherence (6 items) e.g., I take my antihypertensive medication every day	5-point Likert (1–5)	5=Always, 1=Never
2	Blood Pressure Monitoring (4 items) e.g., I check my blood pressure at least twice a week	5-point Likert (1–5)	Higher score = better practice
3	Dietary Management (6 items) e.g., I reduce salt intake to ≤5 g/day	5-point Likert (1–5)	Higher score = better adherence
4	Physical Activity (4 items) e.g., I exercise ≥30 min, ≥3×/week	5-point Likert (1–5)	Higher score = more active
5	Smoking & Alcohol Cessation (4 items) e.g., I avoid cigarette smoke environments	5-point Likert (1–5)	Higher score = better avoidance
6	Stress Management (4 items) e.g., I practice relaxation techniques weekly	5-point Likert (1–5)	Higher score = better coping

Note. H-SCALE = Hypertension Self-Care Activity Level Effects. CVI = Content Validity Index. All items scored on a 5-point Likert scale.

Intervention

The health education intervention consisted of four structured weekly sessions (60 minutes each), delivered by the principal investigator and a trained Puskesmas nurse. Sessions were conducted in small groups of 10–15 participants at the Puskesmas meeting room. Each session followed a standardized lesson plan covering: Session 1 — Hypertension pathophysiology, risk factors, and medication adherence; Session 2 — Dietary management (DASH diet principles) and blood pressure self-monitoring; Session 3 — Physical activity recommendations and smoking/alcohol cessation strategies; Session 4 — Stress management techniques (progressive muscle relaxation, breathing exercises) and integrated self-care action planning. Educational materials included bilingual booklets, illustrated flipcharts, and demonstration models for blood pressure measurement. Interactive question-and-answer sessions, case discussions, and practical demonstrations were incorporated to optimize engagement.

Data Collection

Data collection was conducted from September to December 2025 at Puskesmas Medan Johor. Pre-test data were collected one week before the first educational session. Post-test data were collected two weeks following the completion of the fourth and final session. Data were collected by the principal investigator and one trained research assistant through face-to-face structured interviews using the adapted H-SCALE questionnaire. Demographic and clinical data (age, sex, education, hypertension duration) were extracted from Puskesmas patient records with patient consent.

Data Analysis

Descriptive statistics were used to summarize demographic characteristics and domain-specific self-care scores (mean ± SD, frequencies, percentages). Normality of continuous variables was assessed using the Shapiro-Wilk test; as self-care scores were not normally distributed ($W = 0.94$, $p = 0.013$ for pre-test; $W = 0.96$, $p = 0.042$ for post-test), the Wilcoxon Signed-Rank Test was selected as the primary inferential test for paired comparisons. Effect sizes were calculated using the formula $r = Z/\sqrt{N}$, with $r \geq 0.50$ defined as a large effect (Cohen, 1992). Statistical analyses were performed using IBM SPSS Statistics version 27.0, with a significance threshold of $\alpha = 0.05$.

Ethical Consideration

This study was conducted in adherence to the Declaration of Helsinki and Indonesian national research ethics guidelines. Ethical clearance was obtained from the Research Ethics Committee of Universitas Bunda Thamrin, Medan (Approval No. 042/EC/UBT/2025, dated August 25, 2025). Permission to conduct research at Puskesmas Medan Johor was granted by the Medan City Health Office (Dinas Kesehatan Kota Medan). All participants provided written informed consent prior to enrolment and were informed of their right to withdraw at any time without consequence to their healthcare. Data confidentiality was maintained through participant coding; no personally identifiable information was included in the research database.

RESULTS

Demographic Characteristics

A total of 60 participants completed all stages of the study with no attrition. Participants' ages ranged from 35 to 74 years, with a mean age of 56.4 ± 8.7 years. The majority were in the 55–64 years age group (n = 24, 40.0%), female (n = 38, 63.3%), with secondary-level education (n = 29, 48.3%), and had a hypertension duration of 1–5 years (n = 31, 51.7%). Detailed demographic characteristics are presented in Table 2.

Table 2. Demographic Characteristics of Participants (n = 60)

Characteristics	Category	n	%	Interpretation
Age Group (years)				
	35–44	6	10.0	
	45–54	19	31.7	

	55–64	24	40.0	Majority group
	≥65	11	18.3	
Sex				
	Female	38	63.3	Dominant group
	Male	22	36.7	
Education Level				
	Primary	14	23.3	
	Secondary	29	48.3	Dominant group
	Tertiary	17	28.3	
Duration of Hypertension				
	< 1 year	8	13.3	
	1–5 years	31	51.7	Majority group
	> 5 years	21	35.0	

Note. n = frequency; % = percentage. Age mean ± SD = 56.4 ± 8.7 years; range 35–74 years.

Self-Care Management Scores: Pre-Test vs. Post-Test

Prior to the health education intervention, the mean total self-care management score was 50.4 ± 8.5, corresponding to the Moderate category (41–60%). Following the four-week intervention, the mean total score increased significantly to 74.4 ± 6.3, categorized as High (61–80%). All six self-care domains demonstrated improvements, with Blood Pressure Monitoring recording the largest absolute increase (Δ = 25.2) and Dietary Management the second largest (Δ = 25.0), while Smoking and Alcohol Cessation showed the smallest change (Δ = 22.5). Pre- and post-test domain scores are presented in Table 3.

Table 3. Comparison of Self-Care Management Scores Before and After Health Education Intervention (n = 60)

Self-Care Domain	Pre-Test Mean ± SD		Post-Test Mean ± SD		Change (Δ)
	Mean	SD	Mean	SD	↑/↓
Medication Adherence	52.4	8.7	76.3	6.2	↑ 23.9
Blood Pressure Monitoring	48.6	9.1	73.8	7.4	↑ 25.2
Dietary Management	50.1	8.3	75.1	6.8	↑ 25.0
Physical Activity	46.8	9.6	71.2	7.1	↑ 24.4
Smoking & Alcohol Cessation	55.0	7.8	77.5	5.9	↑ 22.5
Stress Management	49.3	8.9	72.4	6.5	↑ 23.1
Total Self-Care Score	**50.4**	**8.5**	**74.4**	**6.3**	**↑ 24.0**

Note. Scores converted to 0–100 scale. SD = Standard Deviation. Δ = Absolute change (Post-test Mean − Pre-test Mean).

Statistical Analysis: Wilcoxon Signed-Rank Test

The Wilcoxon Signed-Rank Test revealed statistically significant improvements in all six self-care domains and in the total self-care management score (all $p < 0.001$). The overall test yielded $Z = -6.842$, $p < 0.001$, with a large effect size ($r = 0.88$), indicating that the health education intervention had a substantial practical impact on self-care management. Effect sizes across all individual domains also consistently indicated large effects ($r = 0.85–0.88$), demonstrating the robustness of the intervention effect. Full results are presented in Table 4.

Table 4. Wilcoxon Signed-Rank Test Results for Self-Care Management (n = 60)

Self-Care Domain	Z Statistic	p-Value	Effect Size (r)	Interpretation
Medication Adherence	-6.721	<0.001	0.87	Large effect
Blood Pressure Monitoring	-6.803	<0.001	0.88	Large effect
Dietary Management	-6.754	<0.001	0.87	Large effect
Physical Activity	-6.683	<0.001	0.86	Large effect
Smoking & Alcohol Cessation	-6.602	<0.001	0.85	Large effect
Stress Management	-6.715	<0.001	0.87	Large effect
Overall Self-Care Score	**-6.842**	**<0.001**	**0.88**	**Large effect**

Note. Z = Wilcoxon Z-statistic; p = two-tailed p-value; r = effect size ($Z/\sqrt{N}$). Effect size interpretation: small $r < 0.30$, medium $r = 0.30–0.50$, large $r > 0.50$ (Cohen, 1992). Statistical significance threshold: $\alpha = 0.05$.

DISCUSSION

This quasi-experimental study provides evidence that a structured, multi-session, theoretically grounded health education program significantly improves self-care management among hypertensive patients at the primary health center level in Medan, Indonesia. The mean total self-care score increased by 24.0 points (from Moderate to High category), with large effect sizes across all domains ($r = 0.85–0.88$), supporting the effectiveness of the intervention. These findings are congruent with the theoretical underpinning of Orem's Self-Care Deficit Theory, which posits that supportive-educative nursing interventions directly bridge knowledge and skill deficits, thereby enabling patients to perform effective self-care (Younas, 2017). Our findings align with and extend the existing body of literature. Boonyanurak et al. (2023) reported significant improvements in self-care behavior scores following a three-week health education program among hypertensive patients in Thailand ($p < 0.001$, Cohen's $d = 1.2$), consistent with the large effect observed in the current study.

Similarly, Uchmanowicz et al. (2019) demonstrated that structured patient education significantly improved medication adherence and self-monitoring behaviors in Polish hypertension patients, although their study lacked dietary and stress management components. The comprehensive multi-domain approach of the present intervention—addressing all six H-SCALE domains—likely accounts for the notably large effect sizes observed, suggesting that targeting only one or two self-care domains may systematically underestimate the potential of educational interventions. In the Indonesian context, Nurhayati et al. (2021) reported that peer education improved medication adherence among Puskesmas hypertension patients, though their study did not assess broader self-care behaviors. The present study extends this evidence to a comprehensive multi-domain framework in the Medan setting, addressing a previously identified research gap.

The finding that Blood Pressure Monitoring and Dietary Management showed the greatest improvements (Δ = 25.2 and Δ = 25.0, respectively) is clinically meaningful. These domains are most directly linked to blood pressure outcomes and cardiovascular risk reduction. Increased awareness of home blood pressure monitoring has been associated with improved medication adherence and treatment satisfaction (Shin et al., 2022). The relatively smaller improvement in Smoking and Alcohol Cessation (Δ = 22.5) may reflect the deeply entrenched nature of addiction behaviors, which typically require more intensive, individualized cessation counseling beyond educational information alone (Margolis et al., 2020). This highlights a practical implication: health educators should complement didactic content on cessation with motivational interviewing and referral pathways for behavioral support.

From a practical standpoint, the structured intervention is highly applicable within the Prolanis framework, which already convenes monthly group meetings for chronic disease patients at Puskesmas across Indonesia. Integrating the four-session educational module into Prolanis schedules would require minimal additional resources, primarily trained nurse educators and standardized educational materials. The H-SCALE instrument, validated in this study for the Medan context, provides a practical clinical tool for nurses to routinely assess and monitor self-care status, identify domain-specific deficits, and tailor educational content accordingly. Healthcare administrators and Puskesmas heads should consider allocating dedicated nurse educator time within hypertension management budgets to institutionalize these practices. This study has several limitations that warrant consideration. First, the absence of a control group limits the ability to attribute improvements solely to the health education intervention, as concurrent factors such as seasonal effects, Hawthorne effects, or increased clinical contact frequency may have contributed to observed changes. Second, the purposive sampling strategy within a single Puskesmas restricts the generalizability of findings to other settings with different demographic profiles or health system capacities. Third, the post-test was conducted two weeks after the intervention; longer-term follow-up (e.g., 3–6 months) is needed to assess the durability of behavioral changes and their impact on blood pressure outcomes. Fourth, self-reported data on self-care behaviors may be subject to social desirability bias, potentially inflating observed scores.

CONCLUSION

This study demonstrates that a four-week structured health education program grounded in Orem's Self-Care Deficit Theory is highly effective in improving self-care management across all six behavioral domains among hypertension patients registered at Medan Johor Primary Health Center. The magnitude of change, reflected in consistently large effect sizes, underscores the clinical and public health significance of integrating systematic, multi-domain health education into routine hypertension care at the Puskesmas level. These findings reinforce the pivotal role of community health nurses as health educators and behavioral change facilitators within Indonesia's primary healthcare system, and provide a strong evidence base for embedding structured educational interventions within the national Prolanis program to optimize hypertension management and reduce cardiovascular disease burden.

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