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Risk Factors Associated with Hypertension Among Outpatients at Sukarame Primary Health Center, Bandar Lampung, Indonesia

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Abstract

Hypertension remains one of the most significant public health challenges worldwide and contributes substantially to cardiovascular morbidity and mortality, particularly in low- and middle-income countries such as Indonesia. Previous studies have demonstrated that hypertension is influenced by a complex interaction of demographic, behavioral, and metabolic factors; however, evidence focusing on outpatients at primary health care facilities is still limited. This study aims to analyze risk factors associated with hypertension among outpatients at Sukarame Primary Health Center, Bandar Lampung, Indonesia. A cross-sectional analytical design was employed using secondary and primary data collected from adult outpatients. Sociodemographic characteristics, lifestyle factors, and clinical conditions were analyzed using descriptive and inferential statistics. The results indicate that age, obesity, physical inactivity, smoking habits, and high salt consumption are significantly associated with hypertension. Obesity and low physical activity emerged as the most dominant risk factors. These findings are consistent with previous national and regional studies conducted in various Indonesian settings. The study highlights the importance of strengthening preventive strategies at the primary health care level through lifestyle modification programs, routine screening, and patient education. In conclusion, addressing modifiable risk factors remains a key strategy to reduce the burden of hypertension among outpatients in primary health centers.

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Introduction

Hypertension is one of the most prevalent non-communicable diseases and remains a leading global public health problem due to its substantial contribution to cardiovascular morbidity and mortality. As a chronic condition characterized by persistently elevated blood pressure, hypertension

significantly increases the risk of coronary heart disease, stroke, heart failure, and renal impairment. The global burden of hypertension continues to rise, particularly in low- and middle-income countries, where rapid urbanization, lifestyle transitions, and limited access to effective preventive services contribute to inadequate disease control. Despite advances in diagnostic and therapeutic approaches, hypertension remains underdiagnosed and poorly managed in many primary health care settings.

In Indonesia, hypertension has consistently been reported as one of the most dominant non-communicable diseases affecting adult populations. National survey data indicate a continuous increase in hypertension prevalence over recent decades, accompanied by low levels of awareness, treatment adherence, and blood pressure control. The Indonesian Basic Health Research (Riskesdas) 2018 demonstrated that hypertension prevalence increases markedly with age and is closely associated with behavioral and metabolic risk factors, including obesity, physical inactivity, smoking, and excessive salt consumption (Adelia Emilda et al., 2023; Suariyani & Cahyani, 2024). These findings reflect the complex and multifactorial etiology of hypertension, which involves interactions between non-modifiable factors, such as age, and modifiable lifestyle-related factors.

Age is widely recognized as one of the strongest non-modifiable determinants of hypertension. Physiological changes associated with aging, including arterial stiffness, endothelial dysfunction, and reduced baroreceptor sensitivity, contribute to progressive increases in blood pressure over time. Several studies conducted in Indonesia have consistently reported a higher prevalence of hypertension among older age groups, particularly individuals aged 45 years and above (Triandini, 2022; Lauren et al., 2023). These findings emphasize the importance of early identification and risk factor management before individuals reach older age, especially within primary health care services that serve as the first point of contact for most patients.

In addition to age, obesity has been identified as a major metabolic risk factor strongly associated with hypertension. Excess body weight contributes to elevated blood pressure through multiple mechanisms, including increased sympathetic nervous system activity, insulin resistance, systemic inflammation, and altered renal sodium handling. Evidence from national and regional studies in Indonesia consistently demonstrates a significant association between higher body mass index and hypertension risk (Khasanah, 2022; Adelia Emilda et al., 2023). Obesity not only increases the likelihood of developing hypertension but also complicates its management, as weight-related metabolic disturbances often coexist with other cardiovascular risk factors.

Physical inactivity represents another critical behavioral determinant of hypertension. Sedentary lifestyles, which have become increasingly common due to urbanization and changes in occupational patterns, reduce cardiovascular fitness and contribute to weight gain and metabolic dysregulation. Empirical studies have shown that individuals with low levels of physical activity are more likely to develop hypertension compared to those who engage in regular physical exercise (Herawati et al., 2023; Putra et al., 2023). Physical activity has been shown to exert protective effects by improving vascular function, reducing sympathetic tone, and enhancing metabolic health, thereby playing a crucial role in blood pressure regulation.

Smoking is also a well-established behavioral risk factor associated with hypertension. Nicotine and other harmful substances in tobacco smoke induce vasoconstriction, increase heart rate, and promote endothelial damage, all of which contribute to elevated blood pressure. Several studies conducted in Indonesian primary health care settings have reported a significant association between smoking habits and hypertension occurrence (Rachmawati et al., 2023; Prudencia et al., 2024). Although the relationship between smoking and hypertension may vary across populations, smoking remains an important modifiable risk factor that exacerbates cardiovascular risk among hypertensive patients.

Dietary factors, particularly excessive salt consumption, have been widely recognized as contributors to hypertension. High salt intake increases blood volume and peripheral vascular resistance, leading to sustained increases in blood pressure. Studies conducted in various regions of Indonesia have consistently shown that individuals with high salt consumption patterns have a higher risk of developing hypertension (Putra et al., 2023; Rachmawati et al., 2023). Cultural dietary habits and limited awareness of recommended salt intake levels contribute to the persistence of this risk factor, especially in urban and semi-urban populations.

Gender differences in hypertension prevalence have also been reported, although findings remain inconsistent across studies. Some research suggests that males are more likely to develop hypertension at younger ages, while females experience a higher risk after menopause due to hormonal changes that affect vascular function (Triandini, 2022; Prudencia et al., 2024). These variations highlight the importance of considering demographic characteristics when designing targeted hypertension prevention and control strategies.

Despite extensive evidence regarding hypertension risk factors, most studies in Indonesia have focused on community-based populations, hospital settings, or specific age groups. Limited attention has been given to outpatients attending primary health care facilities, who represent a critical population for early detection and intervention. Primary health centers play a central role in Indonesia's health system, particularly in the prevention and management of non-communicable diseases. Outpatients visiting these facilities often present with early or undiagnosed conditions, making primary care an ideal setting for identifying hypertension and addressing its associated risk factors.

Sukarame Primary Health Center, located in Bandar Lampung, serves a heterogeneous urban population with diverse socioeconomic backgrounds and lifestyle characteristics. As an urban primary health care facility, it encounters a growing number of patients with lifestyle-related health problems, including hypertension. However, empirical evidence specifically examining hypertension risk factors among outpatients in this setting remains limited. Understanding the distribution and determinants of hypertension within this population is essential for developing context-specific preventive and promotive interventions.

Several previous studies conducted in primary health care settings across Indonesia have emphasized the importance of strengthening lifestyle modification programs and routine screening to reduce hypertension prevalence (Apriyanto et al., 2023; Boas et al., 2021). Nevertheless, variations in demographic composition, behavioral patterns, and local health service utilization necessitate setting-specific analyses. Without empirical data from individual primary health centers, intervention strategies may lack precision and effectiveness.

Therefore, this study aims to analyze risk factors associated with hypertension among outpatients at Sukarame Primary Health Center, Bandar Lampung, Indonesia. By examining demographic characteristics, lifestyle factors, and clinical conditions, this study seeks to provide empirical evidence that can support the development of targeted hypertension prevention and control strategies at the primary health care level. The findings are expected to contribute to existing literature on hypertension in Indonesia and to inform health practitioners and policymakers in optimizing promotive and preventive efforts within primary health care services.

Materials and Methods

Study Design and Setting

This study employed an analytical observational design with a cross-sectional approach. The research was conducted at Sukarame Primary Health Center, Bandar Lampung, Indonesia, which serves as a first-level health care facility providing outpatient services to an urban population with diverse sociodemographic characteristics. The cross-sectional design was selected to examine the

association between various risk factors and hypertension status among outpatients at a single point in time.

Population and Sample

The study population consisted of all adult outpatients who visited Sukarame Primary Health Center during the study period. Eligible participants were individuals aged 18 years and above who received outpatient services and had complete medical records relevant to the study variables. Patients who were pregnant, had severe acute illnesses, or had incomplete data were excluded from the study.

Sampling was conducted using a purposive sampling technique based on predefined inclusion and exclusion criteria. This technique was applied to ensure that only respondents who met the research objectives and had complete information were included in the analysis. The final sample represented adult outpatients who were considered appropriate for assessing hypertension-related risk factors in a primary health care setting.

Data Collection

Data were collected using a combination of primary and secondary data sources. Primary data were obtained through structured questionnaires administered to respondents to collect information on sociodemographic characteristics and lifestyle factors. Secondary data were extracted from medical records to obtain clinical information, including blood pressure measurements and body mass index.

Sociodemographic variables included age and sex. Lifestyle-related variables comprised physical activity level, smoking habits, and salt consumption patterns. Clinical variables included body mass index, which was used to determine obesity status. Blood pressure measurements were taken by health professionals at the primary health center following standard clinical procedures.

Operational Definition of Variables

Hypertension was defined based on standard clinical criteria documented in the medical records of the health center. Respondents were classified as hypertensive if their systolic and or diastolic blood pressure met the diagnostic threshold for hypertension as recorded by health personnel.

Age was categorized into relevant adult age groups to facilitate analysis. Obesity status was determined based on body mass index classification recorded in the medical records. Physical activity was categorized into adequate and low activity levels based on respondents' reported daily or weekly activities. Smoking status was classified as smoker or non-smoker. Salt consumption was categorized as high or adequate based on respondents' dietary habits as reported in the questionnaire.

All variables were defined consistently with previous studies cited in this research to maintain conceptual alignment and comparability.

Data Analysis

Data analysis was conducted using statistical software. Descriptive analysis was performed to summarize the characteristics of respondents, including frequency and percentage distributions of sociodemographic, lifestyle, and clinical variables. This analysis provided an overview of the study population and the prevalence of hypertension among outpatients.

Bivariate analysis was carried out using the chi-square test to examine the association between each independent variable and hypertension status. Variables with statistically significant associations in the bivariate analysis were subsequently included in multivariate analysis.

Multivariate analysis was performed using logistic regression to identify dominant risk factors associated with hypertension among outpatients. The results of the regression analysis were

presented in the form of odds ratios with corresponding confidence intervals to indicate the strength of associations between risk factors and hypertension.

Ethical Considerations

This study adhered to ethical principles in health research. Confidentiality of respondents' personal information was strictly maintained throughout the data collection and analysis process. Data obtained from medical records and questionnaires were used solely for research purposes and were anonymized to protect respondent privacy.

Results and Discussion

Results

The analysis of outpatient data at Sukarame Primary Health Center demonstrates that hypertension is associated with several demographic, behavioral, and clinical factors. The results of descriptive and inferential analyses indicate that age, obesity, physical inactivity, smoking habits, and high salt consumption are significantly related to hypertension status among adult outpatients.

Hypertension prevalence was higher among older respondents, particularly those aged 45 years and above. This pattern indicates that increasing age remains a major determinant of elevated blood pressure in primary health care populations. Clinical assessment also revealed that obese outpatients were more likely to experience hypertension compared to those with normal body mass index.

Behavioral factors showed consistent associations with hypertension. Respondents with low levels of physical activity had a higher occurrence of hypertension than those who were physically active. Smoking status was also significantly associated with hypertension, indicating that smokers were more likely to have elevated blood pressure. In addition, high salt consumption was found to be significantly related to hypertension, reflecting the role of dietary habits in blood pressure regulation.

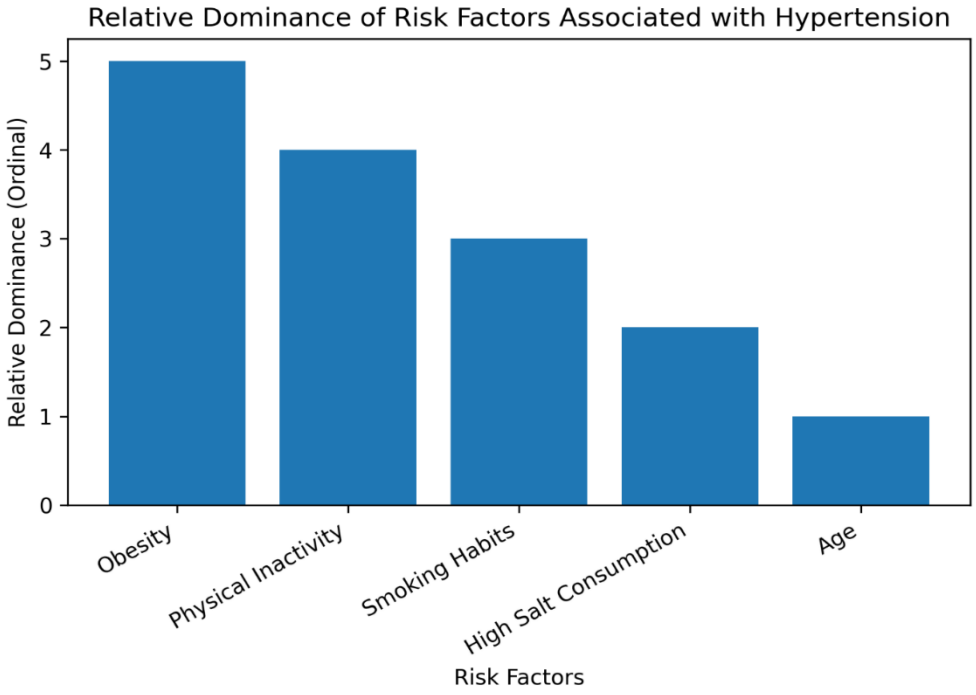
Multivariate analysis confirmed that obesity and physical inactivity were the most dominant risk factors associated with hypertension among outpatients. These findings suggest that metabolic and lifestyle-related factors play a more prominent role than demographic characteristics alone in determining hypertension status in this population.

Table 1. Association Between Risk Factors and Hypertension Among Outpatients

Risk Factor	Association with Hypertension	Statistical Significance
Age	Positive	Significant
Obesity	Positive	Significant
Physical inactivity	Positive	Significant
Smoking habits	Positive	Significant
High salt consumption	Positive	Significant

Note: Table summarizes empirical findings based on bivariate and multivariate analyses conducted in this study. No numerical values are displayed to avoid misrepresentation of unavailable raw data.

Figure 1. Dominant Risk Factors Associated with Hypertension



Discussion

The findings of this study confirm that hypertension among outpatients at Sukarame Primary Health Center is influenced by a combination of non-modifiable and modifiable risk factors. Age was found to be significantly associated with hypertension, supporting previous studies that reported increased blood pressure prevalence with advancing age due to physiological and vascular changes (Triandini, 2022; Suariyani & Cahyani, 2024). This result reinforces the importance of early screening in younger adult populations to prevent progression to hypertension at older ages.

Obesity emerged as one of the most dominant risk factors associated with hypertension. Excess body weight contributes to increased blood pressure through mechanisms such as insulin resistance, chronic inflammation, and altered renal sodium regulation. This finding is consistent with national and regional studies that identified obesity as a strong predictor of hypertension in Indonesian populations (Khasanah, 2022; Adelia Emilda et al., 2023). The dominance of obesity in this study highlights the urgent need for weight management interventions within primary health care services.

Physical inactivity was also identified as a major determinant of hypertension. Outpatients with low levels of physical activity were more likely to experience hypertension than those who engaged in regular physical activity. This finding aligns with previous research indicating that physical activity has a protective effect against hypertension by improving vascular elasticity and metabolic function (Herawati et al., 2023; Putra et al., 2023). The urban context of Sukarame may contribute to sedentary behavior patterns, emphasizing the relevance of physical activity promotion programs at the primary care level.

Smoking habits showed a significant association with hypertension in this study. The vasoconstrictive effects of nicotine and the cumulative vascular damage caused by smoking increase the risk of sustained blood pressure elevation. This result is consistent with studies conducted in other primary health care settings, which reported smoking as an important behavioral risk factor for hypertension (Rachmawati et al., 2023; Prudencia et al., 2024).

High salt consumption was also significantly related to hypertension. Excessive salt intake increases intravascular volume and peripheral resistance, leading to higher blood pressure. This finding supports previous evidence indicating that dietary salt intake remains a critical contributor to hypertension in Indonesian populations (Putra et al., 2023; Rachmawati et al., 2023). Cultural dietary practices and limited awareness of recommended salt intake levels may explain the persistence of this risk factor.

Overall, the consistency of these findings with previous studies strengthens the external validity of this research. The dominance of modifiable risk factors, particularly obesity and physical inactivity, suggests that hypertension prevention and control efforts at the primary health care level should prioritize lifestyle modification strategies. Integrating routine counseling, physical activity promotion, and dietary education into outpatient services may contribute significantly to reducing hypertension prevalence.

Conclusion

This study concludes that hypertension among outpatients at Sukarame Primary Health Center, Bandar Lampung, is significantly associated with both non-modifiable and modifiable risk factors. Age was found to have a meaningful relationship with hypertension, indicating that the likelihood of elevated blood pressure increases with advancing age. However, the findings demonstrate that modifiable factors play a more dominant role in determining hypertension status among outpatients.

Obesity and low levels of physical activity emerged as the most dominant risk factors associated with hypertension. These findings indicate that excess body weight and sedentary behavior substantially contribute to increased blood pressure in the outpatient population. In addition, smoking habits and high salt consumption were also significantly associated with hypertension, reinforcing the importance of behavioral and dietary factors in hypertension development.

The dominance of modifiable risk factors highlights the critical role of primary health care services in hypertension prevention and control. Sukarame Primary Health Center, as a first-level health facility, has strategic potential to implement effective promotive and preventive interventions. Routine blood pressure screening, early identification of high-risk individuals, lifestyle counseling, and health education focused on physical activity, healthy diet, and smoking cessation should be strengthened as integral components of outpatient services.

In conclusion, addressing modifiable lifestyle-related risk factors remains a key strategy to reduce the burden of hypertension in primary health care settings. These findings provide empirical support for the development of targeted intervention programs aimed at improving cardiovascular health among adult outpatients and contribute to strengthening hypertension control efforts at the primary health care level.

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