



The Effects of a Health Education Intervention on Knowledge, Attitudes, and Self-Prevention Practices Related to Hypertension Among Workers at the Kampung Lalang Traditional Market

Dewi Pratiwi Turnip^a |
Widya Yanti Sihotang^{b*} |
Kartika Sari Rizki^c

^a Department of Public Health,
Faculty of Medicine and
Dentistry, Universitas Prima
Indonesia

^{b,c} Department of Medicine,
Faculty of Medicine and
Dentistry, Universitas Prima
Indonesia

***Correspondence:**

widyayantisihotang@unpri.mdn.ac.id

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ABSTRACT

Background: Hypertension is one of the leading non-communicable diseases and a major contributor to cardiovascular morbidity and mortality worldwide. The World Health Organization estimates that approximately 1.28 billion adults aged 30–79 years are living with hypertension, with nearly half remaining undiagnosed. Uncontrolled hypertension substantially increases the risk of stroke, coronary heart disease, heart failure, and chronic kidney disease. In addition to its health consequences, hypertension also reduces work productivity and increases healthcare expenditures. Traditional market workers represent a vulnerable occupational group because they are frequently exposed to unhealthy lifestyles, including excessive salt intake, inadequate physical activity, prolonged working hours, smoking, and work-related stress. These risk factors are often accompanied by limited access to health information and preventive healthcare services, resulting in poor awareness and inadequate hypertension prevention practices. Health education has been recognized as an effective non-pharmacological intervention to improve health literacy, promote healthy behaviors, and encourage self-management of hypertension. Educational interventions based on the Health Belief Model (HBM) are particularly effective because they enhance individuals' perceptions of susceptibility, severity, benefits, barriers, and self-efficacy toward preventive behaviors. However, evidence regarding the effectiveness of HBM-based health education among traditional market workers remains limited. Therefore, this study aimed to evaluate the effect of a health education intervention on hypertension-related knowledge, attitudes, and self-prevention practices among workers at Kampung Lalang Traditional Market, Medan, Indonesia.

Objective: The objective of this study was to evaluate the effect of a Health Belief Model (HBM)-based health education intervention on hypertension-related knowledge, attitudes, and self-prevention practices among workers at Kampung Lalang Traditional Market, Medan, Indonesia. **Methods:** A quasi experimental study using a nonequivalent control group pretest–posttest design was conducted between February and March 2026 at Kampung Lalang Traditional Market, Medan, Indonesia. A total of 46 market workers who met the inclusion criteria were recruited using purposive sampling and allocated non-randomly into an intervention group ($n = 23$) and a control group ($n = 23$). The intervention group comprised workers from the lower section of Kampung Lalang Traditional Market, whereas the control group comprised workers from the upper section. Group allocation was predetermined based on the study setting to minimize contamination between participants; therefore, random assignment was not performed.

The intervention was conducted over a 4-week period. Baseline (pretest) data were collected at the first meeting before the intervention, whereas posttest data were collected at the final meeting after completion of the intervention. The intervention group participated in 12 educational sessions, conducted every Friday, Saturday, and Sunday, and received Health Belief Model (HBM)-based health education through face-to-face lectures, educational videos, educational leaflets, and reinforcement via a WhatsApp group. In contrast, the control group attended two meetings and received educational leaflets only. Data were collected using a structured questionnaire assessing hypertension-related knowledge, attitudes, and self-prevention practices. The same questionnaire was administered at both the pretest and posttest. Prior to data collection, the questionnaire was tested for validity and reliability. Descriptive statistics were used to summarize participants' characteristics. Differences between pretest and posttest scores within each group were analyzed using the Wilcoxon signed-rank

test, whereas differences between the intervention and control groups were analyzed using the Mann-Whitney U test. A p-value of <0.05 was considered statistically significant.

Ethical approval for this study was obtained from the Health Research Ethics Committee of Universitas Prima Indonesia (Approval No. 068/KEPK/UNPRI/1/2026). Written informed consent was obtained from all participants before their enrollment in the study.

Results: The health education intervention significantly improved participants' knowledge, attitudes, and self-prevention practices related to hypertension. In the intervention group, the mean knowledge score increased from 2.39 ± 2.19 at baseline to 9.39 ± 1.53 after the intervention, whereas the control group achieved a posttest mean score of 6.61 ± 3.17 ($p < 0.001$). The mean attitude score in the intervention group increased from 21.9 ± 8.97 to 37.1 ± 1.96 , compared with 32.4 ± 8.22 in the control group after the intervention ($p = 0.036$). Similarly, the mean self-prevention practice score increased from 26.5 ± 9.72 to 38.2 ± 1.41 in the intervention group, while the control group achieved a posttest mean score of 33.0 ± 7.15 ($p = 0.001$). These findings demonstrate greater improvements in knowledge, attitudes, and self-prevention practices among participants who received the Health Belief Model (HBM)-based health education intervention compared with those who received educational leaflets only.

Conclusion: Health education based on the Health Belief Model significantly improved hypertension-related knowledge, attitudes, and self-prevention practices among traditional market workers. Comprehensive educational interventions combining lectures, printed educational materials, and continuous reinforcement through social media were more effective than the provision of leaflets alone. Implementing similar health education programs in traditional market settings may contribute to hypertension prevention and support the reduction of non-communicable disease risk among informal workers.

Keywords: Health education; Hypertension; Knowledge; Attitude; Self-prevention practices; Traditional market workers; Health Belief Model

Introduction

Hypertension remains one of the leading non-communicable diseases and a major contributor to global mortality, particularly in developing countries (WHO, 2023). According to the World Health Organization, the prevalence of hypertension continues to rise worldwide, affecting more than 1.3 billion adults globally (WHO, 2023). In Indonesia, the 2023 National Health Survey reported that 30.8% of the adult population suffers from hypertension (Kemenkes, 2023).

Traditional market workers often experience prolonged working hours, irregular eating patterns, limited opportunities for physical activity, and chronic occupational stress, all of which increase their risk of developing hypertension. As informal sector workers, they generally have limited access to occupational health services and preventive healthcare programs, resulting in inadequate awareness of hypertension prevention and control (Asran & Irwan, 2026). Kampung Lalang Traditional Market was selected as the study site because its workers represent an informal occupational group with daily work activities and lifestyle characteristics that may increase the risk of hypertension. Therefore, implementing workplace-based health promotion is important to improve workers' knowledge, attitudes, and self-prevention practices related to hypertension.

Previous studies have demonstrated that informal workers and market traders are exposed to occupational risk factors, including long working hours, heavy workloads, unhealthy dietary habits, irregular meal schedules, and psychosocial stress, which contribute to an increased risk of hypertension (Aulia et al., 2024). Workplace health

promotion has therefore been recommended as an effective strategy to improve workers' awareness and encourage healthy lifestyle behaviors. Health education based on behavioral theories, particularly the Health Belief Model (HBM), has been shown to improve hypertension-related knowledge, attitudes, and preventive practices (Wang et al., 2024). However, most previous intervention studies have focused on patients with diagnosed hypertension, older adults, caregivers, or the general population (Maluwa et al., 2025). Evidence regarding the effectiveness of HBM-based health education among informal workers, particularly traditional market workers, remains limited. Therefore, this study aimed to evaluate the effect of an HBM-based health education intervention on hypertension-related knowledge, attitudes, and self-prevention practices among workers at Kampung Lalang Traditional Market, Medan, Indonesia.

Although previous studies have reported the effectiveness of health education interventions in improving hypertension-related outcomes, most have been conducted among patients with hypertension, older adults, caregivers, or community populations. Evidence regarding multicomponent Health Belief Model (HBM)-based interventions among informal traditional market workers remains limited. In addition, few studies have compared face-to-face health education combined with educational videos, printed leaflets, and continuous reinforcement through a WhatsApp group with leaflet-only education in this occupational setting. Therefore, this study aimed to evaluate the effect of a multicomponent HBM-based health education intervention on hypertension-related knowledge, attitudes, and self-prevention practices among workers at Kampung Lalang Traditional Market, Medan, Indonesia.

Methods

Study Design and Setting

This study employed a quantitative research approach using a quasi-experimental design with a nonequivalent control group pretest-posttest design. The study was conducted from February to March 2026 at Kampung Lalang Traditional Market, Medan, North Sumatra, Indonesia. Random allocation was not performed because the study used a nonequivalent control group design. Participants were allocated non-randomly into an intervention group and a control group using purposive sampling. The intervention group consisted of workers from the lower section of Kampung Lalang Traditional Market and received health education through lectures, educational leaflets, and follow-up reinforcement via social media. The control group consisted of workers from the upper section of the market, who received educational leaflets only. Hypertension-related knowledge, attitudes, and self-prevention practices were assessed in both groups before (pretest) and after (posttest) the intervention. The study aimed to evaluate the effect of a Health Belief Model (HBM)-based health education intervention on hypertension-related knowledge, attitudes, and self-prevention practices among traditional market workers.

Population and Sample

The study population consisted of all workers at Kampung Lalang Traditional Market, Medan. Participants were selected using a purposive sampling technique based on predetermined inclusion and exclusion criteria. A total of 46 respondents participated in the study and were allocated non-randomly into an intervention group ($n = 23$) and a control group ($n = 23$). The sample size was determined based on the feasibility of recruiting eligible workers during the study period rather than on a formal sample size calculation or statistical power analysis. Therefore, this study should be considered a preliminary quasi-experimental study. The primary outcome was the change in hypertension-related knowledge, while attitudes and self-prevention practices were evaluated as secondary outcomes. Statistical analyses were performed using a significance level of $\alpha = 0.05$. Eligible participants were market workers aged 18 years or older,

able to communicate effectively, willing to participate by providing written informed consent, and available throughout the study period. Participants who did not complete either the pretest or posttest questionnaires were excluded from the final analysis.

Variables and Instruments

The independent variable was the health education intervention, while the dependent variables were hypertension-related knowledge, attitudes, and self-prevention practices. Data were collected using a structured questionnaire consisting of four sections: respondents' demographic characteristics, hypertension-related knowledge, attitudes, and self-prevention practices. The questionnaire was developed based on the literature on hypertension prevention and was administered at baseline and post-intervention. Prior to data collection, the instrument underwent validity and reliability testing. All questionnaire items were found to be valid, with corrected item-total correlation coefficients exceeding the critical value ($r > 0.361$). The instrument also demonstrated good internal consistency, with Cronbach's alpha coefficients of 0.920 for the knowledge scale, 0.887 for the attitude scale, and 0.904 for the self-prevention practices scale, indicating that the questionnaire was reliable for use in this study.

Intervention Procedure

Participants in the intervention group received a multicomponent Health Belief Model (HBM)-based health education program conducted over a 4-week period. The program consisted of 12 face-to-face educational sessions held every Friday, Saturday, and Sunday, with each lecture lasting approximately 15 minutes. Educational materials were delivered through lectures, educational videos, and printed leaflets, covering the definition of hypertension, risk factors, signs and symptoms, complications, healthy lifestyle modification, dietary recommendations, physical activity, stress management, smoking cessation, and regular blood pressure monitoring. In addition to the face-to-face sessions, participants received weekly reinforcement and follow-up through a WhatsApp group to strengthen their understanding of the educational materials. The control group served as an active comparison group and received printed educational leaflets only. No face-to-face educational sessions, educational videos, or WhatsApp-based reinforcement were provided to this group.

Baseline (pretest) assessments of hypertension-related knowledge, attitudes, and self-prevention practices were conducted before the intervention using a structured questionnaire. Posttest assessments were performed two weeks after completion of the intervention program using the same questionnaire. Self-prevention practices were assessed using participants' self-reported responses rather than objective behavioral observations. Therefore, the estimated intervention effect reflects the additional benefit of the multicomponent HBM-based program beyond leaflet distribution alone. Because lectures, videos, leaflets, and WhatsApp reinforcement were delivered simultaneously, the individual contribution of each intervention component could not be determined.

Ethical Considerations

This study was approved by the Health Research Ethics Committee, Universitas Prima Indonesia, under Approval No. 068/KEPK/UNPRI/I/2026. Ethical approval was obtained before participant recruitment and data collection commenced. Permission to conduct the study was also obtained from the management of Kampung Lalang Traditional Market prior to the implementation of the research.

All participants received an explanation regarding the study objectives, procedures, potential benefits, and their rights as research participants before enrollment. Written informed consent was obtained from all participants prior to data collection. Participation was entirely voluntary, and participants were informed of their right to withdraw from the study at any time without any consequences. To maintain confidentiality, participants' identities were anonymized, and all questionnaire data were used solely for research purposes and stored securely by the research team.

For the intervention, WhatsApp was used only as a medium for delivering health education reinforcement. Participants' telephone numbers were accessible only to members of the intervention group and the research team within the WhatsApp group. The group was used exclusively for educational communication, and no personal information or individual responses were disclosed. Participation in the WhatsApp group was voluntary, and participants could leave the group at any time without affecting their participation in the study. Online communications were treated as confidential and were not shared outside the research team.

Data Analysis

Data were analyzed using IBM SPSS Statistics version 26. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize respondents' characteristics and study variables. Inferential statistical analyses were performed to compare knowledge, attitudes, and self-prevention practices before and after the intervention and between the intervention and control groups. Statistical significance was determined at a p-value of less than 0.05.

Result

Respondent Characteristic

A total of 46 respondents participated in this study, with 23 respondents assigned to the control group and 23 respondents to the experimental group. Based on age, the largest proportion of respondents in the control group was aged 56–65 years (76.0%), whereas the majority of respondents in the experimental group were aged 36–45 years (72.7%). Only one respondent was aged 65 years or older, and this participant belonged to the control group. Regarding gender, females predominated in the experimental group (58.1%), while males constituted the majority in the control group (66.7%). In terms of educational level, most respondents in both groups had completed senior high school (SLTA), accounting for 42.9% of the control group and 57.1% of the experimental group. Only one respondent had completed primary school (SD), and one respondent in each group had attained a bachelor's degree (S1). Regarding the history of hypertension, most respondents reported no previous history of hypertension, representing 42.4% of the control group and 57.6% of the experimental group, whereas respondents with a history of hypertension accounted for 69.2% of the control group and 30.8% of the experimental group.

Table 1 Respondent Characteristic

Variable	Control (n=23) n(%)	Experimental(n=23) n(%)
Age		
25-35 years	3(37.5%)	5(62.5%)
36-45 years	3(27.5%)	8(72.7%)
46-55 years	6(46.2%)	7(53.8%)
56-65 years	10(76%)	3(23.1%)
65+ years	1(100%)	0(0%)
Gender		
Male	10(66.7%)	5(33.3%)
Female	13(41.9%)	18(58.1%)
Education		
SD	1(100%)	0(0%)

SMP	6(75%)	2(25%)
SLTA	15(42.9%)	20(57.1)
S1	1(50%)	1(50%)
History of hypertension		
Has history of hypertension	9(69.2%)	4(30.8%)
No history of hypertension	14(42.4%)	19(57.6%)

Differences in Knowledge, Attitudes, and Self-Prevention Practices by Age, Gender, Education, and Hypertension

The analysis of respondents' characteristics in relation to hypertension-related knowledge showed that there were no statistically significant differences based on age ($p = 0.167$), gender ($p = 0.200$), educational level ($p = 0.405$), or history of hypertension ($p = 0.810$). Respondents in the low-risk age group had a slightly higher mean knowledge score (8.53 ± 2.97) than those in the high-risk age group (8.00 ± 2.67). Similarly, male respondents demonstrated a marginally higher mean knowledge score (8.33 ± 3.30) than female respondents (8.16 ± 2.54), while respondents with higher educational attainment also had slightly higher knowledge scores (8.41 ± 2.67) compared with those with lower educational attainment (7.44 ± 3.24). Participants without a history of hypertension showed a slightly higher mean knowledge score (8.39 ± 2.58) than those with a history of hypertension (7.77 ± 3.29); however, none of these differences were statistically significant.

Regarding attitudes toward hypertension prevention, age was the only characteristic significantly associated with attitude scores ($p = 0.003$). Respondents in the low-risk age group demonstrated significantly higher mean attitude scores (37.5 ± 3.32) than those in the high-risk age group (33.5 ± 7.62). No significant differences in attitude scores were observed according to gender ($p = 0.304$), educational level ($p = 0.401$), or history of hypertension ($p = 0.172$), although respondents without a history of hypertension tended to have slightly more positive attitudes than those with a history of hypertension.

For self-prevention practices, no statistically significant associations were found with age ($p = 0.059$), gender ($p = 0.208$), educational level ($p = 0.506$), or history of hypertension ($p = 0.638$). Although respondents in the low-risk age group had higher mean self-prevention practice scores (37.7 ± 3.31) than those in the high-risk age group (35.1 ± 6.73), the difference did not reach statistical significance. Likewise, respondents with higher educational attainment and those without a history of hypertension tended to report slightly better self-prevention practices than their counterparts, but these differences were not statistically significant. Overall, these findings indicate that among the respondents' characteristics examined, only age was significantly associated with attitudes toward hypertension prevention, whereas knowledge and self-prevention practices were not significantly influenced by age, gender, educational level, or history of hypertension.

Table 2 Differences in Knowledge, Attitudes, and Self-Prevention Practices by Age, Gender, Education, and Hypertension History in the Control and Experimental Groups of Workers at Kampung Lalang Traditional Market

Variable	Knowledge		Attitude		Self-Prevention Practices	
	Mean±SD	p-value	Mean±SD	p-value	Mean±SD	p-value
Age						
Low-risk age	8.53±2.97	0.176	37.5±3.32	0.003	37.7±3.31	0.059
High-risk age	8.00±2.67		33.5±7.62		35.1±6.73	
Gender						

Male	8.33±3.30	0.200	35.6±6.68	0.304	36.4±6.20	0.208
Female	8.16±2.54		34.9±6.48		36.1±5.51	
Education						
Low education	7.44±3.24	0.405	34.0±4.18	0.401	35.4±4.03	0.506
High education	8.41±2.67		35.4±6.94		36.4±6.04	
Hypertension history						
Has hypertension history	7.77±3.29	0.810	33.7±6.49	0.172	35.2±7.12	0.638
No hypertension history	8.39±2.58		35.7±6.49		36.6±5.07	

Differences in Knowledge, Attitudes, and Self-Prevention Practices in the Experimental Group of Workers at Kampung Lalang Traditional Market Before and After the Intervention

The comparison of pretest and posttest scores in the experimental group demonstrated significant improvements in all outcome variables following the health education intervention. The mean knowledge score increased from 2.39 ± 2.19 at baseline to 9.39 ± 1.53 after the intervention, with the difference being statistically significant ($p < 0.001$). Similarly, the mean attitude score improved from 21.9 ± 8.97 during the pretest to 37.1 ± 1.96 at the posttest ($p < 0.001$). Self-prevention practices also showed a substantial increase, with the mean score rising from 26.5 ± 9.72 before the intervention to 38.2 ± 1.41 after the intervention ($p < 0.001$).

Table 3 Differences in Knowledge, Attitudes, and Self-Prevention Practices in the Experimental Group of Workers at Kampung Lalang Traditional Market Before and After the Intervention

Variable	Mean± SD		P-value
	Pre test	Post test	
Knowledge	2.39±2.19	9.39±1.53	0.000
Attitude	21.9±8.97	37.1±1.96	0.000
Self-Prevention Practices	26.5±9.72	38.2±1.41	0.000

Differences in Knowledge, Attitudes, and Self-Prevention Practices

The comparison of post-intervention outcomes between the control and experimental groups revealed significant differences in all study variables. The experimental group achieved a significantly higher mean knowledge score (9.39 ± 1.53) than the control group (6.61 ± 3.17), with a statistically significant difference ($p < 0.001$). Likewise, the mean attitude score was significantly higher in the experimental group (37.1 ± 1.96) compared with the control group (32.4 ± 8.22) ($p = 0.036$). Similar findings were observed for self-prevention practices, where participants in the experimental group demonstrated a significantly higher mean score (38.2 ± 1.41) than those in the control group (33.0 ± 7.15) ($p = 0.001$).

Table 4 Differences in Knowledge, Attitudes, and Self-Prevention Practices Between the Control and Experimental Groups of Workers at Kampung Lalang Traditional Market

Variable	Mean± SD		P-Value
	Control	Experimental	
Knowledge	6.61±3.17	9.39±1.53	0.000
Attitude	32.4±8.22	37.1±1.96	0.036
Self-Prevention Practices	33.0±7.15	38.2±1.41	0.001

Discussion

The present study aimed to evaluate the effect of a Health Belief Model (HBM)-based health education intervention on hypertension-related knowledge, attitudes, and self-prevention practices among workers at Kampung Lalang Traditional Market. The findings demonstrated that participants in the intervention group experienced significant improvements in all study outcomes after receiving the multicomponent health education intervention.

Regarding knowledge, the intervention group showed a significant increase in the mean knowledge score after the intervention ($p < 0.001$), indicating that the HBM-based educational program effectively improved participants' understanding of hypertension. This finding is consistent with the Health Belief Model, which suggests that providing accurate health information enhances individuals' awareness of disease susceptibility, severity, benefits of preventive actions, and perceived barriers, thereby promoting informed health decisions. Individuals with adequate knowledge of hypertension risk factors, symptoms, complications, and prevention are more likely to recognize the importance of maintaining a healthy lifestyle and participating in early detection activities (Liu et al., 2020). Similar findings were reported by (Kurnia et al., 2020), who found that structured health education significantly improved participants' hypertension knowledge ($p < 0.05$). In the present study, the combination of face-to-face education, educational videos, printed leaflets, and continuous reinforcement through WhatsApp likely enhanced participants' understanding by allowing repeated exposure to educational messages. This suggests that multicomponent HBM-based education is an effective approach for improving hypertension-related knowledge among traditional market workers.

Attitudes toward hypertension prevention also improved significantly following the intervention ($p = 0.036$). According to the Health Belief Model, attitudes are influenced by individuals' beliefs regarding the seriousness of hypertension, their perceived susceptibility, and the perceived benefits of adopting preventive behaviors. Increased knowledge acquired through health education can positively influence these beliefs, thereby encouraging favorable attitudes toward hypertension prevention. This finding agrees with (Shrestha et al., 2021), who reported that positive attitudes play an important role in motivating healthy lifestyle behaviors, and with (Akuiyibo et al., 2022), who demonstrated that structured health education effectively strengthened positive attitudes toward hypertension prevention. The improvement observed in this study indicates that repeated educational sessions and continuous reinforcement enabled participants to develop a more positive perception of healthy behaviors, including blood pressure monitoring, healthy dietary practices, regular physical activity, and stress management.

The present study also found a significant improvement in self-prevention practices among participants receiving the intervention. Posttest self-prevention practice scores were significantly higher in the intervention group than in the control group (38.2 ± 1.41 vs. 33.0 ± 7.15 ; $p = 0.001$). According to self-care theory and the Health Belief Model, individuals who possess adequate knowledge and positive attitudes are more likely to adopt preventive health behaviors. Self-prevention practices include maintaining a healthy diet, engaging in regular physical activity, avoiding smoking, managing stress, and monitoring blood pressure regularly (Konlan & Shin, 2023). These findings are consistent with (Akinniran et al., 2023), who reported significant improvements in medication adherence, dietary modification, physical activity, and weight management following a structured hypertension education program. In the current study, preventive practices were measured using participants' self-reported responses after the 4-week intervention. Therefore, the findings indicate improvements in reported self-prevention practices rather than objectively verified behavioral changes. Nevertheless, the results suggest that the multicomponent HBM-based health

education program provided additional benefits beyond leaflet-only education in promoting hypertension prevention practices among traditional market workers.

Conclusion

Based on the results of the study on the effect of health education interventions on knowledge, attitudes, and hypertension prevention practices among workers at Kampung Lalang Traditional Market, it can be concluded that the study included 46 respondents divided into intervention and control groups. The majority were in the higher-risk age range (46–65 years), female, and last educated at the senior high school level (SLTA), indicating a group that requires improved health education related to hypertension. There was a significant effect of the health education intervention on respondents' knowledge ($p = 0.000$), shown by a higher mean in the experimental group (9.39 ± 1.53) compared with the control group (6.61 ± 3.17). Health education also had a significant effect on respondents' attitudes ($p = 0.036$), with the experimental group having a higher mean (37.1 ± 1.96) than the control group (32.4 ± 8.22). A significant effect was found on self-prevention practices ($p = 0.001$), with the experimental group mean (38.2 ± 1.41) higher than the control group (33.0 ± 7.15). Overall, health education proved effective in increasing knowledge, shaping attitudes, and promoting hypertension prevention practices, as evidenced by significant score improvements in the intervention group and higher values compared with the control group.

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