Improving self-care behavior knowledge in hypertensive patients through jigsaw learning and educational booklets: A quasi-experimental study

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ABSTRACT

Background: Hypertension remains a major global health problem with a high prevalence rate, necessitating effective educational strategies to improve patient self-care behaviors to prevent cardiovascular complications and premature death.

Objectives: This study aims to analyze the effect of healthy lifestyle education using the Jigsaw method through a booklet medium on improving self-care behavior knowledge in hypertensive patients.

Methods: A quasi-experimental design with a pretest-posttest control group approach was used, involving 58 hypertensive patients in the Benteng Community Health Center working area who were randomly allocated into the intervention and control groups. Data were collected using a hypertension self-care knowledge questionnaire consisting of 24 questions covering six important aspects and analyzed using the Cochran test to evaluate the effect of the intervention.

Results: The results showed a significant difference between the intervention and control groups with a p-value of 0.000 (p < 0.05), indicating that the intervention group experienced a greater increase in self-care behavior knowledge. The intervention group showed a significantly higher increase in mean knowledge scores across all self-care domains compared to the control group, underscoring the superior effectiveness of the collaborative Jigsaw strategy in enhancing deeper understanding and knowledge retention.

Conclusions: These findings indicate that the Jigsaw method is effective in improving patient understanding and empowerment in hypertension management. This study advocates the integration of a patient-centered peer-teaching approach into routine primary healthcare to optimize self-management and clinical outcomes in chronic disease care.

KEYWORD: booklet; hypertension; jigsaw method; knowledge; self-care

INTRODUCTION

Hypertension remains a critical public health concern globally, substantially driving the high rates of morbidity and mortality associated with cardiovascular disease. Data from the World Health Organization (WHO) indicate that the worldwide prevalence of this condition continues to escalate, currently affecting over one billion individuals (1). Effective hypertension management consequently hinges not solely on pharmacological regimens but, crucially, relies on patients' sustained adoption of self-care behaviors (2). Key indicators for successful disease control include patients' functional knowledge regarding medication adherence, healthy dietary practices, consistent physical activity, and effective stress management (2).

Despite this clear imperative, numerous studies highlight that self-care literacy among hypertensive populations remains inadequate, thereby impeding efforts toward optimal blood pressure regulation (3). The demonstrable limitation in the efficacy of conventional educational delivery typically characterized as passive and didactic underscores the urgent necessity for innovative pedagogical strategies that prioritize active patient participation (4,5). The Jigsaw method, a renowned technique for collaborative learning, presents a promising model to enhance the impact of health education by promoting deeper engagement in the learning process (2). Consequently, investigating the application of the Jigsaw method within healthy lifestyle education for hypertensive patients is essential as a novel approach to improving self-care knowledge and fostering patient empowerment in chronic disease management.

Although health education is a standard component of patient care, the effectiveness of traditional instruction in cultivating patient understanding of crucial self-care behaviors is a persistent challenge (2). Unidirectional educational models, such as lectures or simple leaflet distribution, frequently fail to activate optimal participant engagement, thus constraining their influence on behavioral change. This lack of interaction, minimal active involvement, and weak cognitive immersion are collectively identified as substantial impediments to knowledge transfer among those managing hypertension (6). Conversely, cooperative methods like Jigsaw have proven successful in augmenting both conceptual comprehension and social competencies in formal academic environments. However, their targeted application within clinical health education, particularly for individuals managing chronic illnesses such as hypertension, remains limited and underexplored (7).

This paucity of empirical evidence specifically evaluating the Jigsaw method's efficacy in enhancing self-care literacy in hypertensive patients constitutes a significant research gap, thereby forming

the impetus for the current investigation (8). The primary objective of this study is to evaluate the effectiveness of Jigsaw-based healthy lifestyle education in augmenting hypertensive patients' self-care knowledge. More specifically, the research aims to assess the degree to which this collaborative learning strategy can deepen patients' understanding of fundamental self-care principles crucial for hypertension management, when rigorously benchmarked against more conventional instructional techniques.

The findings of this study are anticipated to contribute substantial empirical data, thus advancing the quality of health education practices and reinforcing patient-centered strategies for hypertension control. Furthermore, this investigation holds significant practical merit as it offers an alternative, participation-based educational strategy with the potential to enhance patient autonomy in the long-term management of their condition. Ultimately, the results are intended to enrich the existing literature on innovative health pedagogy and establish a robust framework for developing educational intervention models that are more responsive to patient needs across diverse clinical settings.

MATERIALS AND METHODS

This research adhered to the highest ethical standards and has obtained formal ethical approval from the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, UIN Alauddin Makassar. The ethical clearance document is registered under Ethics Letter Number: C.069/KEPK/FKIK/VIII/2024. All participants provided informed consent prior to inclusion in the study. This study used a quantitative approach with a quasi-experimental design. The research subjects were divided into treatment and control groups without randomization. This design was selected to determine the causal effect of the independent variable (Jigsaw-based healthy lifestyle education) on the dependent variable (self-care behavior knowledge) while controlling for extraneous factors.

The study was systematically conducted at the Benteng Health Center, located in the Benteng District of the Selayar Islands Regency. Data collection and intervention procedures spanned a period from August 26 to 21 September 2024. The target population comprised all hypertensive patients aged 45–75 years who were officially recorded at the Benteng Health Center within the preceding three months, totaling 159 individuals. The required minimum sample size was determined using the Lemeshow formula for proportion estimation, yielding a calculated sample size of 58 respondents. These 58 respondents were subsequently and equally divided into two groups: the intervention group (n=29) and the control group (n=29). The sampling technique in this study employed a mixed-selection approach, combining non-probability and probability

sampling methods. Initially, respondents were selected using purposive sampling based on predetermined inclusion criteria. These criteria required participants to be hypertensive patients aged 45 to 75, both male and female, and to be able to read and understand the booklet. Furthermore, respondents were required to express their willingness to participate in the entire study and sign a consent form.

Next, the researchers divided the subjects into two groups: the intervention group and the control group. Subject allocation at this stage was not completely random, but rather categorized based on the study location conditions to compare the effectiveness of the treatments. This structure enabled the researchers to conduct a comparative analysis between the group receiving the educational intervention and the control group, which did not receive the intervention, to accurately evaluate the impact of the study. Exclusion criteria were applied to maintain data integrity and consistency, encompassing patients who: did not complete the study protocol, had irregular residence, possessed severe physical impairments (e.g., blindness or profound deafness), or suffered from mental disorders.

This research procedure was implemented through four systematic stages, beginning with a pretest to measure respondents' basic knowledge levels. At this stage, both the intervention and control groups were given the same self-care knowledge questionnaire to establish baseline data. After the initial data were collected, the next stage was the delivery of the intervention, which consisted of healthy lifestyle education using the Jigsaw collaborative learning method, delivered through a structured booklet. During the implementation, the intervention group, consisting of 29 subjects, was divided into five small groups to facilitate effective learning and group discussions. These groups consisted of four groups of six and one group of five; although there was a difference in the number of members due to the limited number of subjects, this division maintained the effectiveness of the intervention process. The educational material was organized into five subtopics based on the acronym "SEHAT" (Healthy), which served as specific learning focuses.

Implementation of the Jigsaw method began by assigning each member of the original group to be responsible for one subtopic of "SEHAT." Members with similar subtopics then gathered to form expert groups to explore the material comprehensively. After the in-depth study was completed, expert group members returned to their original groups to present and discuss the material they had learned. This approach allowed each subject to play an active role as both a recipient and a transmitter of information, thereby strengthening collective understanding. Finally, the study concluded with a posttest,

in which both groups completed the same self-care knowledge questionnaire to assess changes in knowledge levels after the intervention period. The research utilized a self-care knowledge questionnaire designed for hypertensive patients, consisting of 24 items covering six significant aspects, including both positive (favorable) and negative (unfavorable) statements.

The research instrument was evaluated through validity and reliability tests before and after the intervention. The instrument validity test used the Pearson Product Moment correlation technique, which was conducted in a location with similar characteristics, namely Geplak Village. The test results showed a correlation coefficient ranging from r = 0.646 to r = 0.912, where all question item values exceeded the table r value of 0.361, so that all questionnaire items were declared valid. In addition, the instrument reliability test conducted using the Cronbach's Alpha method produced an alpha value of 0.972. Considering that this value is greater than the reliability threshold of 0.6, this instrument is considered to have an excellent level of internal consistency for use in research. Next, data analysis was carried out through two main stages, namely univariate and bivariate analysis. Univariate analysis aims to describe each variable briefly, which includes respondent characteristics such as age, gender, and education level, as well as the frequency

distribution and percentage of self-care knowledge levels at the pretest and posttest. In contrast, the bivariate analysis focused on testing the statistical differences in patients' self-care knowledge scores between the two groups before and after the Jigsaw educational intervention. The primary statistical test applied in the bivariate analysis was the Cochran test, which is a variant of the McNemar test in the nonparametric statistical category. This test was selected based on its suitability for analyzing nominal-scale qualitative data with dichotomous categories, such as good or bad knowledge levels. Furthermore, the Cochran test is optimal for data involving repeated measures and does not require the assumption of normal data distribution, making it very appropriate for evaluating changes in respondents' knowledge in this study.

RESULTS AND DISCUSSION
Karakteristik Responden

Table 1 the age distribution of the respondents in this study was dominated by the middle-aged group (45–59 years), comprising 25 individuals (86.2%) in the intervention group and 24 individuals (82.8%) in the control group. This dominance of middle-aged participants indicates that the risk of hypertension increases significantly with age , a phenomenon biologically linked to the decline of cognitive and psychomotor functions. These findings align with

Table 1. Frequency distribution of respondent characteristics in the intervention group and control group

Characteristics	Intervention		Control	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Age				
Middle Age (45-59 Years)	25	86.20	24	82.80
Senior Age (60-75 Years)	4	13.80	5	17.20
Total	29	100.00	29	100.00
Gender				
Male	9	31.00	16	55.20
Female	20	69.00	13	44.80
Total	29	100.00	29	100
Last Education				
Elementary School	1	3.40	1	3.40
Middle School	3	10.30	3	10.30
High School	23	79.30	20	69.00
Bachelor's Degree	2	6.90	5	17.20
Total	29	100.00	29	100.00
Occupation				
Unemployed	0	0.00	1	3.40
Farmer	7	24.10	6	20.70
Self-Employed	8	27.60	7	24.10
Housewife	11	37.90	7	24.10
Civil Servant/Retired Civil Servant	3	10.30	8	27.60
Total	29	100.00	29	100.00

research by T. Mielenz et al. (2021), which states that middle adulthood is a critical period where self-care behaviors are often still low (9). Scientifically, while increasing age enhances exposure to information and experiences that broaden one's knowledge base , the aging process also brings physical-psychosocial challenges that can diminish self-management activities (10). Consequently, health education interventions using the jigsaw method and booklet media are crucial for converting life experiences into cognitive awareness that supports healthy behavior changes before entering the elderly phase.

Regarding gender, the intervention group was predominantly female, with 20 individuals (69%), while the control group was dominated by males, with 16 individuals (55.2%). The high proportion of females in the overall sample reflects biological vulnerability post-menopause, where a decrease in estrogen levels leads to the loss of protective effects on blood vessels and triggers increased blood pressure (11). This result is supported by a

study by Wahyuni & Esanoto (2019) showing that women are more likely to be diagnosed with hypertension than men. The scientific significance of these findings emphasizes that educational strategies must consider gender-specific risk factors; for instance, women require education related to dietary management and emotional support to cope with stress whereas men need interventions focused on lifestyle modifications such as smoking cessation (12).

The educational level of the majority of respondents was at the high school level (SMA), specifically 23 individuals (79.3%) in the intervention group and 20 individuals (69%) in the control group. The concentration of respondents at this secondary education level suggests they possess sufficient cognitive capacity to receive complex health information through the jigsaw cooperative learning method. This is relevant to Lawrence Green's theory, which positions knowledge as a predisposing factor in the formation of healthy behavior. Although higher education tends to correlate with broader insights, this study also notes that formal education is not always directly proportional to health-related lifestyle awareness (13). The clinical implication is that health information delivery via booklet media must remain interactive to bridge the gap between theoretical knowledge and practical implementation in hypertension management.

In terms of occupation, housewives (IRT) constituted the largest group in the intervention group (37.9%), while civil servants/retirees dominated the control group (27.6%). The high number of housewives diagnosed with hypertension indicates a correlation between domestic burden, lack of structured physical activity, and emotional stress on blood pressure stability (14). This finding reinforces the research by Lisda Maria et al. (2025), which identifies housewives as a high-risk group due to limited leisure time for exercise. Analytically, occupation is not merely a social status but a source of interaction that influences access to information and learning experiences (15). Therefore, the use of the jigsaw method in healthy lifestyle education provides a space for respondents, especially those not formally employed, to exchange information and experiences, thereby enhancing their decision-making capabilities for more effective self-management.

Table 2 shows that the initial assessment of self-care behavior knowledge in the intervention group showed that 27 respondents had low levels of knowledge. Similarly, in the control group before the intervention, 29 respondents demonstrated low levels of self-care behavior knowledge. These results indicate a critical need for targeted efforts to improve self-care behavior knowledge among hypertensive patients. Scientifically, a lack of understanding regarding causative

Table 2. The frequency distribution of knowledge levels of self-care behavior prior to receiving education on healthy hypertension patterns in the intervention and control groups in the Benteng Puskesmas Working Area,

Variables	Group	
	Intervention (n)	Control (n)
Pre-Test Self Care Behavior Knowledge Level		
Poor Knowledge	27	29
Good Knowledge	2	0
Total	29	29

Source: Primary data, 2024

factors, lifestyle modifications, the need for sustainable long-term self-care, as well as the potential complications arising from inadequate management, significantly contribute to poor self-care outcomes in hypertensive individuals (14).

Furthermore, research by Tingting Lu et al. (2025) showed that a large proportion of hypertensive patients, specifically 56% of the 45 respondents, demonstrated poor self-regulation. This condition is often characterized by a lack of understanding of disease symptoms and specific factors that trigger increased blood pressure (16). Effective hypertension control is fundamentally influenced by the patient's level of disease-specific knowledge. Patients with high levels of health literacy are more likely to internalize the clinical goals of blood pressure monitoring and management (17). These findings align with research by Ali and Muhealddin Amin (2025), which showed that improved self-regulation related to hypertension encourages individuals to adopt better health-seeking behaviors, thereby maintaining optimal blood pressure control

(18). Positive self-care behaviors are implemented through important lifestyle modifications, including limiting high-fat foods, reducing sodium intake, avoiding smoking and alcohol, engaging in regular exercise, and implementing stress management techniques. Ultimately, patients' knowledge of hypertension directly influences their medication adherence. Patients with strong self-regulation behaviors are more compliant in monitoring their blood pressure and following disease management protocols, leading to improved clinical outcomes (19).

Therefore, the baseline data presented in **Table 2** confirm significant deficits in knowledge of self-care behaviors across the intervention and control groups. These deficits serve as key determinants of poor self-regulation and low adherence in long-term hypertension management. Without adequate understanding of risk factors and lifestyle modifications, patients are likely to fail to maintain optimal blood pressure control. Therefore, there is an urgent need for structured educational interventions such as the Jigsaw method to

transform patient health literacy into self-management behaviors.

Table 3 shows that the intervention group experienced a significant increase in the number of respondents with high levels of knowledge, specifically 24 respondents in post-test 1 and 22 respondents in post-test 2. In contrast, the control group was consistently dominated by respondents with low levels of knowledge during post-test 1 (26 respondents) and post-test 2 (28 respondents). This finding indicates that providing healthy lifestyle education through the jigsaw method, supported by a booklet, significantly increased knowledge of self-care behaviors. This is in line with Ali and Muhealddin Amin (2025), who stated that self-care is a conscious activity aimed at building individual independence in maintaining physical and psychological health. Clinically, the integration of cooperative learning methods such as jigsaw with visual media has been shown to be effective in transforming complex medical information into practical understanding for hypertensive patients (20). Despite the significant increase in knowledge after the intervention, the data

Table 3. Frequency distribution of knowledge level of self-care behavior after receiving healthy hypertension pattern education in the intervention and control groups in the Benteng Puskesmas Working Area

Variables	Group	
	Intervention (n)	Control (n)
Knowledge Level of Self Care Behavior Pos-Test 1		
Poor Knowledge	5	26
Good Knowledge	24	3
Total	29	29
Knowledge Level of Self Care Behavior Pos-Test 2		
Poor Knowledge	7	28
Good Knowledge	22	1
Total	29	29

Source: Primary data, 2024

also showed a slight decrease in knowledge levels from post-test 1 to post-test 2 in both the intervention and control groups. This phenomenon can be interpreted as the impact of natural cognitive processes in the elderly, who tend to experience declines in short-term memory and information processing speed. As people age, the ability to retain newly learned information is often hampered by physical and intellectual regression. Consequently, the scientific implications of these findings emphasize the importance of ongoing education rather than incidental sessions to reduce information degradation in elderly patients by strengthening the intellectual, psychological, and social dimensions (21). The success of the jigsaw method in this study further

demonstrates that a high level of knowledge is a strong predictor of patient self-care motivation. Patients with adequate knowledge tend to have greater internal drive because they understand the clinical consequences of neglecting self-care (22). These results suggest that high self-care behavior scores are closely related to receiving adequate information regarding disease care concepts. Theoretically, knowledge serves as the primary foundation in self-management schemes; without proper understanding, patients lack a strong foundation for independent blood pressure control (23). Furthermore, these findings confirm that knowledge, attitudes, and perceptions regarding hypertension play a crucial role in successful chronic disease management. It is assumed that superior knowledge fosters personal awareness, which is then internalized into concrete health behaviors, such as medication adherence, balanced nutrition, smoking cessation, stress management, and regular physical activity. The main clinical implication is that optimizing self-care behavior is key to successful long-term hypertension treatment. Knowledge not only serves as a collection of information but acts as a behavior modifier that enables patients to make informed health decisions to independently improve their quality of life and well-being (24).

In conclusion, the data presented in **Table 3** indicate that although the Jigsaw method integrated with the booklet effectively improved health literacy, the observed small decline in knowledge retention underscores the need for a continuing education framework. These results confirm that adequate knowledge serves as a crucial behavioral modifier for sustained self-management. Therefore, the strategic implementation of cooperative learning should be maintained as an ongoing process to mitigate cognitive decline in elderly patients for long-term hypertension management.

Table 4 shows a significant difference in the level of knowledge of self-care behaviors between the group receiving Jigsaw-based education through a textbook and the control group receiving routine care at Benteng Community Health Center. This was statistically confirmed through a Cochran test, yielding a significant value ($p = 0.000 < \alpha = 0.05$), verifying that the increase in knowledge in the intervention group was substantially higher than in the control group. Substantially, this finding implies that the structured educational intervention was able to change patients' understanding of hypertension management. These results align with research by Inas Fadhil Oleiw (2025), which stated that patients with high levels of knowledge have stronger internal motivation for self-care due to a clearer understanding of the clinical consequences of neglect. The clinical implications confirm that delivering targeted information is key to encouraging active patient involvement in disease

Table 4. Frequency distribution of self-care behavior knowledge levels after treatment in the intervention and control groups in the Benteng Community Health Center Work Area

Group	n	Mean	Std. Deviation	P-Value
Intervention				
Post-Test 1	29	1.83	0.384	
Post-Test 2	29	1.76	0.435	0.000
Control				
Post-Test 1	29	1.10	0.310	
Post-Test 2	29	1.03	0.186	

management (18). Theoretically, this intervention supports the concept of self-care behaviors as an individual's independent effort to maintain a healthy lifestyle and well-being across physical and psychological dimensions. The ability to perform self-care is a natural aspect of human existence, and the nursing role is optimized by facilitating this ability (25). This reinforces Orem's theory, which emphasizes that nursing focus should be directed at meeting patients' self-care needs. Thus, the success of the Jigsaw method in this study provides theoretical implications that a cooperative learning model can serve as an effective tool for addressing self-care deficits in patients with chronic diseases (26). The importance of self-care awareness is further reflected in the finding that respondents with high or moderate levels of knowledge recognized self-management as a vital necessity for preventing hypertension recurrence. Conversely, low levels of knowledge often correlated with non-adherence to antihypertensive medication and failure to maintain a low-sodium diet

due to boredom or indifference to health (17). As emphasized by Clara, Felicia et al. (2021), self-care behaviors are a key indicator of an individual's success in disease control, and strong self-care significantly reduces the risk of hypertension exacerbations. Therefore, education should be directed not only at transferring information but also at developing a caring attitude to overcome psychological barriers, such as reluctance to engage in self-management (3).

The effectiveness of this intervention was also linked to the use of booklets as supporting media for the Jigsaw method. These results align with research by Kalpana Chaudhary et al. (2023), which showed that health education without media support tends to be less effective, failing to produce significant increases in knowledge at the post-test stage (27). Educational media serves as a visual aid that facilitates the reception of complex information, enabling optimal self-care behaviors, a crucial component of successful therapy. Scientific implications indicate that the

integration of interactive instructional methods (Jigsaw) and portable information tools (booklets) creates a synergy that accelerates information retention in patients (28). As a final synthesis, these findings indicate that hypertensive patients with superior knowledge tend to have better controlled blood pressure compared to those with inadequate knowledge. Knowledge serves as an initial modality that enables patients to understand the therapy program and integrate blood pressure control methods into their daily lives (29). The results of this study offer strategic implications for primary healthcare providers to adopt innovative media-based educational methods to ensure patients have adequate health literacy. With knowledge integrated into daily behavior, patient independence in managing hypertension can be achieved, ultimately reducing morbidity caused by hypertension complications in the community (30).

In summary, the statistical evidence in **Table 4** confirms that the Jigsaw-based intervention was significantly superior in improving knowledge of self-care behaviors. These findings provide an empirical basis for demonstrating that structured cooperative learning integrated with visual media effectively addresses self-care deficits in chronic disease management.

CONCLUSION AND RECOMMENDATION

This study demonstrates that teaching healthy hypertension patterns using the Jigsaw method via booklet media significantly increases hypertensive patients' knowledge of self-care behavior in the Benteng Puskesmas working area. This finding is supported by the results of the Cochran test, which show a significant difference between the intervention and control groups (0.000< α= 0.05), the intervention group demonstrated a significant difference from the control group. Higher increase in knowledge following the intervention. The Jigsaw method, which is based on collaborative learning, has demonstrated efficacy in encouraging active patient participation, deepening understanding, and strengthening self-management skills in the context of chronic disease. This study emphasizes the importance of using innovative, interactive, and patient-centered educational strategies to improve hypertension management in primary care.

Based on the study's findings, it is recommended that the Jigsaw education method, combined with booklet media, be used more widely in patient education programs at Puskesmas and other health care facilities, particularly in the management of chronic diseases like hypertension. Health workers are expected to receive specialized training related to the Jigsaw method facilitation technique in order to make education implementation more optimal and consistent. For future research, it is recommended to develop studies with stronger experimental designs,

larger sample sizes, broader regional coverage, and to take into account patients' socio-cultural factors to increase the external validity of research results. In addition, long-term evaluation of changes in self-care behavior and clinical outcomes of patients after education needs to be carried out to ensure the sustainability of the benefits of the intervention.

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