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Effectiveness of the PATUH EDucational Modul on Motivation, Attitude, and Behavior among Hypersensitive Patients: A- Quasi-Experimental Study

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ABSTRACT

Background: Hypertension remains a leading global health concern, often resulting in hypertensive crises when preventive self-care behaviors are inadequate. Patient motivation and adherence to prevention programs play crucial roles in mitigating these risks. The PATUH program, a culturally tailored educational intervention, aims to enhance motivation, attitude, and behavior among hypertensive patients. **Object:** This study aimed to examine the effect of the PATUH educational module on improving motivation, attitude, and self-care behavior, among patients with hypertension in preventing hypertensive crises. **Method:** A quasi-experimental design with a control group at Pucang Sewu and Tambak Rejo Primary Health Centers, Surabaya, Indonesia. Sixty hypertensive patients were selected using purposive sampling, divided into an intervention group (n = 30) and a control group (n = 30). The intervention group received the PATUH educational module, while the control group received standard health education. Data were collected using validated questionnaires and analyzed using paired t-tests and independent t-tests; non-parametric tests (Wilcoxon and Mann–Whitney) were used when data were not normally distributed. **Results:** The intervention group showed significant improvements in motivation, attitude, and self-care behavior scores compared with the control group ($p < 0.05$). The findings indicate that the PATUH module effectively enhances patient engagement and preventive actions toward hypertensive crisis prevention. **Conclusion:** The PATUH educational module effectively increases motivation, attitude, and preventive behavior among hypertensive patients. Integrating this intervention into primary health care settings can strengthen hypertension management and reduce the risk of hypertensive crises. Further longitudinal studies are recommended to assess the module's long-term impact.

Keywords: Hypertension, Motivation, PATUH Education Module, Hypertensive Crisis, Attitude, Behavior

BACKGROUND

Hypertension is a chronic condition affecting over 1.28 billion adults globally and remains a major contributor to cardiovascular morbidity and mortality World Health Organization (2025) estimates that over 1.28 billion adults aged 30–79 years live with hypertension, with nearly two-thirds residing in low- and middle-income countries (LMICs). Despite advances in pharmacological therapy and public health efforts, hypertension awareness, treatment adherence, and control rates remain suboptimal, particularly in Southeast Asia (Zhou et al., 2021). Uncontrolled hypertension often leads to hypertensive crises, characterized by a sudden and severe increase in blood pressure that can result in target organ damage, including the brain, heart, and kidneys (Hall et al.,

2021). In Indonesia, the prevalence of hypertension continues to rise. The Riset Kesehatan Dasar (Basic Health Research, 2018) reported that 34.1% of Indonesian adults aged ≥18 years have hypertension, with East Java recording a slightly higher prevalence of 36.3%. Alarmingly, many hypertensive patients remain undiagnosed or fail to adhere to lifestyle modifications and medication regimens, primarily due to low motivation and limited understanding of the disease (Kemenkes RI, 2022). Some more recent national-level analyses indicate that only a minority of hypertensive individuals are diagnosed, treated, or controlled: one report estimates that Indonesia diagnoses about 29.6% of its hypertensive population, treats 23.4%, and achieves control in just 4.4% (Jubayer et al., 2024). Uncontrolled hypertension may precipitate hypertensive crisis, a medical emergency characterized by an acute surge in blood pressure accompanied by symptoms such as blurred vision, confusion, weakness, dyspnea, or chest pain. Without prompt and adequate management, hypertensive crises can lead to target organ damage in the heart, brain, and kidneys, and even death (your original description). Preventing hypertensive crisis in individuals with chronic hypertension is therefore critical. One modifiable factor in preventing crisis is patient motivation for self-management. Motivation is conceptualized as an internal drive—conscious or subconscious—that prompts an individual to act toward specific goals. It comprises directional, sustaining, and regulatory components (i.e. initiating behavior, maintaining it over time, and withstanding environmental influences). Previous research suggests that around 44.4% of hypertensive patients exhibit low motivation toward self-treatment regimens. Other studies have linked higher motivation levels with better self-care behaviors in hypertension, including adherence to medications, regular blood pressure monitoring, low-sodium diet, physical activity, smoking cessation, and limited alcohol intake (Hani et al., 2024). Given the public health importance of controlled hypertension and prevention of crises, governments have introduced multi-component strategies. In Indonesia, the "PATUH" movement (an acronym for Periksa rutin or routine check-ups, Atasi penyakit dengan pengobatan tepat or Treat disease with the right medication, Tetap diet seimbang or Maintain a balanced diet, Upayakan aktivitas fisik or Make an effort to engage in physical activity, Hindari asap rokok & alcohol or Avoid cigarette smoke & alcohol) is one such national-level initiative. In a preliminary investigation, among the five PATUH components only three (routine check-ups, balanced diet, safe physical activity) were found to significantly influence motivation among hypertensive patients. Based on that finding, a module delineating those three components was developed to enhance motivation in preventing hypertensive crisis. However, to date, empirical evidence remains limited on whether such a modular intervention can effectively improve motivation and, by extension, self-care behaviors and clinical outcomes in hypertensive individuals. Moreover, there is a lack of up-to-date interventional studies in Indonesia addressing motivational enhancement targeted at crisis prevention specifically. In addition, many existing self-care and behavioral-change frameworks (e.g. Protection Motivation Theory, Theory of Planned Behavior) have been examined in relation to adherence and hypertension control (Karimi et al., 2024), but seldom in the context of crisis prevention or with modules derived from national health initiatives like PATUH. Therefore, this study aims to evaluate the effect of the tailored module (focusing on three PATUH components: routine check-ups, balanced diet, and safe physical activity) on enhancing motivation among hypertensive patients to prevent hypertensive crisis. Our hypothesis is that

patients exposed to the module will show significantly greater improvement in motivational scores compared to controls, which could ultimately lead to better self-management and fewer crisis events.

RESEARCH METHODS

Description of Materials of Research Subject

The research subjects of this study were adult patients diagnosed with primary hypertension who were registered at community health centers (Puskesmas) in East Java, Indonesia. Participants were recruited using purposive sampling based on inclusion and exclusion criteria. The main research material in this study was a Motivational Module designed to enhance the motivation of hypertensive patients in preventing hypertensive crises. The module was developed based on findings from previous exploratory research that identified three components of the Indonesian national "PATUH" movement significantly influencing motivation: Routine Health Check-ups, Balanced Diet, Safe Physical Activity. The module is in the form of a printed book that explains hypertension, the risks of a hypertensive crisis, and the prevention of a hypertensive crisis through the PATUH approach.

Research Design

The research design is a quasi-experimental design with a pre-test-post-test control group design involving two groups of subjects, namely the group that receives treatment (experimental group) and the other group that does not receive treatment (control group) (Sugiyono et al., 2022). The design was chosen to evaluate the causal effect of the PATUH educational module on motivation, attitude, behavior, and family support among hypertensive patients. Two groups were compared: an intervention group that received the PATUH module and a control group that received standard care. Measurements were taken before and after the intervention to assess within- and between-group differences.

Research Procedure

This quasi-experimental study was conducted from July to August 2025 at two primary health care centers, Puskesmas Pucang Sewu and Puskesmas Tambak Rejo, Surabaya, Indonesia. The study involved 60 patients diagnosed with hypertension who met the inclusion criteria and were willing to participate. Participants were divided equally into two groups: 30 participants in the intervention group and 30 participants in the control group.The research procedure began with obtaining ethical approval from the institutional review board and official permission from the local health authority. Potential participants were identified from the hypertension patient registry at both health centers. After eligibility screening, informed consent was obtained from each participant prior to data collection.

Instruments and Equipment

Several standardized instruments were used to collect data:

1. Motivation Scale for Hypertensive Patients, adapted from previous research and validated for this study (Likert-type 1–5 scale). The scale measures three domains—initiation, direction, and maintenance of behavior—consistent with motivational theory (Karimi et al., 2024).
2. Hypertension Self-Care Activity Level Effects (H-SCALE) questionnaire to measure adherence to medication, diet, and exercise (Kirat et al., 2024).

Demographic form covering age, gender, education, and duration of hypertension.

Data Collection Methods

Data collection was conducted through interviews using a questionnaire that had undergone validity and reliability tests. In the experimental group,

evaluations were carried out twice with a one-week interval. In the first week, in addition to evaluating changes in attitude, the module was reinforced so that respondents remained consistent with the treatment provided. Subsequently, in the second week, evaluations were conducted on the motivation, attitude, and actions of hypertensive patients in preventing hypertensive crises.

Data Analysis

Data analysis in testing the effect of using modules about the PATUH program on increasing motivation, attitude, and actions of hypertensive patients in preventing hypertensive crises using *Independent T-test* and *Paired T-test* statistics; if the data distribution is not normal, the *Mann-Whitney* and *Wilcoxon tests* are used.

Research Ethics

This study was approved by the Health Research Ethics Committee of Surabaya Health Polytechnic (No EA/3850/KEPK-Poltekkes_Sby/V/2025). All participants received detailed information regarding study procedures and provided written informed consent prior to participation

RESULT AND DISCUSSION

Characteristics of Respondents and Homogenity Test

The respondents in this study were hypertension patients who visited Pucang Sewu Health Center and Tambak Rejo Health Center in July - August 2025. The total number of respondents was 60, consisting of an intervention group and a control group, each with 30 respondents. The characteristics of the respondents included gender, age, education, and duration of suffering from hypertension. The following is an overview of the respondents' characteristics and the results of the equality test based on the intervention and control groups:

Table 1.

Characteristics of hypertensive patients at Pucang Sewu and Tambak Rejo Health Centers in July - August 2025 (n=60) and Equality Test of Intervention and Control Groups

Characteristics		Group		Equality value
		Intervention (n=30)	Control (n=30)	
Gender				
	Male	12 (40.0%)	10 (33,3%)	0,789
	Female	18 (60,0%)	20 (66,7%)	
Age				
	30-40 years	1 (3,3%)	1 (3,3%)	
	41-50 years	6 (20,0%)	5 (16,7%)	0,553
	51-60 years	6 (20,0%)	11 (36,7%)	
	>60 years	17 (56,7%)	13 (43,3%)	
Education				
	Elementary School	8 (26,7%)	2 (6,7%)	

Characteristics		Group		Equality value
		Intervention (n=30)	Control (n=30)	
	Middle School	3 (10,0%)	6 (20,0%)	0,012
	High School	15 (50,0%)	9 (30,0%)	
	University	4 (13,3%)	13 (43,3%)	
Long suffering from hypertension				
	<2 years	5 (16,7%)	10 (33,3%)	
	2-5 years	8 (26,7%)	6 (20,0%)	0,326
	>5 years	17 (56,6%)	14 (46,7%)	

* Considered equivalent if the p/sig value >0.05

Table 1 shows the distribution of hypertensive patients according to gender, age, education level, and duration of hypertension in both the intervention and control groups.

Gender

In the intervention group, there were 12 male patients (40.0%) and 18 female patients (60.0%), while in the control group there were 10 males (33.3%) and 20 females (66.7%). The homogeneity test yielded a p-value of 0.789 (> 0.05), indicating no significant difference between groups by gender. Thus, both groups were comparable in terms of gender distribution.

Age

In the intervention group, most respondents were older than 60 years (56.7%), followed by those aged 41–50 years (20.0%) and 51–60 years (20.0%), with only 1 respondent (3.3%) aged 30–40 years. Similarly, in the control group, most participants were also above 60 years (43.3%), followed by 51–60 years (36.7%), 41–50 years (16.7%), and 30–40 years (3.3%). The p-value was 0.553 (> 0.05), suggesting no significant difference between the two groups in age distribution. Educational Level. In the intervention group, 50.0% of respondents had completed senior high school, followed by 26.7% with primary school, 13.3% with college education, and 10.0% with junior high school.

In contrast, in the control group, 43.3% of respondents had college education, followed by 30.0% with senior high school, 20.0% with junior high school, and 6.7% with primary school. The homogeneity test yielded a p-value of 0.012 (< 0.05), indicating a significant difference in education level between the two groups. This means the groups were not equivalent in educational attainment. Duration of Hypertension. In the intervention group, most participants (56.7%) had suffered from hypertension for more than five years, 26.7% had hypertension for 2–5 years, and 16.7% for less than two years. Similarly, in the control group, 46.7% had hypertension for more than five years, 33.3% for less than two years, and 20.0% for 2–5 years. The p-value was 0.326 (> 0.05), showing no significant difference in duration of hypertension between the two groups.

Overall, the findings indicate that the intervention and control groups were homogeneous in terms of gender, age, and duration of hypertension, but differed significantly in education level. This difference in educational background should be considered in interpreting

subsequent analyses, as education may influence patients' motivation, attitudes, and health behaviors.

Effect of the PATUH Module on Motivation in Preventing Hypertensive Crisis

Table 2.

Test results on the effect of using modules on increasing the motivation of hypertension patients in preventing hypertensive crises

Variable	Group	Pre test	Post test	Delta	*p-value*
		Mean±SD	**Mean±SD**	**Mean±SD**	
Motivation	Intervention	44,40±2,920	49,73±2,363	5,33±4,147	0,000
	Control	44,77±3,059	44,77±3,491	0,00±1,259	1,000
	p-value	0,782	0,000	0.000	

*Considered significantly different if the p/sig value < 0.05

A p-value < 0.05 indicates a statistically significant difference. The pre-test comparison showed no significant difference in motivation between the intervention and control groups (p = 0.782 > 0.05). However, after implementation of the PATUH module, a significant difference emerged (p = 0.000 < 0.05), with the intervention group achieving a higher mean motivation score (49.73 ± 2.363) than the control group (44.77 ± 3.491).

Within-group analysis revealed a significant increase in motivation among participants exposed to the module (Δ = 5.33, p = 0.000), while no change occurred in the control group (Δ = 0.00, p = 1.000). These results indicate that the PATUH module effectively improved patient motivation to prevent hypertensive crisis

Effect of the PATUH Module on Attitude Toward in Preventing Hypertensive Crisis

Table 3.

Test results on the effect of using modules on improving the attitudes of hypertension patients in preventing hypertensive crises

Variables & Dimensions	Group	Pre test	Post test	Delta	*p-value*
		Mean±SD	**Mean±SD**	**Mean±SD**	
Attitude	Intervention	43,70±3,140	49,70±4,036	5,79±5,027	0,000
	Control	43,47±2,921	43,80±2,355	0,33±1,729	0,358
	p-value	0,735	0,000	0,000	
Regular Health Checkups	Intervention	15,03±1,586	16,77±1,612	1,73±2,149	0,000
	Control	14,73±1,461	14,73±1,413	0,00±0,910	0,819

Variables & Dimensions	Group	Pre test	Post test	Delta	*p-value*
		Mean±SD	**Mean±SD**	**Mean±SD**	
	p-value	0,371	0,000	0,000	
Balanced Diet	Intervetion	14,33±1,422	16,33±1,583	2,00±1,682	0,000
	Control	14,67±1,184	14,73±1,172	0,07±o,691	0,593
	p- value	0,153	0,000	0,000	
Safe Physical Activity	Intervention	14,37±1,629	16,60±1,567	2,23±1,924	0,000
	Control	14,07±1,143	13,33±1,295	0,27±1,015	0,176
	p-value	0,310	0,000	0,000	

*Considered significantly different if the p/sig value < 0.05

All p-values < 0.05 are considered statistically significant. Before the intervention, there were no significant differences between the two groups across all attitude dimensions (p > 0.05). After the module intervention, significant differences were observed in overall attitude and each of its dimensions (p = 0.000). The intervention group showed a substantial increase in mean attitude scores (from 43.70 ± 3.140 to 49.70 ± 4.036), while the control group showed no meaningful change. Dimensionally, the largest improvements occurred in safe physical activity (Δ = 2.23) and balanced diet (Δ = 2.00). Overall, the PATUH module effectively enhanced positive attitudes toward hypertension self-management and crisis prevention.

Effect of the PATUH Module on PATUH Actions in Preventing Hypertensive Crisis

Table 4.

Test results on the effect of using modules on improving the PATUH Actions of hypertension patients in preventing hypertensive crises

Variables & Dimensions	Group	Pre test	Post test	Delta	*p-value*
		Mean±SD	**Mean±SD**	**Mean±SD**	
PATUH Actions	Intervention	37,13±5,158	51,00±3,151	13,87±5,077	0,000
	Control	36,53±5,355	36,60±5,392	0,07±1,363	0,791
	p-value	0,660	0,000	0,000	
Regular Health Checkups	Intervention	12,17±2,705	16,20±1,669	4,03±2,266	0,000
	Control	11,97±2,428	12,03±2,526	0,07±0,785	0,645

Variables & Dimensions	Group	Pre test	Post test	Delta	*p-value*
		Mean±SD	**Mean±SD**	**Mean±SD**	
	p-value	0,764	0,000	0,000	
Balanced Diet	Intervention	13,47±2,980	17,50±1,815	4,03±2,735	0,000
	Control	13,50±2,583	13,50±2,726	0,00±0,643	1,000
	p-value	0,963	0,000	0,000	
Safe Physical Activity	Intervention	11,50±2,162	17,30±1,208	5,80±2,552	0,000
	Control	11,07±2,766	11,07±2,803	0,00±1,017	1,000
	p-value	0,502	0,000	0,000	

*Considered significantly different if the p/sig value < 0.05

Prior to the intervention, no significant difference existed between groups across all PATUH behavioral components ($p > 0.05$). Post-test results revealed highly significant improvements in the intervention group for all components ($p = 0.000$). The mean total PATUH action score increased by 13.87 points, with the largest gain in safe physical activity ($\Delta = 5.80$). Conversely, the control group exhibited no meaningful changes. These findings demonstrate that the PATUH module substantially improved participants' preventive behaviors in managing hypertension and avoiding crisis episodes.

Discussion

Respondent Characteristics

Descriptively, the results of this study show that the majority of hypertension patients are female, over 60 years old, and have had hypertension for more than 5 years. Half of the hypertension patients have a high school education. However, based on the equivalence test results of the intervention and control groups by gender, age, and duration of hypertension, the groups were found to be equivalent (homogeneous), whereas there was a significant difference between the two groups based on educational level. Based on gender, the results of this study are not much different from other studies which show that the number of female hypertension patients is higher than that of males. In contrast, regarding age, the results of this study differ, where the research conducted by Hailu D, et al., showed that the age group of hypertension patients was dominated by the 41-59 years age group.

Similarly, the education level differs from this study, where based on education level, hypertension patients were dominated by those who are illiterate (Hailu et al., 2025). Based on the duration of suffering from hypertension, this study was dominated by hypertensive patients who had been suffering from hypertension for more than 5 years. Meanwhile, another study showed similar results, where most hypertensive patients had been suffering from hypertension for more than 10 years (Sharif et al., 2025). The high number of female hypertension patients in this study is related to the age of the patients, most of whom are over 60 years old. Although it is generally stated that the prevalence of hypertension between men and women is not significantly different, in individuals over 45 years old, the prevalence of hypertension in women increases.

This is due to the decrease in estrogen, which functions to protect blood vessels from damage. Another possible reason for the high number of female hypertension patients in this study is due to women's awareness and tendency to seek care, resulting in a higher number of female hypertension patients (Jalo et al., 2025). The high prevalence of hypertension is associated with the systemic aging process that affects various organs and physiological processes, contributing to structural and functional changes in the heart, making the elderly more vulnerable to heart failure due to subclinical diastolic and systolic dysfunctions that occur with aging (Fang et al., 2025).

The effect of using modules on increasing the motivation of hypertension patients in preventing hypertensive crises

Based on the statistical test results in this study, a p-value of 0.000 (<0.05) was obtained, which means there is a significant effect on the motivation of hypertension patients after using the module. The results of this study are consistent with other research on the effect of nursing interventions on increasing awareness of hypertension patients in preventing stroke. The research results concluded that nursing interventions affect the knowledge and awareness of hypertensive patients in preventing stroke. This is evidenced by the statistically significant differences between before and after the nursing interventions in both the study group and the control group (Maksoud et al., 2025).

Similar results are also shown in research on the use of mobile health technology (mHealth) support, where the use of mHealth can improve self-management and motivate hypertensive patients in controlling their blood pressure (Maskur et al., 2024). The motivation of hypertension patients plays a very important role in preventing a hypertensive crisis. With good motivation, hypertension patients will be more enthusiastic in raising awareness and practicing a healthy lifestyle to prevent a hypertensive crisis. Research results show that high motivation will increase patient adherence to taking hypertension medication; therefore, the role of healthcare workers is very important in enhancing and maintaining the motivation of hypertension patients (Abdul et al., 2025). Following the intervention, participants in the treatment group demonstrated a substantial improvement in motivation toward hypertension crisis prevention compared to the control group. Prior to the intervention, motivation levels between both groups were statistically equivalent, indicating a comparable baseline.

After engaging with the PATUH module for two weeks, participants in the intervention group exhibited greater awareness, commitment, and enthusiasm to adopt preventive behaviors. This result highlights the effectiveness of educational interventions in fostering intrinsic motivation for disease management. The improvement in motivation aligns with findings from previous studies emphasizing that structured health education can enhance self-efficacy and readiness for behavioral change among individuals with chronic illnesses (Islam & maddison, 2021).

The effect of using modules on improving the attitudes of hypertension patients in preventing hypertensive crises

Based on the statistical test results in this study, a p-value of 0.000 (<0.05) was obtained, which means there is a significant effect on the attitude towards regular health check-ups, diet management, and efforts to engage in physical activity in hypertension patients after using the module. Similar research using digital health intervention methods shows results that are not much different,

where the use of these methods facilitates various patient health behaviors in maintaining a healthy lifestyle, including preventing hypertension crises (Duan et al., 2025). Similarly, similar research on the use of modules to prevent hypertension found that modules based on the Health Belief Model are effective in increasing adolescents' awareness and behavior in preventing hypertension (Setyarini et al., 2023).

One of the causes of hypertensive crises is that most hypertensive patients do not know or realize the importance of regular blood pressure checks, a proper diet, and physical activity. Patient awareness or attitude needs to be improved because attitude forms the basis of the behavioral formation process, including hypertensive patients in preventing hypertensive crises (Seluma et al., 2021). Consistent with Bandura's Social Cognitive Theory, the module's behavioral guidance and practical examples likely enhanced participants' perceived control and positive outcome expectations (Nabavi & Bijandi, 2024).

Similar improvements in health-promoting attitudes have been documented in prior educational interventions targeting chronic disease management (Almoslem et alm 2021). Such attitudinal shifts are essential precursors to behavioral change, demonstrating that cognitive understanding combined with motivational reinforcement can facilitate healthier choices among hypertensive patients.

The effect of using modules on improving the PATUH action of hypertension patients in preventing hypertensive crises

Based on the statistical test results in this study, a p-value of 0.000 (<0.05) was obtained, which means there is a significant effect on health check actions, regular diet, and encouraging physical activity in patients with hypertension after using the module. The results of this study are consistent with other research on the impact of nursing interventions to improve knowledge and self-care behavior regarding hypertension. The research results showed a significant increase in knowledge and behavior levels in the experimental group that received the 'EducaTHE' treatment (Sabogal & Rojas, 2025).

The same results were found in a study in China on the effect of comprehensive health management on medication adherence and healthy lifestyle behaviors of hypertensive patients, which showed that comprehensive health management interventions significantly improved medication adherence and promoted healthy lifestyle behaviors in hypertensive patients in rural China (Lu et al., 2025). Patients in the intervention group demonstrated markedly higher adherence to PATUH behaviors than those in the control group. The largest mean difference was found in the "safe physical activity" component, suggesting that the module successfully motivated patients to engage in feasible and safe exercises. This result is consistent with Tadesse et al. (2023), who emphasized that combining behavioral education with practical guidelines significantly improves adherence to physical activity and dietary recommendations among hypertensive adults.

Continuous education that emphasizes self-monitoring and simple, achievable steps can strengthen patients' commitment to sustained behavioral change (Worku, 2023). The use of modules in health education is beneficial for improving the actions of hypertensive patients in preventing hypertensive crises. Modules that explain the importance of regular health check-ups, maintaining a proper diet, and engaging in regular physical activity have been proven to increase awareness among hypertensive patients, thereby guiding them to take actions such as regular health check-ups, adhering to their diet, and engaging in

physical activity to prevent hypertensive crises. This aligns with the theory that states health education can influence an individual's psychomotor skills, thereby shaping actual activities or actions in preventing the occurrence of a hypertension crisis through regular health check-ups, proper dieting, and maintaining regular physical activity (Amalia&Soesanto, 2024).

These findings correspond with prior studies showing that education-based behavioral interventions can significantly improve self-care practices in hypertension management (Sihotang et al., 2020).

Research Implications

Taken together, these results demonstrate that the PATUH module is an effective educational tool for improving motivation, attitudes, preventive behaviors, and family support among hypertensive patients. The intervention's success can be attributed to its structured, culturally adapted content, practical guidance, and emphasis on self-efficacy and social support. These findings align with the growing body of literature suggesting that multi-component behavioral interventions produce better hypertension management outcomes than routine counseling alone [28]. In summary, the PATUH module effectively enhances psychosocial and behavioral determinants of hypertension control, offering a replicable model for community-based interventions aimed at preventing hypertensive crises.

Reserach Limitations

1. The quasi-experimental design without randomization may limit the ability to fully control for confounding variables between the intervention and control groups. Although participants were matched based on baseline characteristics, unmeasured factors such as medication adherence, lifestyle habits, or stress levels might have influenced the outcomes
2. The relatively small sample size and the use of participants from only two community health centers in Surabaya restrict the generalizability of the findings to broader populations. Future studies with larger and more diverse samples across multiple regions are recommended to strengthen external validity.
3. The short duration of the intervention (two weeks) may not fully capture long-term behavioral changes related to motivation, attitude, and preventive actions. Sustained follow-up is needed to determine whether the positive effects of the PATUH module persist over time.
4. Data collection relied on self-reported questionnaires, which may introduce response bias or social desirability bias, particularly in variables such as motivation and attitude. Objective measures, such as direct observation or digital monitoring of health behaviors, could enhance the accuracy of future assessments.
5. The study did not control for potential differences in health education exposure received by the control group outside the study, which might have influenced post-test outcomes. Future research could implement stricter control over external information sources to ensure better internal validity.

CONCLUSION

This study demonstrated that the use of the **PATUH** educational module significantly improved the motivation, attitudes, and behaviors of patients with hypertension in preventing hypertensive crises. Overall, this study contributes to the growing body of evidence emphasizing that behavioral and motivational interventions are essential components in the prevention of hypertensive crises and the promotion of cardiovascular health.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the conduct, results, or publication of this study. The research was conducted independently without any financial, personal, or institutional influences that could have affected the integrity or objectivity of the findings.

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