



Implementation of the CERDIK and PATUH Programs for Hypertension Control: A Systematic Literature Review

Silvia Anggraini¹, Misnaniarti¹, Rini Mutahar¹

¹Faculty of Public Health, Universitas Sriwijaya, Palembang, Indonesia

*Corresponding Author: Silvia Anggraini

E-mail: silviaanggraini2808@gmail.com



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Abstract

Hypertension is a non-communicable disease that requires ongoing control through behavioral change, early detection, treatment, and adherence to health recommendations. The CERDIK and PATUH programs were developed as promotive and preventive approaches to support hypertension control in the community. However, their implementation still shows variation in execution and outcomes. This systematic literature review aims to analyze the implementation of the CERDIK and PATUH programs in hypertension control, including implementation strategies, supporting and inhibiting factors, and the roles of health workers and the community. This study used a systematic literature review design. Literature searches were conducted in PubMed, Scopus, ScienceDirect, Google Scholar, and Garuda for publications from 2021 to 2026. Articles were selected based on inclusion and exclusion criteria, assessed for methodological quality, and then synthesized narratively following the PRISMA 2020 guidelines. The review shows that the implementation of CERDIK and PATUH is carried out through health education, screening and blood pressure measurement, lifestyle modification, medication adherence, counseling, and patient monitoring. Health workers and cadres play an important role in program implementation. Supporting factors include continuous education, community involvement, and health service support, whereas barriers include limited human resources, funding, and infrastructure, as well as the suboptimal role of cadres. The implementation of CERDIK and PATUH has the potential to strengthen hypertension control when carried out in an integrated and sustainable manner, based on primary health care, and supported by health workers, cadres, families, and the community.

Introduction

Hypertension is one of the major public health problems that contributes substantially to the occurrence of cardiovascular disease, stroke, chronic kidney disease, and premature death (Ichsan et al., 2024; Hezam et al. 2024; Burnier & Damianaki, 2023; Chaturvedi et al., 2024; Law et al., 2023). Hypertension often develops without symptoms, so that many individuals are unaware of their condition until complications occur. The World Health Organization (WHO) reported that approximately 1.4 billion adults aged 30–79 years worldwide had hypertension in 2024, or about one-third of the population in that age group. Although hypertension can be detected and controlled through treatment and lifestyle changes, only about 23% of people with hypertension have their blood pressure under control. This condition indicates that hypertension control remains a global challenge and requires interventions that are oriented not only toward treatment but also toward behavioral change and the strengthening

of health services (Schutte et al., 2025; Byiringiro et al., 2023; Silva et al., 2022; Elendu et al., 2024; Ordunez et al., 2024; Sun et al., 2024).

Hypertension control fundamentally requires a comprehensive approach through early detection, modification of risk factors, appropriate treatment, therapeutic adherence, blood pressure monitoring, and health service follow-up (Shiukashvili, 2026; Sun et al., 2026; Mancia et al., 2023; Bajinka et al., 2025). WHO emphasizes that effective hypertension management requires a combination of lifestyle changes, access to antihypertensive medication, regular blood pressure monitoring, and continuous health services. A primary health care-based approach is particularly important because most of the needs for detection, treatment, education, and monitoring of hypertension can be met at the primary care level (Ahmad, 2025; Ordunez et al., 2024; Osonuga et al., 2025; Frieden et al., 2023).

Problems in hypertension control are not only related to the availability of health services but also to individuals' ability to sustain healthy lifestyle behaviors and adhere to treatment over the long term. A systematic review by Ferreira et al. (2024) showed that adherence to antihypertensive therapy is influenced by a range of interrelated factors, including patient-related factors, disease condition, therapy, socioeconomic status, and the health care system. Adherence is also related to communication between patients and health workers, satisfaction with services, the patient-provider relationship, health literacy, self-efficacy, and social support. These findings indicate that hypertension control requires a multidimensional intervention strategy and should not place the patient as the sole party responsible for the success of treatment (Ferreira et al., 2024).

In addition to treatment adherence, lifestyle change is an important component of hypertension control. Behaviors such as adequate physical activity, a healthy and low-salt diet, smoking cessation, stress management, weight control, and blood pressure self-monitoring contribute to achieving controlled blood pressure. An integrative review by Konlan et al. (2023) showed that self-management of hypertension at home is associated with treatment adherence, lifestyle modification, knowledge of hypertension management, and the ability to recognize and control risk factors. Successful hypertension control therefore requires interventions capable of integrating behavioral change with therapeutic adherence and continuous health monitoring (Konlan et al., 2023; Elendu et al., 2024).

In the Indonesian context, the government has developed promotive and preventive approaches through the CERDIK and PATUH behaviors as part of efforts to control non-communicable diseases, including hypertension. CERDIK comprises regular health check-ups, avoiding cigarette smoke, engaging in regular physical activity, following a healthy diet with balanced caloric intake, getting adequate rest, and managing stress, while PATUH is aimed primarily at individuals who already have a non-communicable disease, through regular health check-ups, managing the disease with appropriate and consistent treatment, maintaining a healthy diet with balanced nutrition, engaging in safe physical activity, and avoiding cigarette smoke, alcohol, and other carcinogenic substances. This approach positions behavioral change and adherence as complementary components of hypertension control (Meng et al., 2023; Choudhry et al., 2022).

The urgency of implementing CERDIK and PATUH in Indonesia is further underscored by the results of the 2023 Indonesian Health Survey (Survei Kesehatan Indonesia/SKI). The prevalence of hypertension among the population aged ≥ 18 years, based on blood pressure measurement, reached 30.8%, whereas the prevalence based on physician diagnosis was only 8.6%. This discrepancy indicates a substantial gap between the actual condition of hypertension as measured and the community's awareness of their hypertension status. In addition, the 2023 SKI data reveal gaps in treatment-seeking behavior, including regularity of treatment and follow-up visits among individuals already diagnosed with hypertension. These findings

indicate that the problem of hypertension in Indonesia lies not only in its high prevalence but also in the capacity of the health system and the community to detect, treat, monitor, and control hypertension on an ongoing basis (Muharram et al., 2024; Solihah et al., 2025; Marni et al., 2025; Rumampuk et al., 2026).

The implementation of CERDIK and PATUH in hypertension control has been reported in a number of studies in Indonesia. Lailiah et al. (2023), for example, showed that education on CERDIK and PATUH is used as a preventive and control approach for hypertension aimed at increasing community knowledge about the disease and its control. Other research has also shown an association between CERDIK behaviors and blood pressure control; the better the CERDIK behaviors practiced by patients, the greater the tendency for blood pressure to be controlled (Lailiah et al., 2023).

Evidence on program implementation at the health service level is also beginning to develop. A study by Alendra et al. (2024) on the implementation of the hypertension health service policy through CERDIK and PATUH at Puskesmas Alahair showed that the program was implemented through health promotion, hypertension screening, treatment, monitoring, and evaluation. However, implementation continues to face various obstacles, including limited human resources, suboptimal cadre involvement, limited funding and infrastructure, and continued low community awareness of the importance of hypertension control. These findings indicate that the existence of a policy or program does not automatically guarantee optimal implementation in the field (Alendra et al., 2024).

Program implementation is also influenced by the approaches used in delivering education and building community engagement. Ichsan et al. (2024) reported the implementation of CERDIK and PATUH as a hypertension prevention effort, while Megayanti et al. showed that a CERDIK and PATUH education approach combined with teaching and interprofessional collaboration can improve community knowledge of hypertension control. These findings suggest that program effectiveness can be influenced by communication methods, the involvement of health workers, cross-professional collaboration, and the characteristics of the target community (Megayanti et al., 2025).

Nevertheless, scientific evidence on CERDIK and PATUH remains heterogeneous in character. Some studies focus on the increase in knowledge following education, others assess the association between CERDIK behaviors and blood pressure, while still others analyze policy implementation at a single health care facility. Differences in focus, study design, target population characteristics, form of intervention, implementation indicators, and outcomes used have resulted in evidence on the implementation of CERDIK and PATUH that remains fragmented. This condition makes it difficult to draw conclusions regarding the program components that are most consistently applied, the factors that support or hinder implementation, and the strategies most appropriate for improving the success of hypertension control.

From the perspective of health policy implementation, the success of a program is determined not only by the substance of the policy but also by communication, resources, implementer capacity, organizational characteristics, community involvement, and monitoring and evaluation mechanisms. This is particularly important for the CERDIK and PATUH programs because they involve individual behavioral change while also requiring support from the health service system. The findings of Alendra et al. (2024) show that limited human resources, cadres, funding, infrastructure, and cross-sectoral coordination can be barriers to program implementation. Implementation analysis therefore needs to examine the program more comprehensively, from policy, implementers, and resources, through the implementation process and community acceptance, to the outcomes achieved.

The need to synthesize this evidence is increasingly important because research on hypertension control shows that the success of interventions is strongly influenced by various interacting factors. A systematic review by Ferreira et al. (2024) found that adherence to antihypertensive therapy is a multidimensional phenomenon influenced by patient, therapy, socioeconomic, and health service factors. Meanwhile, Zeng et al. (2024) showed that physician–patient communication has a promising association with medication adherence and blood pressure control. This evidence reinforces the notion that hypertension control programs need to be understood as an implementation process involving the interaction of individuals, health workers, service organizations, and the social environment (Ferreira et al., 2024; Zeng et al., 2024).

Although research on CERDIK and PATUH has developed in Indonesia, scientific evidence that specifically and systematically synthesizes the implementation of the CERDIK and PATUH programs in hypertension control remains limited to date. Available studies tend to be conducted locally, with variation in methods, locations, target population characteristics, forms of intervention, and success indicators. As a result, a comprehensive picture has not yet been obtained of how the CERDIK and PATUH programs are implemented across various health service contexts, which components are most frequently applied, which factors support or hinder implementation, and which outcomes are most consistently reported.

This gap indicates the need for a systematic literature review to identify, evaluate, and synthesize scientific evidence on the implementation of the CERDIK and PATUH programs in hypertension control. A systematic review approach allows research findings with different designs and contexts to be integrated transparently and systematically, thereby producing a more comprehensive picture of the evidence. Such a synthesis is also important for identifying implementation patterns, supporting and inhibiting factors, implementation strategies, and program outcomes that have been reported in previous studies.

Based on the foregoing, this systematic literature review was conducted to identify and synthesize scientific evidence on the implementation of the CERDIK and PATUH programs in hypertension control, covering the forms and components of program implementation, health education and promotion strategies, the involvement of health workers and the community, supporting and inhibiting factors, and outcomes related to hypertension control. The findings of this review are expected to provide an evidence base for strengthening the implementation of the CERDIK and PATUH programs, particularly in improving early detection, behavioral change, treatment adherence, blood pressure monitoring, and hypertension control through more effective and sustainable health services.

Methods

Study Design

This study used a descriptive qualitative design with a systematic literature review (SLR) approach. The study aimed to identify, evaluate, and describe the scientific evidence on the implementation of the CERDIK and PATUH programs in hypertension control. This approach was used to obtain a systematic overview of the forms of program implementation, implementation strategies, the involvement of health workers and the community, supporting and inhibiting factors, and program outcomes based on previous research findings. The systematic literature review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to ensure that the process of identifying, selecting, and reporting the literature was carried out transparently and systematically (Page et al., 2021).

The literature search was conducted systematically across several databases, namely PubMed, Scopus, ScienceDirect, Google Scholar, and Garuda. Multiple databases were selected to obtain both national and international articles relevant to the topic of CERDIK and PATUH

program implementation in hypertension control. The search strategy used a combination of the keywords "CERDIK," "PATUH," "CERDIK PATUH," "hypertension," "hypertension control," "hypertension management," "program implementation," "health program implementation," "lifestyle modification," and "medication adherence." Keywords were combined using the Boolean operators AND and OR to broaden the search coverage while maintaining article relevance. The literature search was limited to articles published between 2021 and 2026 so that the synthesis would be based on relatively up-to-date scientific evidence.

Inclusion criteria comprised original research articles with quantitative, qualitative, or mixed-methods designs, as well as program evaluations addressing the implementation of CERDIK and/or PATUH in the prevention or control of hypertension; studies involving hypertensive patients, at-risk community members, cadres, health workers, or program implementers; articles available in full text; publication in peer-reviewed scientific journals; and publication within the 2021–2026 period. Both national and international articles were eligible for inclusion provided they were relevant to program implementation and hypertension control.

Exclusion criteria comprised editorials, opinion pieces, commentaries, letters to the editor, conference abstracts, articles without empirical data, articles not available in full text, and studies addressing only the pharmacological treatment of hypertension without any relation to the implementation of CERDIK and PATUH. Duplicate articles identified across multiple databases were removed prior to further selection.

Article selection was carried out in stages through identification, removal of duplicate articles, screening based on title and abstract, full-text assessment, and determination of articles meeting the inclusion criteria. Methodological quality was assessed using the Critical Appraisal Tools from the Joanna Briggs Institute (JBI), appropriate to the design of each article. The quality assessment covered the appropriateness of the research objectives, methods, participant characteristics, data collection and analysis processes, and the clarity of the findings (Aromataris & Munn, 2020).

Data from articles meeting the criteria were then extracted using a data extraction matrix. The information collected included author, year of publication, study location, study objective, study design, population characteristics, number of respondents or informants, the form of the CERDIK and PATUH programs, program targets, program implementers, implementation methods, education strategies, screening and monitoring activities, supporting factors, inhibiting factors, and program implementation outcomes.

The extracted data were subsequently analyzed using descriptive qualitative analysis. The analysis was carried out by thoroughly reading the findings of each article, identifying information related to program implementation, and then grouping the findings according to predetermined categories. The analytical categories included CERDIK program components, PATUH program components, implementation strategies, resources, the involvement of health workers and the community, supporting factors, inhibiting factors, monitoring and evaluation, and hypertension control outcomes.

The CERDIK components analyzed comprised regular health check-ups, avoiding cigarette smoke, engaging in regular physical activity, following a healthy diet with balanced caloric intake, getting adequate rest, and managing stress. Meanwhile, the PATUH components comprised regular health check-ups, managing the disease with appropriate and consistent treatment, maintaining a healthy diet with balanced nutrition, engaging in safe physical activity, and avoiding cigarette smoke, alcohol, and other risk factors. This grouping was used to describe the program components applied and their form of implementation across different research contexts.

The analysis was also directed at identifying factors influencing program implementation. These factors were grouped into supporting and inhibiting factors, comprising the availability

and competence of health workers, policy support, facilities and infrastructure, financing, cadre involvement, family support, community knowledge, patient adherence, access to health services, and monitoring and evaluation. Comparisons across studies were made to identify consistent patterns of findings as well as variations based on study characteristics and context.

The implementation outcomes analyzed comprised increases in community knowledge and awareness, changes in healthy lifestyle behavior, treatment adherence, regularity of blood pressure examinations, increased utilization of health services, and blood pressure control. These outcomes were used to describe the contribution of CERDIK and PATUH program implementation to hypertension control efforts.

To ensure transparency of the research process, all stages of the systematic literature review were reported according to the PRISMA 2020 guidelines, covering the identification, screening, eligibility, and inclusion of final articles. A PRISMA flow diagram was used to show the number of articles identified, duplicate articles, articles excluded at each selection stage, and the reasons for exclusion (Page et al., 2021).

Article and reference management was carried out using Mendeley Reference Manager to organize the literature, identify duplicate articles, and manage citations and the reference list according to the Harvard style of the Faculty of Public Health, Universitas Sriwijaya. The final findings of the review are presented in the form of a study characteristics table and a narrative description to provide a comprehensive overview of the implementation of the CERDIK and PATUH programs in hypertension control.

Data Analysis

Data analysis in this study used descriptive qualitative analysis of the findings from articles meeting the inclusion criteria. The analysis aimed to systematically describe the pattern of implementation of the CERDIK and PATUH programs, implementation strategies, supporting and inhibiting factors, and program outcomes in hypertension control.

The first stage involved extracting information from each article, including author, year of publication, study location, study design, population characteristics, program form, target population, implementers, implementation methods, supporting and inhibiting factors, and the main research findings. The data obtained were then organized into a synthesis matrix to facilitate the identification of similarities and differences across studies.

The next stage involved grouping the findings according to major themes, namely CERDIK implementation, PATUH implementation, education and health promotion strategies, hypertension screening and monitoring, the involvement of health workers and the community, program resources, supporting factors, inhibiting factors, and hypertension control outcomes. Each theme was analyzed descriptively by comparing findings across articles. The grouped findings were then used to identify the implementation patterns most frequently reported, as well as variations in program implementation based on location, target population characteristics, resources, and health service context. Supporting and inhibiting factors were analyzed to determine the conditions that could strengthen or hinder the success of CERDIK and PATUH implementation.

Subsequently, program outcomes were analyzed by comparing changes in knowledge, awareness, healthy lifestyle behavior, treatment adherence, regularity of blood pressure examinations, and blood pressure control reported in the studies. Findings with similarities were grouped as major patterns, while differences in results were described according to the characteristics of the study and the context of implementation.

The results of the analysis were then presented descriptively-narratively and in the form of a synthesis table. This approach was used because the reviewed articles varied in study design, population characteristics, forms of implementation, program indicators, and measured

outcomes, so that a statistical pooling of results or meta-analysis was not conducted. Descriptive synthesis allowed the various research findings to be integrated to provide a comprehensive picture of the implementation of the CERDIK and PATUH programs in hypertension control.

The entire process of identification, selection, eligibility assessment, and reporting of findings was carried out according to the PRISMA 2020 guidelines to ensure that the review process was systematic, transparent, and replicable (Page et al., 2021). The final results of the analysis were used as the basis for identifying implementation patterns, supporting and inhibiting factors, and program aspects that need to be strengthened in efforts to improve hypertension control.

Result and Discussion

Table 1. Characteristics and Summary of Included Studies on Ginger Supplementation and Inflammatory Markers in Metabolic Diseases

No	Author	Title and Publication	Research Design	Research Variables	Results
1	Zhou et al., 2023	Ginger Supplementation for the Treatment of Non-Alcoholic Fatty Liver Disease: A Meta-analysis of Randomized Controlled Trials (African Health Sciences)	Meta-analysis RCT	Independent: Ginger supplementation; Dependent: CRP, TNF- α , HOMA-IR, metabolic profile	Ginger provides significant improvements in inflammatory and metabolic parameters in NAFLD patients
2	Ebrahimzadeh et al., 2022	The Effect of Ginger Supplementation on Metabolic Profiles in Patients with Type 2 Diabetes Mellitus (Complementary Therapies in Medicine)	Systematic Review dan Meta-analysis RCT	Ginger; blood glucose, HbA1c, insulin resistance, inflammatory markers	Ginger supplementation improves metabolic profile and reduces inflammation in type 2 DM patients
3	Rahimlou et al., 2026	Ginger Supplementation in Nonalcoholic Fatty Liver Disease (Hepatitis Monthly)	Double-blind RCT	Ginger 2 g/day; inflammatory cytokine, HOMA-IR	There was a decrease in inflammatory cytokines, insulin resistance, and the degree of liver steatosis after 12 weeks of intervention
4	Mohammad et al., 2021	The effects of the ginger supplements on inflammatory parameters in type 2 diabetes patients: A systematic review	RCTs	Ginger; hs-CRP, TNF- α	Ginger reduced hs-CRP and TNF- α compared to the control group

		and meta-analysis of randomised controlled trials (Clin Nutr ESPEN)			
5	Morvaridzadeh et al., 2021	Effect of ginger (Zingiber officinale) on inflammatory markers: A systematic review and meta-analysis of randomized controlled trials (Cytokines)	RCTs	Ginger; CRP, hs-CRP, IL-6, sICAM, and TNF- α	There was a significant decrease in proinflammatory cytokines after ginger supplementation
6	Rjabi et al., 2025	Antioxidant and Anti-inflammatory Effects of Ginger Supplementation in Adults: A GRADE-Assessed Systematic Review and Dose-Response Meta-analysis of Randomised Controlled Trials (Inflammopharmacology)	RCT	Ginger; CRP, TNF- α , IL-6, TAC, SOD, MDA	Ginger supplementation significantly decreased CRP, TNF- α , and IL-6 and increased total antioxidant capacity (TAC) and SOD activity. The effects were more pronounced in individuals with chronic metabolic or inflammatory diseases.
7	Paudel, Orent, & Penela, 2025	Pharmacological Properties of Ginger (Zingiber officinale): What Do Meta-Analyses Say? A Systematic Review (Frontiers in Pharmacology)	Systematic Review	Ginger; inflammatory markers, type 2 diabetes, metabolic syndrome	Reviews show that most meta-analyses reported significant reductions in CRP, hs-CRP, and TNF- α after ginger supplementation, accompanied by improvements in metabolic parameters.
8	Ayustanngwarno	A Critical Review of Ginger's Antioxidant, Anti-inflammatory	Narrative Review	Gingerol, shogaol, zingerone;	The active compounds in ginger are able

	et al., 2024	and Immunomodulatory Activities (Frontiers in Nutrition)		NF-κB inflammatory pathway	to inhibit NF-κB activation, reduce the expression of TNF-α, IL-6, and IL-1β, and reduce oxidative stress which plays a role in metabolic diseases [20].
9	Zhang et al., 2024	Nutritional Components, Phytochemical Compositions, Biological Properties, and Potential Food Applications of Ginger (<i>Zingiber officinale</i>): A Comprehensive Review (Journal of Food Composition and Analysis)	Comprehensive Review	Phytochemical components of ginger; biological activities	Gingerols and shogaols were identified as the main components contributing to the anti-inflammatory, antioxidant, antidiabetic, and hypolipidemic effects in metabolic disorders
10	Ghoreishi et al., 2024	The Effects of Ginger (<i>Zingiber Officinale</i> Roscoe) on Non-Alcoholic Fatty Liver Disease in Patients with Type 2 Diabetes Mellitus: A Randomized Double-Blinded Placebo-Controlled Clinical Trial (Journal of Dietary Supplements)	Randomized Double-Blind Placebo-Controlled Clinical Trial	Independent: Ginger; Dependent: NAFLD, metabolic parameters, inflammatory markers	Ginger administration provides improvements in non-alcoholic fatty liver disease parameters in type 2 DM patients and shows potential to reduce inflammation and improve metabolism.
11	Schumacher et al., 2024	The Effect of Oral Supplementation of Ginger on Glycemic Control of Patients with Type 2 Diabetes Mellitus: A Systematic Review and Meta-analysis	Systematic Review dan Meta-analysis	Ginger; blood glucose, HbA1c, insulin resistance, metabolic parameters	Meta-analysis showed that ginger supplementation contributed to improved glycemic control and

		(Clinical Nutrition ESPEN)			supported a reduction in the risk of inflammation associated with type 2 diabetes.
12	Rjabi et al., 2025	Impact of Ginger Supplementation on Obesity Indices and Adipokine Profiles in Adults: A GRADE-Based Systematic Review and Dose-Response Meta-analysis of Randomized Controlled Trials (Complementary Therapies in Medicine)	Dose-Response Meta-analysis	Ginger; BMI, body weight, adiponectin, leptin	Ginger reduces various obesity indices and improves adipokine profiles. Changes in adiponectin and leptin suggest potential improvements in metabolic inflammation in obese individuals.
13	Al-Awwadi et al., 2024	The Effect of Therapeutic Doses of Culinary Spices in Metabolic Syndrome: A Randomized Controlled Trial (Nutrients)	Double-Blind Randomized Controlled Trial	Ginger 3 g/day; blood glucose, HbA1c, lipids, metabolic syndrome	Ginger consumption for 12 weeks improved several parameters of metabolic syndrome, including fasting blood glucose, HbA1c, LDL, and total cholesterol compared to placebo
14	Rostamkhani H., Veisi P., Niknafs B., et al. (2023)	The Effect of Zingiber officinale on Prooxidant-Antioxidant Balance and Glycemic Control in Diabetic Patients with ESRD Undergoing Hemodialysis: A Double-Blind Randomized Control Trial. (BMC	Double-Blind Randomized Placebo-Controlled Trial	Ginger 2000 mg/day for 8 weeks; Fasting Blood Glucose (FBG), insulin, HOMA-IR, urea, creatinine, and Prooxidant-	Ginger supplementation for 8 weeks significantly reduced FBG, HOMA-IR, and urea levels compared to the placebo group. Furthermore, creatinine and

		Complementary Medicine and Therapies)		Antioxidant Balance (PAB).	PAB levels decreased in the intervention group. The results indicate that ginger can improve glycemic control, increase insulin sensitivity, and improve oxidative status in diabetic patients with ESRD undergoing hemodialysis.
15	Rafieipour N., Gharbi N., Rahimi H., et al. (2024)	Ginger Intervention on Body Weight and Body Composition in Adults: A GRADE-Assessed Systematic Review and Dose-Response Meta-analysis of 27 Randomized Controlled Trials. (Nutrition Reviews)	Systematic Review dan Dose-Response Meta-analysis	Ginger; Body weight, Body Mass Index (BMI), waist circumference (WC), and body fat percentage	Ginger supplementation significantly reduced body weight (WMD = -1.52 kg), BMI (WMD = -0.58 kg/m ²), waist circumference (WMD = -1.04 cm), and body fat percentage (WMD = -0.87%). Dose-response analysis showed an effective dose of approximately 2 g/day with an intervention duration of more than 8 weeks. These results indicate that ginger has the potential to

					improve body composition and risk factors for metabolic diseases associated with chronic inflammation
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Description of Studies Identified

Based on the literature search conducted through PubMed, Scopus, ScienceDirect, Google Scholar, and Garuda, a number of articles relevant to the implementation of the CERDIK and PATUH programs in hypertension control were obtained. The identified articles were then selected based on inclusion and exclusion criteria through the stages of identification, title and abstract screening, full-text examination, and eligibility assessment in accordance with the PRISMA 2020 flow (Page et al., 2021).

Articles meeting the criteria were published during the 2021–2026 period, with varied study designs including quantitative, qualitative, mixed methods, and program evaluations. In general, the studies addressed the implementation of CERDIK and PATUH through health education, blood pressure examination, lifestyle change, treatment adherence, counseling, and monitoring of hypertensive patients.

The review findings indicate that education, the involvement of health workers and cadres, regular health examinations, changes in healthy lifestyle behavior, and treatment adherence were components frequently found in program implementation. Supporting factors included support from health workers, cadres, health facilities, and community participation, while barriers identified included limited resources, limited infrastructure, and low awareness and adherence among part of the community. Overall, the implementation of CERDIK and PATUH shows potential for improving knowledge, healthy lifestyle behavior, treatment adherence, and blood pressure control efforts. The characteristics and findings of each study meeting the criteria are presented in the following table.

Table 2. Summary of Studies

No.	Author & Year	Study Location	Study Title	Method	Key Findings
1	Alendra, Syafrani, Dewi, Kiswanto, & Abidin (2024)	Puskesmas Alahair, Kepulauan Meranti Regency	Policy Implementation Analysis of the Hypertension Health Service Program through CERDIK and PATUH at Puskesmas Alahair, Kepulauan Meranti Regency, 2024	Qualitative, case study	The CERDIK and PATUH programs were implemented through health promotion, hypertension screening, health examinations, and treatment. However, implementation continued to face barriers such as limited human resources, minimal cadre involvement, and limited funding.

2	Pitayanti & Priyoto (2021)	Kuwon Village, Karas Subdistrict, Magetan Regency	Education on CERDIK and PATUH Behavior in Hypertension Control	Community service / health education	Education on CERDIK and PATUH behaviors improved community knowledge and understanding of hypertension. The education was directed at encouraging lifestyle change toward healthier behaviors for hypertension control.
3	Susanti, Anita, & Santoso (2021)	Balok Sub-district, Kendal City District	CERDIK Behavior among Hypertensive Patients during the COVID-19 Pandemic	Descriptive quantitative, non-hypothesis survey; 77 respondents	Most respondents had implemented several CERDIK components at a good level. Regular health checks, avoiding cigarette smoke, physical activity, healthy diet, rest, and stress management were important components of hypertension control.
4	Supriyatin & Novitasari (2022)	Puskesmas Bobotsari, Purbalingga Regency	The Relationship between CERDIK Behavior and Blood Pressure among Prolanis Participants at Puskesmas Bobotsari, Purbalingga Regency	Quantitative correlational, cross-sectional	There was an association between CERDIK behavior and blood pressure among Prolanis participants. The results showed that implementing CERDIK behavior was related to blood pressure control among program participants.
5	Lailiah, Fazry, Hasan, Wasiaty, Nurwahidah, Mahmud, El Faraby, Kisworo, & Wati (2023)	Indonesia	Prevention and Control of Hypertension through CERDIK for Non-Communicable Diseases and PATUH	Community service	The program was carried out through hypertension prevention and control efforts by implementing CERDIK and PATUH behaviors. Activities aimed to increase community knowledge of hypertension and the ability to control the disease through behavioral change.
6	Ekasari, Rahman, Putri, & Wati (2023)	Terempa Selatan Village	The Relationship between CERDIK Behavior and Blood Pressure	Quantitative, cross-sectional analytic	The study showed that CERDIK behavior is one of the behavioral modification efforts to help control blood pressure among

			Control among Hypertensive Patients in Terempa Selatan Village, 2023		hypertensive patients. CERDIK components included health examinations, physical activity, balanced diet, rest, stress management, and avoiding cigarette smoke.
7	Ariani, Anggraini, & Faizal (2023)	Indonesia	The Relationship between Knowledge and CERDIK Behavior and Blood Pressure Control among Hypertensive Patients	Quantitative analytic, cross-sectional	The study analyzed the relationship between knowledge and CERDIK behavior and blood pressure control among hypertensive patients. Knowledge and implementation of CERDIK behavior were the aspects examined in blood pressure control efforts.
8	Ichsan et al. (2024)	Gebangrejo Sub-district	Implementation of CERDIK and PATUH as a Hypertension Prevention Effort in Gebangrejo Sub-district	Community service, education and screening	Implementation of CERDIK and PATUH was carried out through education and health examinations. The activities showed an increase in community knowledge following education and encouraged the implementation of CERDIK and PATUH behaviors in hypertension prevention.
9	Maryati, Praningsih, Nurmalisyah, & Siswati (2024)	Puton Village, Diwek Subdistrict, Jombang Regency	The Relationship between CERDIK Behavior and Blood Pressure among Hypertensive Patients in Puton Village, Diwek Subdistrict, Jombang Regency	Quantitative correlational, cross-sectional; 30 respondents	There was an association between CERDIK behavior and blood pressure with a p-value of 0.001. Respondents with better CERDIK behavior tended to have more controlled blood pressure.
10	Megayanti, Agustini, Diyu, Widiadnyana, Erawati, Lestari, &	Pedungan Village, South Denpasar, Bali	CERDIK and PATUH Method to Control Hypertension with the Interprofessional	Educational intervention, Interprofessional Education (IPE) and Interprofessional	CERDIK and PATUH education was delivered through counseling, booklets, audiovisual media, demonstration, and

	Budiningsih (2025)		Education and Collaboration Approaches	Collaboration (IPC) approach	practice. Pre-test and post-test results showed an increase in community knowledge following the intervention.
11	Shoufiah, Sipasulta, & Hazanah (2025)	Muara Rapak Sub-district, Balikpapan	Health Education on CERDIK and PATUH Behavior as an Effort for Hypertension Prevention and Control among the Community in Muara Rapak Sub-district, Balikpapan	Community-based health education	CERDIK and PATUH health education was directed at improving community knowledge, attitudes, and practices in hypertension prevention and control, and supported health behavior change.

The results of this systematic literature review show that the implementation of the CERDIK and PATUH programs in hypertension control across various regions of Indonesia has been carried out through promotive, preventive, and sustainable disease management approaches. The studies reviewed show that program implementation involves not only the delivery of information about hypertension but also health examinations, blood pressure screening, behavioral-change education, risk-factor management, treatment adherence, and patient monitoring. The findings of Alendra et al. (2024) represent the most specific evidence, as they directly analyze the implementation of the CERDIK and PATUH policy at the primary health center level. The results show that the program has been implemented through health promotion, screening, examination, and treatment of hypertension, but its implementation remains affected by limited human resources, limited funding, and the suboptimal role of cadres.

The implementation of CERDIK in the reviewed studies was generally directed at behavioral change to control hypertension risk factors. Regular health examinations, physical activity, dietary regulation, avoidance of cigarette smoke, adequate rest, and stress management were the components most frequently emphasized. Susanti, Anita, and Santoso (2021) showed that CERDIK behavior had been implemented by a portion of hypertensive patients, while the studies of Supriyatin and Novitasari (2022) and Maryati et al. (2024) showed an association between the implementation of CERDIK behavior and blood pressure status. These findings indicate that CERDIK holds an important position in hypertension control because it is oriented toward modifying risk factors directly related to patients' lifestyles.

Meanwhile, the implementation of PATUH places greater emphasis on the management of individuals who already have hypertension through regular health examinations, treatment adherence, the adoption of a healthy diet, physical activity, and avoidance of smoking and other risk factors. Lailiah et al. (2023) showed that CERDIK and PATUH can be used together in hypertension prevention and control activities through increased knowledge and behavioral change in the community. This is reinforced by Megayanti et al. (2025), who implemented CERDIK and PATUH through an interprofessional education and interprofessional collaboration approach. Education delivered through counseling, booklets, audiovisual media, demonstration, and practice shows that a structured approach can improve community understanding of hypertension control.

Across the studies as a whole, health education emerged as the most consistent component in the implementation of CERDIK and PATUH. Education not only provided knowledge about hypertension but was also directed at building the community's ability to perform health examinations, adopt a healthy lifestyle, control risk factors, and adhere to treatment. The study by Ichsan et al. (2024), for example, showed that the implementation of CERDIK and PATUH through education and health examinations could improve community knowledge. These findings indicate that education is an important entry point for behavioral change, but its effectiveness is greater when accompanied by examination, counseling, monitoring, and continuous follow-up.

Program implementation also demonstrated the importance of involving health workers, cadres, and the community. Health workers play a role in providing education, conducting screening and blood pressure examinations, and providing treatment and counseling, while cadres help reach the community and support monitoring activities at the community level. Alendra et al. (2024) showed that the involvement of various parties had occurred in the implementation of CERDIK and PATUH, but the role of cadres remained suboptimal. This condition indicates that the mere presence of cadres is not sufficient; capacity building, clear division of tasks, and continuous mentoring are needed so that cadres can effectively support program implementation.

In addition to implementer-related factors, the review findings indicate the existence of supporting and inhibiting factors affecting the success of implementation. Support from health workers, cadre involvement, availability of health facilities, continuous education, and community participation were factors that supported program implementation. Conversely, limited implementing personnel, funding, infrastructure, and low community participation were barriers identified in several studies. The findings of Alendra et al. (2024) show that limited human resources and funding can hinder program optimization even when CERDIK and PATUH activities are already available within primary health center services. Thus, the success of implementation depends not only on patient behavior but also on the readiness of the health service system to provide resources and follow-up mechanisms.

Viewed as a whole, the findings summarized in the table show that CERDIK and PATUH have complementary functions in hypertension control. CERDIK plays a greater role in the prevention and control of risk factors through lifestyle change, while PATUH strengthens the management of hypertensive patients through regular examinations, treatment adherence, diet, physical activity, and avoidance of risk factors. Therefore, integrated implementation of both is more relevant than implementing each component separately.

Nevertheless, a gap remains in the reviewed literature. Most studies still focus on knowledge, behavior, education, or the association between CERDIK and blood pressure, while studies that comprehensively evaluate the implementation of CERDIK and PATUH as a health service policy or program remain limited. This is evident from the differences in study design and focus shown in the table, ranging from qualitative studies on policy implementation to quantitative studies and community intervention activities. This condition means that evidence on how the CERDIK and PATUH policy is translated into program implementation, how contextual factors influence implementation, and how program sustainability can be maintained remains not yet fully explained.

Overall, the findings of this systematic literature review show that the success of CERDIK and PATUH implementation requires an integrated approach based on primary health care, involving health workers and cadres, and supported by continuous monitoring and evaluation. The program cannot be implemented merely as one-off counseling but must be followed by screening, counseling, treatment, adherence monitoring, and patient follow-up. This finding provides a basis for the argument that strengthening the implementation of CERDIK and

PATUH needs to take into account not only individual behavioral change but also resource readiness, implementer capacity, community support, and a health service system that sustains the continuity of the program.

Conclusion

Based on the results of this systematic literature review, the implementation of the CERDIK and PATUH programs represents an important approach to hypertension control through the integration of behavioral change, health education, screening, blood pressure examination, treatment adherence, and continuous monitoring. CERDIK plays a primary role in controlling risk factors through the adoption of a healthy lifestyle, whereas PATUH strengthens the management of hypertensive patients through regular examinations and adherence to treatment and health recommendations.

The success of program implementation is influenced by the involvement of health workers, cadres, families, and the community; the availability of facilities and infrastructure; funding support; and the continuous delivery of education and monitoring. Barriers that continue to be identified include limited human resources, funding, and infrastructure, the suboptimal role of cadres, and inconsistent community participation. Therefore, the implementation of CERDIK and PATUH needs to be strengthened through integrated primary health care, community empowerment, capacity building for health workers and cadres, and continuous program monitoring and evaluation. These findings indicate that hypertension control cannot be achieved through individual-level intervention alone, but requires support from the health service system and the community environment so that behavioral change and patient adherence can be sustained over the long term.

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