

The Association of Hypertension Risk Factors among Employees of the Health Quarantine Office: A Cross-Sectional Study

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ABSTRACT

Background: Hypertension is the leading cause of mortality worldwide, with 90–95% of cases classified as essential hypertension. According to data on non-communicable or degenerative diseases in East Kalimantan, 595,689 individuals over the age of 15 were projected to suffer from hypertension in 2023. Several factors contribute to the prevalence of hypertension in Indonesia, including age, sex, family history of hypertension, educational level, occupation, place of residence, nutrition and lifestyle, and physical activity. The aim of this study was to examine the association between individual characteristics and nutritional status with the risk of hypertension among employees of the Class I Health Quarantine Office (Balai Karantina Kesehatan/BKK) in Samarinda, aged between 27 and 57 years. **Methods:** This research employed a cross-sectional design involving 47 civil servants, comprising both permanent (PNS) and contract-based (PPPK) staff. Blood pressure and nutritional status (body mass index) data were obtained through direct measurements conducted in March 2025 at the BKK Class I Samarinda Office. The findings of this study indicate a significant association between individual characteristics specifically age and nutritional status and the incidence of hypertension among the employees.

INTRODUCTION

Hypertension is defined as a systolic blood pressure greater than 140 mmHg and a diastolic blood pressure greater than 90 mmHg, measured twice at five-minute intervals while at rest.(1,2) Hypertension remains the leading cause of mortality worldwide, with an estimated 90–95% of global deaths attributed to this condition. Currently, nearly one billion individuals are affected by hypertension, and approximately two-thirds of them reside in low- and middle-income countries. Globally, one in three adults suffers from hypertension, which is a major risk factor for stroke, myocardial infarction, heart failure, renal impairment, and various other health complications. Alarmingly, the global burden of hypertension has doubled over the past three decades, rising from 650 million cases in 1990 to 1.3 billion in 2019 (3).

According to WHO Indonesia data in 2019, approximately 51.3 million adults aged between 30 and 79 years suffered from hypertension. Among them, 36% had been diagnosed with hypertension (29% men and 41% women), 19% received treatment (15% men and 21% women), and only 4% had their blood pressure under control (4% men and 5% women) (3). Additionally, 69% of deaths due to cardiovascular disease in 2019 were attributed to high blood pressure (3). The 2023 Indonesian Health Survey (SKI) and the 2011–2021 Non-Communicable Disease (NCD) cohort study stated that hypertension is the fourth leading cause of death, accounting for 10.2% of all deaths. In East Kalimantan, based on data from the Provincial Office of Non-Communicable or Degenerative Diseases, the number of people over the age of 15 with hypertension in 2021, 2022, and 2023 were 206,848; 448,644; and 595,689 respectively (4).

Several studies have identified various contributing factors to hypertension in Indonesia, including age, sex, education level, occupation, place of residence, dietary and lifestyle patterns, physical activity, smoking, and alcohol consumption (5,6). According to data from the Indonesian Ministry of Health, individuals aged 18–59 years with low physical activity are 1.9 times more likely to have hypertension than those with sufficient physical activity; those with central obesity in the same age group are 3.4 times more likely to suffer from hypertension compared to those without central obesity; and among individuals over 60 years, the number of hypertension cases is equal between those with and without central obesity (7).

The aim of this study is to determine how individual characteristics and nutritional status correlate with the risk of hypertension among employees of the Class I Health Quarantine Office (Balai Kekarantinaan Kesehatan/BKK) in Samarinda, who fall within the productive adult age range of 27–57 years.

METHODS

This study employed a quantitative cross-sectional design, involving 47 employees of the Class I Health Quarantine Office (Balai Kekarantinaan Kesehatan/BKK) in Samarinda, who were classified as belonging to the active adult age group (27–58 years). The study received ethical approval from the Health Research Ethics Committee of the Faculty of Medicine, Mulawarman University, Samarinda, under approval number 88/KEPK-FK/V/2025.

Blood pressure and nutritional status (body mass index/BMI) were measured in March 2025 at the BKK Class I Samarinda Office. Blood pressure measurements were conducted using a digital sphygmomanometer and stethoscope. Three measurements were taken at intervals of 5–10 minutes, with the participant seated and at rest. The classification of hypertension followed the guidelines from the 7th Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VII), defined as an average systolic blood pressure >140 mmHg and/or a diastolic blood pressure >90 mmHg, or current use of antihypertensive medication.

Honorary employees and contract-based civil servants (Non-Civil Servant Government Employees/PPNPN) were excluded from the study.

Other variables collected included individual characteristics such as age (classified according to the Ministry of Health of the Republic of Indonesia), gender, ethnicity, marital status, education, occupation, family history of hypertension, and lifestyle factors such as smoking, physical activity, and sleep duration. These data were obtained through structured interviews using a validated questionnaire.

The collected data were analyzed using SPSS software. Bivariate analysis was performed using the chi-square test to examine the association between the dependent variable (hypertension status) and independent variables (respondent characteristics, family history of hypertension, nutritional status, lifestyle, and dietary patterns). For independent variables with more than two categories, bivariate logistic regression was used.

RESULT AND DISCUSSION

RESULT

Respondent Characteristics

Table 1. Respondent Characteristics by Hypertension Status

Variable	Hypertension		No. Hypertension		P-value
	n	%	n	%	
Age					0,002
20 – 39	2	20	9	90	
40 – 59	4	19,05	20	95,24	
Sex					0,413
Male	4	16,67	20	83,33	
Female	2	8,70	21	91,30	
Marital Status					0,424
Married	6	13,95	37	86,05	
No Married	0	0,00	4	100,00	
Ethnicity					0,258
Jawa	3	10,71	26	92,86	
Banjar	2	33,33	5	83,33	
Toraja	1	33,33	2	66,67	
etc	0	0,00	8	80,00	
Education					0,149
Diploma	0	0,00	6	100,00	
Bachelor's degree	3	9,68	28	90,32	
Master	3	30,00	7	70,00	
					0,58

Job					
Civil Servant	6	13,33	39	86,67	
PPPK	0	0,00	2	100,00	
History of Hypertension					0,113
No	1	4,55	21	95,45	
Yes	5	20,00	20	80,00	
Nutritional status					0,015
Normal (18,5 – 24,9)	0	0,00	17	100,00	
Pra Obesity (25 – 29,9)	2	11,11	12	85,71	
Obesity level 1 (30 – 34,9)	2	11,11	11	84,62	
Obesity level 1 2 (35 – 39,9)	2	11,11	1	33,33	

Table 1 shows that 12.8% or 6 out of 47 employees at the Class I Health Quarantine Office (BKK) in Samarinda were found to have hypertension. This table presents the respondent characteristics based on hypertension status, indicating that hypertension is more frequently observed among middle-aged individuals compared to younger adults. Hypertension also appears to be more common among employees who are overweight or obese, with a prevalence of 16.67% among males and 13.95% among Javanese individuals. Moreover, the data indicate that civil servants (PNS) rather than contract-based employees (PPPK) experienced hypertension. Five of the civil servants diagnosed with hypertension reported a family history of the condition.

In addition, the data suggest that age, marital status, ethnicity, education level, occupation, and family history of hypertension were not significantly correlated with hypertension risk.

Lifestyle and Dietary Patterns

Table 2. Lifestyle and Dietary Patterns

Variable	Hypertension		No. Hypertension		P-value
	n	%	n	%	
Physical Activity					0,923
Light	1	14,29	6	85,71	
Moderate	3	11,11	24	88,89	
Heavy	2	15,38	11	84,62	
Sleep Duration					0,639
Sufficient	4	11,43	31	88,57	
Insufficient	2	16,67	10	83,33	
Smoking					-
Never	6	12,77	41	87,23	
ever	0	0,00	0	0,00	
Green Vegetable Consumption (Times/Week)					0,764
> 3	2	10,53	17	89,47	
1 – 3	4	15,38	22	84,62	
0	0	0,00	2	100,00	
Fried Food Consumption (Times/Week)					0,175
> 3	3	23,08	10	76,92	
1 – 3	2	6,45	29	93,55	
0	1	33,33	2	66,67	
Fruid consumption (Times/Week)					0,336
> 3	1	6,25	15	93,75	
1 – 3	5	16,13	26	83,87	
0	0	0,00	0	0,00	
Instant Noodle Consumption (Times/Week)					0,236
> 3	1	50,00	1	50,00	
1 – 3	4	12,90	27	87,10	
0	1	7,14	13	92,86	

Consumption of Sugary Foods (Times/Week)				
> 3	3	13,04	20	86,96
1 – 3	3	13,04	20	86,96
0	0	0.00	1	100,00

0,928

DISCUSSION

The Association between Respondent Characteristics and Nutritional Status with Hypertension

This study presents findings that differ slightly from a previous study conducted among employees at a similar office in Jayapura City. That earlier study identified age, obesity, physical activity, workload, and stress as significant risk factors for hypertension (8). However, in this current study conducted at the Class I Health Quarantine Office (BKK) in Samarinda, the factors found to significantly influence the occurrence of hypertension among employees were age (p-value = 0.022) and nutritional status (p-value = 0.015). Age was shown to have a significant impact on the incidence of hypertension. The findings indicate that the older the employees, the higher the likelihood of developing hypertension. This supports the theory of vascular elasticity reduction, where aging is associated with decreased arterial elasticity, contributing to elevated systolic blood pressure, commonly referred to as the arterial stiffness hypothesis (9,10).

Another factor found to influence hypertension risk was nutritional status. The study revealed that all employees diagnosed with hypertension were either overweight or classified as Obesity Class I or Class II. This aligns with the Overweight and Obesity Theory, which suggests that excess body weight increases insulin resistance and leads to hyperactivation of the sympathetic nervous system as well as the renin-angiotensin-aldosterone system (RAAS), all of which contribute to elevated blood pressure (11,12). An additional supporting explanation comes from the Chronic Inflammation Theory, which posits that poor nutritional status, particularly obesity, triggers chronic inflammation through the release of pro-inflammatory cytokines such as interleukin-6 and TNF- α . This chronic inflammatory process impairs vascular function and leads to an increase in blood pressure (13, 14). Other variables related to respondent characteristics such as gender, marital status, ethnicity, education level, and family

CONCLUSION

Based on the findings of this cross-sectional study on the relationship between hypertension risk factors among employees of the Class I Health Quarantine Office (BKK) in Samarinda, six employees aged 40–59 years (19.05%) were found to have hypertension, with 11.11% being overweight. These results indicate an association between individual characteristics and nutritional status with the risk of hypertension among employees in the productive adult age group.

Body weight was identified as a major contributor to nutritional status, which ultimately influenced the onset of hypertension. As an adjustable factor, body weight requires special attention, particularly since all employees with hypertension in this study were overweight, classified as Obesity Class I or II. Therefore, health promotion regarding healthy food consumption, weight control, and increasing awareness about the dangers of hypertension is recommended at BKK Class I Samarinda. Further in-depth research is also recommended to better understand how dietary patterns and physical activity affect nutritional status, which is a key risk factor for hypertension. Such studies should be conducted on a larger scale to yield more accurate and generalizable data.

history of hypertension did not show a significant association in this study. Although most hypertension cases are classified as essential hypertension, which is often influenced by genetic factors, these genetic influences can be altered or minimized through the adoption of a healthy lifestyle or through medical interventions (15). The slight differences observed between the findings of this study and previous research on hypertension risk factors suggest several limitations. These include a limited sample size, which may restrict the generalizability of the findings to larger populations. In addition, nutritional status was measured through interviews and body mass index (BMI) assessments, which may introduce potential bias or inaccuracies. The use of interview methods also opens the possibility of response bias, particularly if respondents did not provide truthful or accurate information regarding their dietary habits or physical activity.

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