ORIGINAL RESEARCH

SCOPING REVIEW ON RISK FACTORS ASSOCIATED WITH HYPERTENSION IN INDONESIA

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Article Info	Abstract
  Corresponding Author: Victor Trismanjaya Hulu Email: victortrismanjayahulu@unprim dn.ac.id	**Background:** Hypertension is a global health problem that contributes significantly to deaths from cardiovascular disease. Unhealthy lifestyles, including excessive salt consumption, physical inactivity, and obesity, are the primary factors. Without management, hypertension can lead to serious complications such as heart disease, stroke, and kidney failure. **Objective:** This study aims to investigate, summarise, and identify various scientific evidence related to hypertension risk factors. **Methods:** This study employed a scoping review approach organised according to the PRISMA protocol. The Population–Concept–Context (PCC) framework was utilised as an initial guideline in formulating research questions and searching for relevant articles. The literature search process was conducted using several databases, including Google Scholar and Scopus. The included articles had to meet the inclusion criteria, which were limited to open-access journals published between 2020 and 2025. From a total of 512 articles found, only 14 met the selection criteria and were suitable for analysis. The data extraction process was conducted by eight people on the 14 selected articles, followed by qualitative data analysis. **Results:** The findings indicate that factors such as age, gender, length of employment, consumption of salt, sugary drinks, high-fat foods, elevated total cholesterol levels, low vegetable intake, lack of physical activity, stress, and abdominal circumference that exceeds the recommended play a role in increasing the risk of hypertension. **Conclusion:** These factors trigger fluid retention, insulin resistance, dyslipidemia, and central obesity that together raise blood pressure and accelerate vascular damage.

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1. Introduction

One of the most prevalent chronic diseases in the world today is hypertension (1). Hypertension is one of the leading causes of non-communicable disease burden worldwide (2). Hypertensive crisis, also known as hypertensive emergency, is characterised by a sudden and substantial increase in blood pressure (3). About one-third of people worldwide suffer from hypertension, which is a major modifiable risk factor for several Cardiovascular Diseases (CVDs), including peripheral arterial disorders, heart failure, ischemic heart disease, and cerebrovascular disease (4), (5).

On a global scale, hypertension ranks as the leading cause of cardiovascular disease and premature death (5). The majority of the 1.28 billion people in the world who suffer from hypertension are in low- and middle-income countries, with the majority of those affected aged between 30 and 79. Nearly half of all adults with hypertension do not know they have it. Only 42% of people with hypertension receive a diagnosis and treatment. About a quarter of people with hypertension have it under control (6). Risk factors for hypertension include salt intake (high sodium, low potassium), obesity, alcohol use, lack of physical activity, and poor dietary habits (5). Patients with a history of comorbid cardiovascular conditions, such as coronary artery disease (OR=1.654, 95%CI 1.232, 2.222), stroke (OR=1.769, 95%CI 1.218, 2.571), or chronic kidney disease (OR=2.899, 95%CI 1.32, 6.364), are at higher risk for hypertensive crisis (3).

Several studies on hypertension risk factors in Indonesia have been conducted. Still, a review that systematically summarises and maps the results of studies using a scoping review approach, by reviewing articles from SINTA 1 and SINTA 2-accredited journals, does not exist to date. Therefore, it is essential to summarise and understand the available literature to reveal key factors that contribute to the incidence of hypertension. Thus, this study aimed to identify and synthesise relevant scientific evidence on risk factors for hypertension, thereby providing a deeper understanding and complementing previous studies.

2. Methods

This study used a scoping review (7) Approach by applying the PRISMA protocol to collect and analyse findings from previous studies on risk factors for hypertension in young adults in Indonesia. In the initial stage, the article search strategy and the formulation of research questions were carried out using the PCC framework. The literature search process was conducted using Google Scholar and Scopus databases. Article search using keywords: (risk factors OR affecting factors OR determinants) AND (hypertension OR HTN) AND (crossectional OR case-control) AND (Indonesia). The inclusion criteria for this study are (1) journal articles published from 2020 to 2025, (2) English and Indonesian articles with open access, and (3) articles published in Scopus-indexed SINTA 1 and SINTA 2. Exclusion criteria are (1) journal articles in the form of reviews, (2) articles published before 2020. The article selection process began by identifying publications from two databases, namely Google Scholar and Scopus. The articles analysed focused on studies that addressed the phenomenon of hypertension risk factors in Indonesia and were published in SINTA 1 and SINTA 2- accredited journals.

The selection of these journals was based on the belief that the published articles had undergone a rigorous peer review process before publication. From a total of 512 journal articles collected, a duplication check was conducted using the Mendeley application, and 77 articles were identified as duplicates. After this process, the remaining 423 articles were filtered by excluding 259 articles that were not available in full-text format. Of the remaining 176 articles, 107 were eliminated because they were not relevant to the topic. Furthermore, of the 69 full-text articles, 55 were excluded because they were not suitable, for example, they did not employ an appropriate research design, were still in the acceptance stage, or were review articles. In the final stage, a qualitative data synthesis was conducted on fourteen articles that passed the selection process.
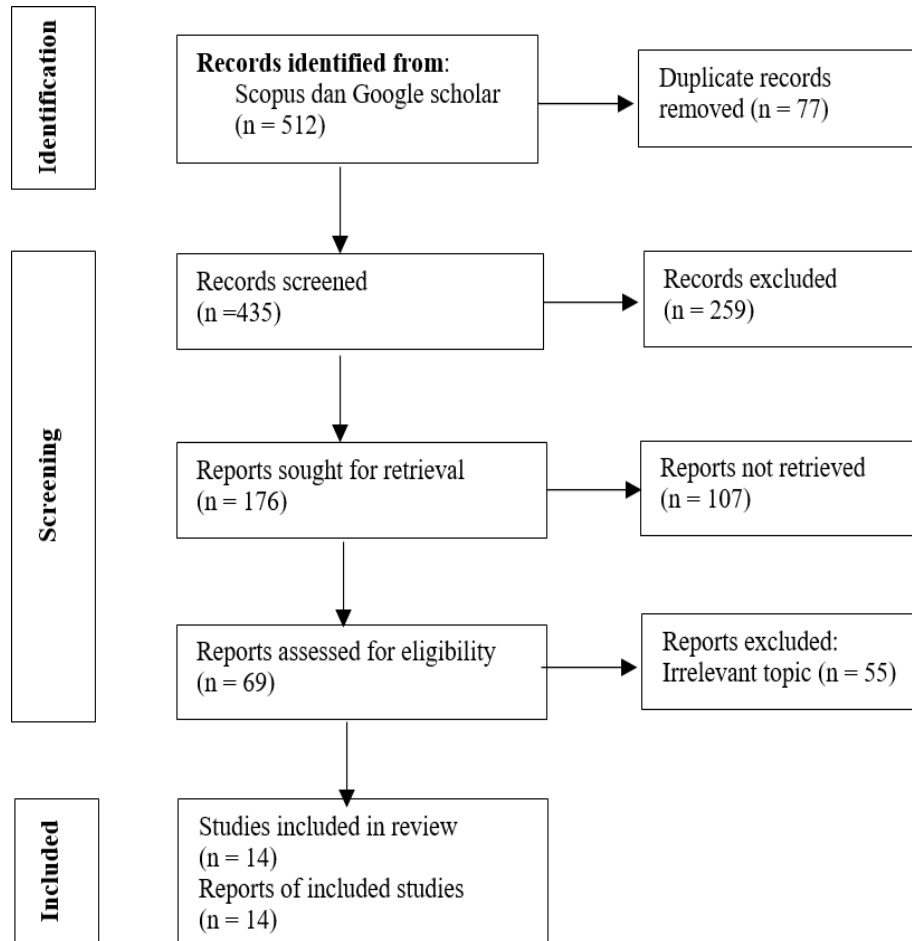
Figure 1. PRISMA

Eight people were involved in the data extraction process of 14 articles that met the criteria. The extraction stage began by reviewing the article title, abstract, research design, measurement methods, and data analysis. In the analysis stage, several steps were taken, starting with summarising the content of each article. This process involved identifying the author's name, year of publication, volume, and journal name, methodology used, main findings of the research, and the database source where the article was published. The data summary was then organised into a tabular synthesis matrix to facilitate the analysis process. The next step involved grouping questions related to the issue of hypertension in Indonesia to facilitate the identification of the study's focus through an examination of the findings obtained from the eleven selected articles. In the final stage, an in-depth analysis of the empirical evidence, theoretical foundations, and conceptual perspectives related to the study findings and methodological approaches used in each publication is conducted. The discussion section is organised to present a comprehensive elaboration of the research results, integrating the relevant theoretical framework as an analytical footing.

3. Results

Table 1 presents all articles included in this study that met the inclusion criteria, published between 2020 and 2025 and sourced from various journal databases, including Google Scholar and Scopus.

Table 1. Data Extraction Results

| Author and Year	Country	Participant	Study Design	Results	Database
(8)	Indonesia	100	*Cross-sectional*	Excess weight is significantly associated with the incidence of hypertension in the elderly.	SINTA 1/Scopus
(9)	Indonesia	46,186	*Cross-sectional*	Age is positively significant for hypertension, and exercise is negatively significant for hypertension.	SINTA 1/Scopus
(10)	Indonesia	100	*Cross-sectional*	Obesity is significant for hypertension.	SINTA 1/Scopus
(11)	Indonesia	212	*Cross-sectional*	Stress level is not significant for hypertension.	SINTA 1/Scopus
(12)	Indonesia	88	*Cross-sectional*	Smoking and hereditary factors are significant for the incidence of hypertension.	SINTA 1/Scopus
(13)	Indonesia	148	*Cross-sectional*	Nutritional status, total cholesterol level, abdominal circumference, and family history are significant factors for hypertension. Employment type, marital status, stress level, smoking habit, and physical activity were not important for hypertension.	SINTA 1/Scopus
(14)	Indonesia	80	*Cross-sectional*	Noise level, age, tenure, amount of exposure, and use of ear protection all contributed to increased blood pressure. However, smoking and exercise were not significantly associated with high blood pressure.	SINTA 1/Scopus
(15)	Indonesia	55	*Cross-sectional*	Age, consumption of sweets, and family history were significant for hypertension.	SINTA 1/Scopus
(16)	Indonesia	110	*Cross-sectional*	Knowledge and diet are significant for hypertension	SINTA 1/Scopus
(17)	Indonesia	297	*Cross-sectional*	Age, male, and waist circumference are significant factors in systolic blood pressure. Male age, waist circumference, and BMI are substantial predictors of systolic blood pressure.	SINTA 1/Scopus
(18)	Indonesia	154	Case control	Family history, knowledge level, and resting habits were significantly associated with hypertension.	SINTA 2/Google Scholar
(19)	Indoenesia	17,080	*Cross-sectional*	Body mass index, excess salt consumption, lack of eating fruits and vegetables, lack of physical activity, excess fat consumption, gender, and age were significant for hypertension. The variables of smoking and drinking alcohol are not significant to hypertension.	SINTA 2/Google Scholar
(20)	Indonesia	52	*Cross-sectional*	Family adherence is significant to the incidence of hypertension	SINTA 2/Google Scholar
(21)	Indonesia	120	*Cross-sectional*	Obesity, family history, and exercise activity were significant for hypertension. Smoking habit was not	SINTA 2/Google Scholar
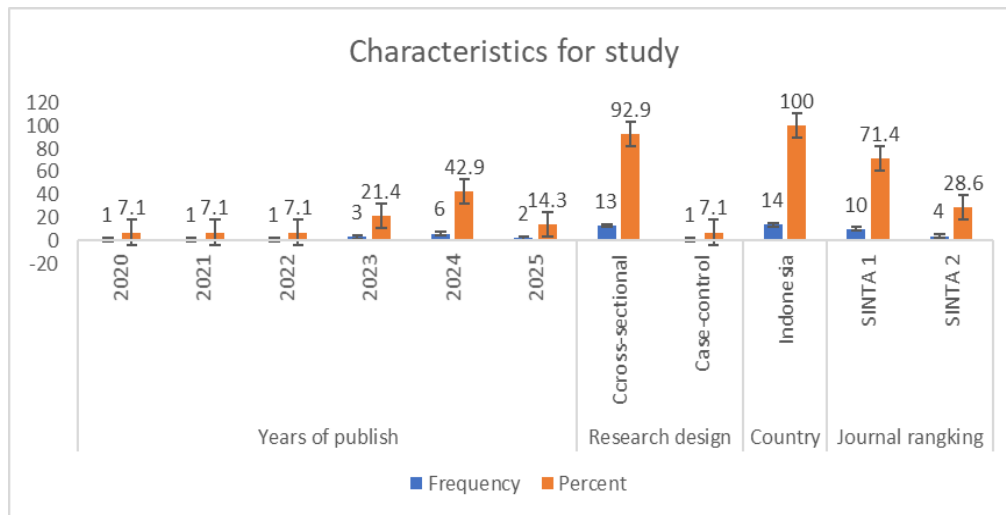
Figure 2. General Characteristics for Study Selection (n=14)

Data characteristics in this study included the year of publication, with 42.9% of articles published in 2024, 21.4% in 2023, and 14.3% in 2025. In terms of research design, the majority of articles (92.9%) used a cross-sectional approach, while the rest (7.1%) applied a case-control design. In terms of journal rank, 71.4% of the articles came from SINTA 1-accredited journals, while the other 28.6% came from SINTA 2 journals.

Table 2. Factors Associated with Hypertension Risk

Predictor Factors	Significant Risk Factors	Main Empirical Sources
Overweight	Overweight (p = 0,001)	(8)
Age, salty food consumption, sugary drink consumption, smoking habit, physical activity, body mass index status, history of tooth and gum disease	Age (p = <0.001; AOR = 1.06; 95%CI = 1.05-1.06), salty food consumption (>1 time a day (p = 0.037; AOR = 1.16; 95%CI = 1.01-1.33), sugary drink consumption >1 time a day (p = 0.001; AOR = 0.78; 95%CI = 0.67-0.90) and one time a day (p = 0.003; AOR = 0.79; 95%CI = 0.69-0.92). Physical activity (p = <0.001), obesity (p = <0.001; AOR = 2.59; 95%CI = 2.43-2.77), overweight (p = <0.001; AOR = 1.58; 95%CI = 1.45-1.72), underweight (p = <0.001; AOR = 0.55; 95CI = 0.49-0.61).	(9)
Obesity	Obesity (p = 0.006; r = 0.283)	(10)
Stress level	Stress level on systolic blood pressure (p = 0.131; and diastolic blood pressure (p = 0.831)	(11)
Smoking, heredity	Smoking (p = 0.016; OR = 3.51; 95%CI = 1.22-10.0), heredity (p = 0.023; OR = 3.08; 95%CI = (1.14-8.27).	(12)
Nutritional status, total cholesterol level, abdominal circumference, family history, employment type, marital status, stress level, smoking habit, and physical activity.	Total cholesterol level (p = <0.001; OR = 6.99; 95%CI = 2.396 - 20.396), abdominal circumference size (p = 0.014; OR = 0.032; 95%CI = 0.339 - 2.954), family history (p = <0.001; OR = 0.022; 95%CI = 0.005-0.089).	(13)
Noise level, age, tenure, amount of exposure, use of ear protection, smoking, and exercise.	Noise level (p = 0.041; PR = 1.83; 95%CI = 1.058-3.178), age (p = 0.024; PR = 1.83; 95%CI = 1.091- 3.092), length of service (p = 0.013; PR = 1.97; 95%CI = 1.158-3.365), number of	(14)

Predictor Factors	Significant Risk Factors	Main Empirical Sources
	exposures (p = 0.020; PR = 1.69; 95%CI = 1.068 - 2.681) and use of ear protection (p = 0.001; PR = 2.64; 95%CI = 1.417-4.927).	
Gender, age, obesity, smoking, consumption of sweets, consumption of fatty foods, consumption of fiber foods, consumption of salty foods, exercise routine, family history, knowledge and diet	Age (p = <0.001; PR = 3.50; 95%CI = 1.80-6.82), sweet food consumption (p = 0.02; PR = 0.54; 95%CI = 0.36 - 0.91), family history (p = <0.001; PR = 1.91; 95%CI = 1.20 - 3.04).	(15)
	Knowledge (p = 0.004; r = 0.974), and diet (p = 0.004; r = 0.974).	(16)
Male, age, waist circumference, BMI	Age (β=0.14; 95% CI=0.03 - 0.25; p=0.011), waist circumference (β=0.21; 95% CI=0.11 - 0.32; p<0.001), BMI (β=0.40; 95% CI=-0.01 - 0.26; p=0.064).	(17)
Resting habits, knowledge, family history, and attitude.	Resting habits (p = <0.001; OR = 0.18; 95%CI 0.03 - 0.70) knowledge (p = 0.01; OR = 26.25; 95%CI = 3.96-1.11), family history (p = <0.001: OR = 13.67; 95%CI 5.63-39.17)	(18)
Age, gender, smoking, physical activity, excessive salt consumption, excessive fat consumption, lack of fruit and vegetables, drinking alcoholic beverages, and BMI	BMI (p = <0.001; PR = 1.61; 95%CI = 1.51 - 1.72), excess salt consumption (p = <0.001; PR = 1.58; 95%CI = 1.48-1.69), eating less fruits and vegetables (p = <0.001; PR = 1.23; 95%CI 1.15 - 1.31), lack of physical activity (p = 0.01; PR = 1.10; 95%CI 1.03 - 1.18), excess fat consumption (p = 0.03; PR = 1.08; 95%CI = 1.01 - 1.15), gender (p = <0.001; PR = 0.84; 95%CI = 0.79 - 0.89), and age (p = <0.001; PR = 0.47; 95%CI = 0.44 - 0.51).	(19)
Family compliance	Family compliance (p = <0.001)	(20)
Obesity, family history, exercise activity, and smoking habits.	Obesity (p = 0.001), family history (p = 0.013), and physical activity (p = 0.009).	(21)

Table 2 reports that several variables are significant for hypertension risk factors. Of the fourteen studies analysed, seven studies discussed the characteristics of respondents, including age, tenure, gender, type of work, marital status, heredity, and the incidence of hypertension (9), (14), (19), (15), (12), (17), (18), (13). In addition, two studies discuss overweight, body mass index status, obesity, cholesterol levels, and other levels (8), (13), (10). However, few studies have focused on salty food consumption, sugary drink consumption, stress levels, smoking, family compliance, physical activity, and stress levels (9), (11), (20), (21).

4. Discussion

This scoping review provides evidence on risk factors for hypertension in Indonesia, focusing on articles published in SINTA 1 and SINTA 2 journals. Of the fourteen studies that met the inclusion criteria, various independent variables were found to be significant in the incidence of hypertension in Indonesia (Table 2). From multiple studies, it appears that there is still no consistent research on risk factors for hypertension. According to the review in this study, characteristics such as age, tenure, gender, occupation, marital status, family history and heredity are among the predictors associated with hypertension problems. Previous studies reported that age, education of respondents, gender, occupation, and history of hypertension were significant factors for the incidence of hypertension (22). However, another study reported that heredity, gender, BMI, and length of employment were not significant predictors of hypertension (23).

This study demonstrated a correlation between physical activity, smoking habits, drinking alcohol, knowledge, attitude, and hypertension (16), (18), (19), (21). However, smoking had no significant effect on hypertension (19), (21). Previous studies have also indicated that physical activity is not significant in the incidence of hypertension (24). Other studies indicate that smoking and physical activity are significant predictors of hypertension (25). Smoking behaviour, including the number of cigarettes, with hypertension, smoking duration, cigarette, and physical activity, is significantly associated with hypertension (26). Other studies also indicate that hypertension is associated with a family history of the disease (p=0.01), being overweight, smoking, lack of exercise, and drinking too much alcohol (27). Furthermore, A strong positive association was seen between knowledge and both attitude and practice, and practice with knowledge, but no significant link was detected between attitude and practice with hypertension (28).

This study review also indicated that salty food consumption, sugary drink consumption, fiber food consumption, excess salt consumption, excess fat consumption, total cholesterol level, and lack of fruit and vegetables (9), (13), (15), (19). According to previous studies, it is reported that having high triglyceride levels, obesity, and a lack of vegetable intake (at least 2 days per week) were associated with hypertension (29). In addition, consuming excessive amounts of salt is associated with an increased risk of hypertension. A person's sensitivity to salt can affect how much salt they consume (30). However, another study found no correlation between salt, fibre, and fat consumption and the development of hypertension. However, a good diet and exercise can lower blood pressure (31). Eating salty foods once a day, drinking sugary drinks three times a month, and not regularly consuming fruits and vegetables (32).

Based on this study, it was found that the level of public awareness is still relatively low on hypertension risk factors related to lifestyle, especially diet, such as consumption of salty foods, consumption of sweet drinks, lack of vegetable consumption which has a vital role in maintaining electrolyte balance and helping to lower blood pressure. Therefore, hypertension control requires strengthening promotive and preventive efforts based on a comprehensive understanding of its risk factors, to support policy formulation and implementation of more appropriate and efficient public health programs. Previous studies have indicated that it is important to improve the literacy and attitudes of the community in efforts to prevent and control hypertension to support the achievement of a healthier and more prosperous quality of life (33). This study only examined articles from SINTA 1 and SINTA 2 indexed journals, thus ignoring potentially relevant information from SINTA 3 to SINTA 6 journals. This restriction may introduce selection bias, as it only considers highly accredited sources, which may not fully reflect the diversity of contexts and findings in the field. In addition, this study did not include articles from reputable international journal databases, which may have introduced publication bias. However, this study has the advantage of strict source selection, as it only includes articles from SINTA 1 and SINTA 2 accredited journals, thereby ensuring the quality of the methodology and the credibility of the analysed data.

5. Conclusion

Increasing age, gender, tenure, and family history are irreversible and significant risk factors for hypertension. Several factors, such as consumption of salt, sugary drinks, fatty foods, increased total cholesterol, lack of vegetable consumption, less physical activity, stress, and excess abdominal circumference, contribute to the risk of hypertension. These factors trigger fluid retention, insulin resistance, dyslipidemia, and central obesity that together raise blood pressure and accelerate vascular damage. Low vegetable consumption contributes to an increased risk of hypertension as the body lacks natural intake of fibre, potassium, magnesium, and antioxidants. Future research is recommended to combine quantitative and qualitative methods to get a more comprehensive picture of hypertension risk factors. Future studies could also examine the relationship between risk factors and consider the role of social and environmental determinants in shaping lifestyles that contribute to the

development of hypertension.

6. Acknowledgments

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