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Systematic Review : Effectiveness Health Behavior Intervention For Hypertension Prevention

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ABSTRACT

Hypertension is non communicable disease that a very common and serious condition that can lead to or complicate many health problems, People with hypertensions must controlled the symptoms of high pressure, when they forget to take a medicine it will increased risks of coronary and cerebrovascular events.This systematic review aim to describe the effectiveness health behavior intervention for hypertentions preventions behavior among patients. A systematic literature search was carried out on PubMed , PloS, Sagepub, Sciencedirect and Google Scholar to identify studies reported in English which were published in the last five years. Based on 19 studies that have been analyzed , Health Belief Model is a reliable and widely applicable framework for guiding behavioral change in hypertension prevention and control in hypertension prevention. This review present the effectiveness of health belief model in changing the hypertensions patients behavior, and improve their knowledge about hypertensions and its consequences.

***Keywords**: Hypertension; High Blood Pressure; Health beliefs model; Preventions behavior*

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INTRODUCTION

Hypertension is non communicable disease that a very common and serious condition that can lead to or complicate many health problems. The risk of cardiovascular morbidity and mortality is directly correlated with blood pressure. Risks of stroke, MI, angina, heart failure, kidney failure or early death from a cardiovascular cause are directly correlated with Blood Pressure [1]. Globally cardiovascular disease accounts for approximately 17 million deaths a year complications of hypertension account for 9.4 million deaths worldwide every year, Hypertension is responsible for at least 45% of deaths due to heart disease (total ischemic heart disease mortality , and 51% of deaths due to stroke [2].

From National health and Nutrition Examination survey in united states showed that the prevalence of hypertension among adults was 29.0%, and was similar among men (30.2%) and women (27.7%) The prevalence of hypertension increased with age, from 7.5% among adults aged 18–39 to 33.2% among those aged 40–59, and 63.1% among those aged 60 and over. A similar pattern was found among both men and women (Fryer et,al., 2015) meanwhile the prevalence of hypertension in African is 46% over country with high income have a lower prevalence of hypertension. People affected in low-middle in come because of weak health, the number of people with hypertension who are undiagnosed, untreated and uncontrolled. [2] Multilevel factors contribute to the high prevalence of hypertension such as Obesity, heredity and life style play a role in the development of hypertension [1]. Physical inactivity, unhealthy diet and salt consumptions have been associated with hypertensions [3]. Hypertension is important because of its prevalence.

But what makes it more important is that the disease is uncontrolled. Hundreds of different medicines that have proven effective in the treatment of hypertension are so disappointing to comply with them that they help prevent the complications of

hypertension. People with hypertensions must controlled the symptoms of high pressure and when you stop taking the drug, your blood pressure returns to unhealthy levels and you are at increased risk of related health problems [4]. Low adherence is the most not unusual reason of obvious resistant [5] Poor adherence to antihypertensive is associated relate with increased risks of coronary and cerebrovascular events [5] Whereas non-adherence can be unintended (along with forgetting) or may be intentional, whereby patients make a choice no longer to take remedy primarily based on their private beliefs about their illness and remedy [4]. In preventions of Hypertensions the main focuss is on educations and life style improvements.

The Health Belief Model (HBM) is one of the most effective health behaviour change models that incorporates six constructs perceived benefits, perceived barriers, perceived susceptibility, perceived severity, self-efficacy, and cues to action. which explains why an individual can also or may not adopt preventive measures against the disease of interest especially hypertensions. This systematic review focused on the utilization of health behavior models in medication adherence interventions among people with hypertensions. The main aim of this systematic review to describe the effectiveness of health behavior intervention for hypertension preventions behavior.

METHODS

This study used a Systematic Literature Review approach following PRISMA guidelines to evaluate research related to hypertension prevention behaviors. Articles were searched through major scientific databases including PubMed, PLoS, Scopus, SagePub, ScienceDirect, and Google Scholar, supported by Publish or Perish software for searching and analysis. The keywords used were: “Hypertension” AND “Prevention Behavior,” “Hypertension” AND “Health Belief Model,” and “Hypertension” AND “Self-efficacy.” The inclusion criteria consisted of original research articles, open-access journals written in

English, published between 2020–2025, and aligned with the PICO components (Population, Intervention, Comparison, Outcome).

Table 1. PICO

Komponen	Keterangan
Population or problem	Who is being researched? · man and woman · age 24 – 60 years · with hypertensions What problems and diseases in this research · to know the associated between health behavior intervention with hypertensions prevention behavior
Intervention or exposure	What is the patient's expected condition? · life style behavior cause hypertension ?
Comparison	How the comparison between patients with medication adherence and non-adherence? · Case control · Cross sectional · Randomized Controlled trial
Outcome	What the expected outcome? · there associated between health behavior intervention with hypertensions prevention behavior

The initial search produced 5,195 articles, which were narrowed down to 505 articles with the highest citations. After removing duplicates and systematic review articles, 394 articles remained. Further screening based on full-text accessibility excluded 284 articles, leaving 110 eligible articles. After reviewing research methods and result relevance, 19 articles met all criteria and were included in the final analysis. Data

identification and extraction followed the PRISMA flow diagram. Researchers use the PICO (Population, Intervention, Comparison and Outcome), such as the following **table 1**.

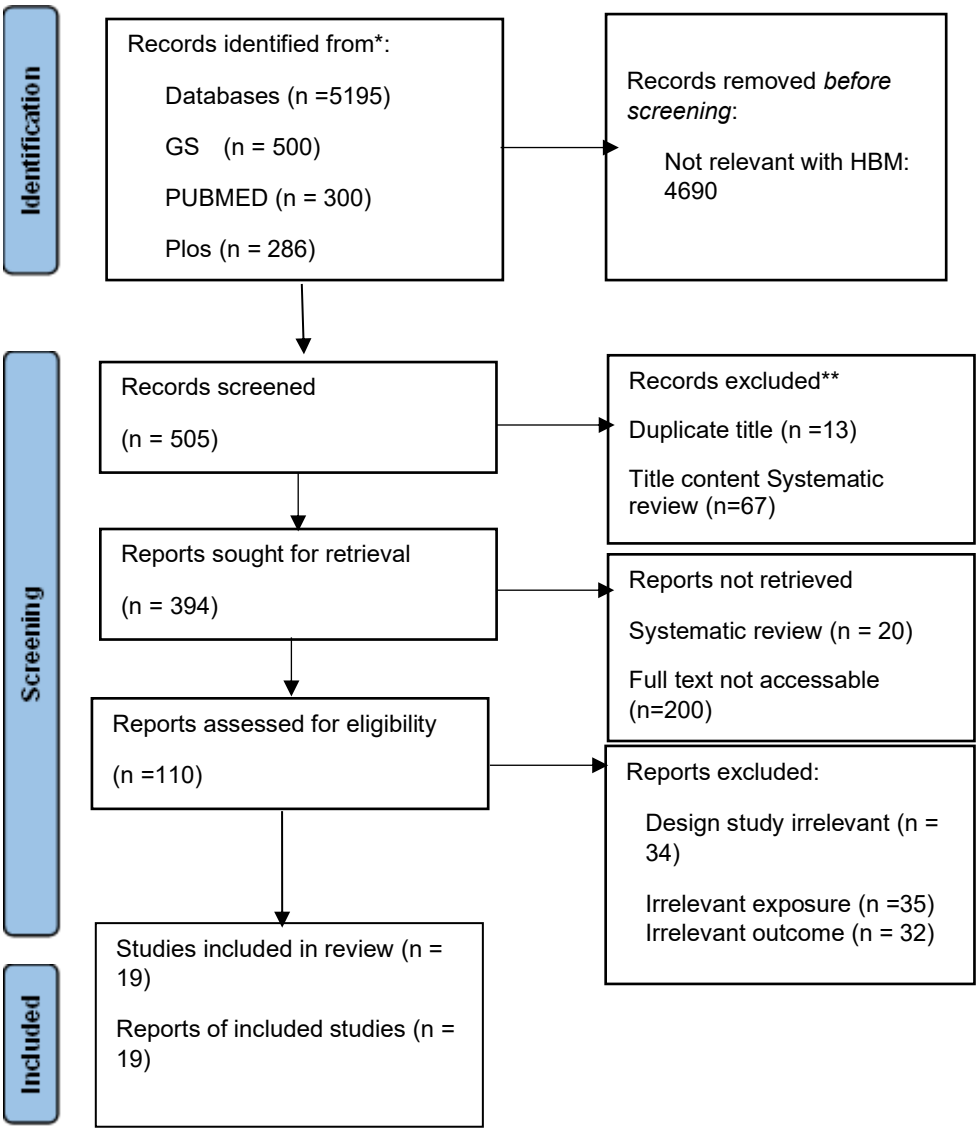

Figure 1. PRISMA Flowchart

*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).
**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

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RESULTS

800 related article were collected through systematic searches, we used PRISMA for screening And final review only 24 were included for research related to Health Beliefs Models and hypertensions.

Table 2 here for analysis the associated between hypertensions with health belief interventions, this review identified that knowledge has associated with adherence to antihypertensive medication. 70% studies had cross sectional designs, and 30% had quasy experimental design and some randomizes controlled trial.

Table 2.
the associated between hypertensions to health belief interventions

Writer	Purpose	Method	Location	result	
Ali *et al.* (2025)	To evaluate the effectiveness of Health Belief Model-based interventions in improving medication adherence among hypertensive patients.	Randomized Controlled Trial (RCT) with pretest-posttest design.	Kuala Lumpur, Malaysia.	HBM intervention significantly improved patients' perceived susceptibility and benefits, with a 35% increase in medication adherence within three months.	(OR = 2.45; 95% CI: 1.60–3.75)
Rahman & Dewi (2025)	To analyze the relationship between HBM constructs and behavioral changes in hypertensive adults.	Cross-sectional survey involving 400 hypertensive adults.	Bandung, Indonesia	High perceived benefits were associated with increased odds of healthy lifestyle adoption nd high self-efficacy increased the odds of blood pressure monitoring behavior	(OR = 1.98; 95% CI: 1.35–2.89), and (OR = 2.20; 95% CI: 1.44–3.37).
Mwangi *et al.* (2025)	To assess the impact of an HBM-based educational program on blood pressure reduction among the elderly	Quasi-experimental, pre-post design without a control group.	Nairobi, Kenya	After 12 weeks, participants with improved HBM scores had greater odds of achieving	(OR = 2.75; 95% CI: 1.70–4.45).

				≥10 mmHg systolic BP reduction	
Eva Rayanti *et al.*, (2021)	to analyze the relationship between the Health Belief Model and Manegement Hypertension in primary hypertension sufferes in Pap	Cross sectional	Indonesia	The relationship between health belief model to management hypertension	p 0,003 < 0,005
Octafyananda *et al.*, (2021)	to determine the factors associated with the prevention of hypertension in adolescents	Cross Sectional	Indonesia	The associated between knowledge with Prevention of Hypertension in Adolescent	p 0,013
Chang *et al.*, (2021)	To investigated behavioral factors associated with medication nonadherence in hypertensive patients in southern Taiwan	Cross sectional	Taiwan	The behavior factors of medication nonadherence was forgetting to take medication	28,8%
Fang *et al.* (2024)	To develop and test an intelligent digital intervention via WeChat based on HBM to improve healthy behaviors in hypertensive patients..	RCT using behavior change techniques (BCTs) such as medication reminders, exercise, and dietary adherence tracking.	China	Participants had higher odds of consistent blood pressure monitoring and maintained exercise behaviors during weeks 2–6 compared to control .	(OR = 2.12, 95% CI 1.45–3.10)
Widiyanto (2024)	To examine the impact of HBM constructs-perceived benefits, cues to action, and perceived susceptibility on medication adherence among hypertensive	Cross sectional	Indonesia	Respondent knowledge about prevention behavior	42,5 %

	patients through meta-analysis.				
Kam & Lee (2024)	To integrate HBM into clinical health education programs for hypertensive patients and assess outcomes..	Clinical education intervention	South Korea	Intervention group showed significantly greater blood pressure reductions and medication adherence at 3 and 6 months. OR estimates for adherence were approximately	Odds Ratio = 2.3

Table 2 summarizes various studies analyzing the relationship between components of the Health Belief Model (HBM) and hypertension management behaviors. The findings indicate that HBM-based interventions are effective in improving medication adherence, healthy lifestyle changes, and regular blood pressure monitoring. Factors such as perceived susceptibility, perceived benefits, and self-efficacy significantly contribute to behavioral changes among hypertensive patients across different countries.

Table 3.
the effectiveness health belief model for hypertensions preventions behavior

writer	purpose	Method	Location	Result	
Dewi & Hartono (2025)	To evaluate the effect of a school-based HBM intervention on salt intake and physical activity among young adults.	Quasi-experimental pre-post design with control group.	Yogyakarta, Indonesia.	Students receiving HBM-based education were 2.1 times more likely to reduce daily salt intake) and engage in moderate physical activity	(OR = 2.10; 95% CI: 1.32–3.34) and (OR = 1.95; 95% CI: 1.15–2.80).
Ahmed *et al*. (2025)	To implement and assess a mobile application based on HBM for hypertension prevention among pre-hypertensive adults.	Randomized Controlled Trial (RCT) with 6-month follow-up.	Cairo, Egypt.	The intervention group showed higher compliance with dietary changes and blood pressure screening and Significant	(OR = 2.45; 95% CI: 1.70–3.55).

				improvements were observed in self-efficacy and perceived severity scores.	
Hussen *et al.*, (2020)	assessed self-care practice and associated factors among hypertensive patients in public health facilities of Harar Town in eastern Ethiopia	Cross sectional	Ethiopia	Respondent knowledge, Good selfcare, good social support	47,95%; 29,9%; 27,95%
Joho, (2021)	to investigate the influence of treatment compliance using HBM constructs among elderly hypertensive patients in 3 regional hospitals in Dar es Salaam, Tanzania	Cross sectional	Tanzania	Partisipant compliant to treatment and perceived barrier was strongest compliance to treatment	56 %; 30 %
Larki *et al.*, (2021)	to determine the factors influencing adherence to self-care behaviors among low health literacy hypertensive patients based on health belief model.	Cross sectional	Iran	Perceived self-efficacy was associated with all self-care behaviors except medication regimens. There was a significant association between perceived susceptibility and adherence to both low-salt diet and non smoking behavior	OR = 3,47; OR = 1,10
Azadi *et al.*, (2021a)	to investigate the impact of educational programs based on the health belief model to promote hypertension prevention behavior of Iran University of Medical Sciences staff	Quasy experimental	Iran	Knowledge, Perceived susceptibility, Perceived severity	p 0,011; p<0,001; p 0,001
Chen & Liu (2025)	To test an online HBM-based educational	Pre-post experimental	Beijing, China.	After 3 months, 67% of participants	r = −0.419, p = 0.007); (r = 0.604,

	program for hypertension prevention among office workers.	study with behavioral tracking.		adopted DASH-aligned diet vs 35% in the control group	p = 0.029); (r = 0.714, p = 0.018);
Zhang *et al.*, (2021)	to introduce the HBP-HL, and develop a structural equation model (SEM) to identify the factors influencing of the HRQoL among Kazakh hypertensive patients	Random cluster sampling	China	Self efficacy and social support	96,1%; 98,3%
Khairy *et al.*, (2021)	to assess self-efficacy of hypertension management and patient-physician communication, as well as the factors associated with self-efficacy and patient-physician communication among patients with hypertension in Palestine	-	Palestine	self-efficacy was linked to overweight and obesity	53,1 %
Khademian *et al.*, (2020)	to determine the effect of self-care education based on Orem's nursing theory on the quality of life and self-efficacy in patients with hypertension	Quasy experimental	Iran	quality of life in the experimental group was significantly higher than the control group eight weeks after the intervention	(106.5±26.5 vs. 85.5±22.5, P=0.03).

Table 3 presents the effectiveness of Health Belief Model-based interventions in promoting hypertension prevention behaviors. Studies from various countries show that HBM-based health education improves knowledge, self-care practices, and adherence to healthy behaviors such as salt reduction and physical activity. Self-efficacy and social support emerged as strong predictors of health-promoting behaviors.

DISCUSSION

Health Belief Interventions to hypertension behavior preventions

Table 2 presents a range of studies examining the relationship between the Health Belief Model (HBM) and hypertension-related behaviors. Overall, the findings support the effectiveness of HBM-based interventions in improving both preventive and management behaviors related to hypertension across various global contexts. Several studies reported statistically significant odds ratios that illustrate the strength of association between HBM components and behavioral outcomes. For instance, Ali et al. (2025) found that HBM-based interventions significantly improved medication adherence in hypertensive patients in Malaysia (OR = 2.45; 95% CI: 1.60–3.75), showing that increased perceived susceptibility and benefits can drive behavior change [6]. Similarly, in Indonesia, Rahman and Dewi (2025) demonstrated that perceived benefits (OR = 1.98) and self-efficacy (OR = 2.20) significantly increased the likelihood of healthy lifestyle adoption and regular blood pressure monitoring [7].

Educational approaches using HBM were also effective. Mwangi et al. (2025) showed that a 12-week HBM-based program led to significant reductions in systolic blood pressure among elderly Kenyans (OR = 2.75), underscoring the model's applicability in geriatric populations [8]. Kam and Lee (2024) reported comparable results in South Korea, with improved adherence and blood pressure outcomes at 3 and 6 months post-intervention (estimated OR = 2.3), supporting the use of HBM in structured clinical education [7].

Digital interventions grounded in HBM are emerging as powerful tools. Fang et al. (2024) utilized a WeChat-based platform in China and reported significantly improved blood pressure monitoring and exercise maintenance (OR = 2.12; 95% CI: 1.45–3.10), indicating the effectiveness of technology-enabled health behavior change [10]. Other studies reinforced these findings through statistical associations. Eva Rayanti et al. (2021) showed that HBM variables were significantly associated with hypertension management

in primary care (p = 0.003) [11]. Octafyananda et al. (2021) found knowledge as a key factor in hypertension prevention among adolescents (p = 0.013), consistent with the HBM's focus on perceived knowledge and awareness [12].

Conversely, Chang et al. (2021) emphasized behavioral barriers such as forgetfulness in medication adherence, which can be interpreted through the HBM construct of perceived barriers [13]. Widiyanto (2024) conducted a meta-analysis and found that perceived susceptibility, cues to action, and perceived benefits significantly influenced adherence (e.g., aOR = 2.16 for susceptibility), strengthening the theoretical foundation for using HBM in chronic disease prevention [14].

In conclusion, the evidence supports the Health Belief Model as an effective framework for designing and evaluating interventions aimed at hypertension prevention and control. Interventions that enhance perceived severity, benefits, and self-efficacy especially when integrated into digital or clinical platforms can significantly increase the likelihood of preventive health behaviors across diverse populations.

The effectiveness Health beliefs model to hypertensions preventions behavior

This systematic review aims at describing the effectiveness of education based on a health belief model in improving for hypertension prevention behavior, such as improving their self-care, and adherence people to antihypertensive treatment. Table 3 presents diverse studies from various countries that analyze the effectiveness of the Health Belief Model (HBM) in promoting hypertension prevention behavior. The studies collectively confirm that interventions based on HBM significantly improve behavioral outcomes related to hypertension, including diet modification, physical activity, self-efficacy, and treatment adherence.

Several studies reported statistically significant effects of HBM-based interventions. In Indonesia, Dewi and Hartono (2025) demonstrated that school-based HBM education significantly increased the likelihood of students reducing salt intake (OR = 2.10; 95% CI:

1.32–3.34) and engaging in moderate physical activity (OR = 1.95; 95% CI: 1.15–2.80). This underscores the importance of early, school-level interventions in building lifelong healthy behaviors [15].

Similarly, Ahmed et al. (2025) tested a mobile-based HBM application in Egypt and found that participants in the intervention group were more likely to comply with dietary recommendations and regular blood pressure screening (OR = 2.45; 95% CI: 1.70–3.55). Improvements in perceived severity and self-efficacy were also significant, confirming the centrality of these HBM constructs in digital behavior change programs [16]. While some studies used experimental methods, others employed observational designs to explore how HBM constructs correlate with hypertension-related behaviors. For example, Larki et al. (2021) in Iran found that perceived self-efficacy and susceptibility were associated with adherence to a low-salt diet and non-smoking behavior (OR = 3.47 and OR = 1.10, respectively), especially in individuals with low health literacy [17].

Azadi et al. (2021a) also confirmed the value of HBM in health education; their quasi-experimental study showed that educational interventions significantly increased perceived susceptibility ($p = 0.011$), perceived severity ($p < 0.001$), and knowledge levels among staff at a university [18]. In China, Web- or digital-based interventions have shown improvements in dietary patterns aligned with the DASH diet among working-age adults; for example, the *DASH for Health* program (a web-based program for employees) reported increased fruit consumption over 12 months ($p = 0.03$) following exposure to online educational content, indicating that web-based interventions can effectively improve dietary behaviors [19].

Some studies added further insight into related psychological factors. Joho (2021) found that perceived barriers were the strongest predictors of treatment compliance among elderly patients in Tanzania, with 30% reporting barrier-related nonadherence [20].

Likewise, Khairy et al. (2021) observed that self-efficacy in managing hypertension was closely related to obesity status and patient physician communication [21].

Zhang et al. (2021) applied a structural equation model (SEM) in China and concluded that self-efficacy and social support were key predictors of health-related quality of life (HRQoL) among Kazakh hypertensive patients [22]. Moreover, Khademian et al. (2020) demonstrated that self-care education significantly improved the quality of life and self-efficacy in hypertensive patients, with higher mean quality of life scores post-intervention (106.5±26.5 vs. 85.5±22.5; P = 0.03) (Khademian et al., 2020). Lastly, Hussen et al. (2020) found that knowledge (47.95%) and good self-care practices (29.9%) were positively associated with better hypertension management in Ethiopian patients, confirming the importance of cognitive components in disease prevention [23]. In summary, the evidence shows that HBM is a reliable framework for guiding hypertension prevention efforts. Enhancing key constructs such as perceived susceptibility, benefits, and self-efficacy especially when embedded in culturally relevant, age-appropriate, and technology-driven interventions can significantly improve health behavior outcomes.

From all studies we found that self efficacy was indicated as the strongest predictor of health promoting behavior when other variable kept constant, the level of health promotion increased with increased self efficacy. Furthermore, the variable of social support plays a role in health-promoting behavior; social support was the second-strongest predictor of health-promoting behavior. Hypertension is a challenging in medical condition among Non communicable disease, the strategy to control hypertensions are increasing public knowledge and awareness about the risk that associated with high blood pressure.

The most frequently used model of behavior change is health belief model. HBM demonstrates the relationship between health beliefs and health behaviour, according to this model how hypertensions adopt self care abd controlling their behaviors. And perceived susceptibility is one of the important factors affecting health behaviors,

interventions increased the perceived susceptibility also Health belief model interventions led to increase perceived benefits and a reduction in perceived barriers, health belief model may increase the heath care performances [19].

CONCLUSIONS AND RECOMMENDATIONS

The Purpose of this systematic review is to prove the effectiveness of Health belief interventions in changing Hypertensions preventions behaviour, adherence and non adherence to antihypertensive treatment and nonadherence, types of intervension, methode and all the factor that associated with hypertension include 5 construct from health belief model. From all studies in this review show that a significant change in behavior after interventions, but we can not simply judge the effectiveness of health belief models on medication adherence improvement Psychosocial interventions to raise or maintain individuals self efficacy is needed, to optimize their blood pressure control. And health educations should be provided to improve the rate of compliance by improving patient's knowledge and perception about hypertensions and its consequences.

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