

ORIGINAL RESEARCH

ANALYSIS OF AGE, SMOKING HABIT, NUTRITIONAL STATUS, AND THEIR INFLUENCE ON HYPERTENSION

Analisis Pengaruh Umur, Kebiasaan Merokok dan Status Gizi Terhadap Kejadian Hipertensi

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ARTICLE INFO

Article History:

Received September, 11th, 2020

Revised form November, 12th, 2020

Accepted January, 7th, 2021

Published online January, 29th, 2021

Keywords:

hypertension;
smoking habits;
age;
status gizi;
fat intake

Kata Kunci:

hipertensi;
kebiasaan merokok;
umur;
nutritional status;
asupan lemak

ABSTRACT

Background: Hypertension is a major risk factor for cardiovascular disease that can lead to death; it is a condition that is related to age, nutritional status and smoking habit. The likelihood of a person being overweight or obese increases every year, and there are still many people who have a smoking habit. **Purpose:** This study aims to analyze the effect of age, smoking habit and nutritional status on incidences of hypertension in East Java Province. **Methods:** This was an analytical observational study using a cross-sectional design and employing secondary data derived from the 5th Indonesian Family Life Survey (IFLS). Data collection was carried out among all household members in East Java who were still at a productive age (15–64 years) making a total of 3,803 respondents. The variables observed were age, gender, nutritional status, smoking habit, physical activity, and consumption of high-fat foods. The data analysis used the chi-squared test and logistic regression. **Results:** The findings of this study show that there is a relationship between age and nutritional status and the incidence of hypertension. However, there was no significant relationship between smoking habit and the incidence of hypertension. Elderly respondents were shown to have 12 times the risk of developing hypertension than teenage respondents. **Conclusion:** Age is the dominant factor causing hypertension in East Java Province. Adults and the elderly in East Java Province are expected to maintain a healthy lifestyle.

How to Cite: Putra, W. N., Wiratama, B. S., Indawati, R., & Indriani, D. (2021). An analysis of age, smoking habit and nutritional status and their influence on incidences of hypertension in East Java Province. *Jurnal Berkala Epidemiologi*, 9(1), 10–17. <https://dx.doi.org/10.20473/jbe.v9i12021.10-17>

ABSTRAK

Latar Belakang: Hipertensi merupakan faktor risiko utama penyakit kardiovaskuler yang menyebabkan kematian; ini adalah kondisi yang berkaitan dengan usia, status gizi, dan kebiasaan merokok. Prevalensi overweight dan obesitas mengalami peningkatan setiap tahunnya dan masih banyak masyarakat yang memiliki kebiasaan merokok. **Tujuan:** Penelitian ini bertujuan untuk menganalisis pengaruh umur, kebiasaan merokok dan status gizi dengan kejadian hipertensi di Provinsi Jawa Timur. **Metode:** Jenis penelitian ini adalah observasional analitik dengan desain cross sectional menggunakan data sekunder Indonesian Family Life Survey 5. Pengumpulan data dilakukan pada semua Anggota Rumah Tangga (ART) yang berusia produktif (15-64 tahun) di provinsi Jawa Timur berjumlah 3.803 responden. Variabel yang diobservasi adalah usia, jenis kelamin, status gizi, kebiasaan merokok, aktivitas fisik, dan konsumsi sumber lemak. Analisis data menggunakan uji chi square dan regresi logistik. **Hasil:** Penelitian ini menunjukkan adanya hubungan antara usia dan status gizi terhadap kejadian hipertensi, namun tidak ditemukan adanya hubungan yang bermakna antara kebiasaan merokok dengan kejadian hipertensi. Responden dengan usia lanjut berisiko 12 kali lebih besar mengalami hipertensi daripada responden usia remaja. **Kesimpulan:** Usia merupakan faktor dominan penyebab terjadinya hipertensi di Provinsi Jawa Timur. Usia dewasa dan lansia di Provinsi Jawa Timur diharapkan lebih menjaga pola hidup sehat.

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INTRODUCTION

Hypertension is a condition involving an increase in blood pressure (i.e., one that exceeds normal limits and persists continuously). Hypertension is commonly referred to as the “silent killer,” because it is often found in individuals without any previous symptoms. Hypertension has become one of the comorbidities that contribute significantly to the incidence of stroke, coronary heart disease, and kidney failure, and is one of the leading causes of death in society (and likely to increase in the future) (Nelwan, Widjajanto, Andarini, & Djati, 2016).

According to the World Health Organization (2009) it is estimated that there are around 1.50 billion people in the world who experience high blood pressure, with a fatality rate of eight million deaths per year in the world and 1.50 million deaths per year in Southeast Asia. Indonesia Basic Health Research (Riskesdas) data in 2018 showed that the prevalence of high blood pressure based on measurement results among people aged ≥ 18 years in Indonesia increased from 25.80% in 2013

to 31.70% in 2018 (Ministry of Health RI, 2018). The health profile of the Province of East Java in 2016 showed that the incidence rate of hypertension was 13.74% (i.e., about 1 in 7 people experience hypertension) (East Java Provincial Health Office, 2018)

The results of the study conducted by Choi, Kim, & Kang (2017) indicate that there is a relationship between gender and hypertension in the 2010–2014 Korean National Health and Nutrition Examination survey. The prevalence of hypertension in adults was found to be higher in men (34.60%) than women (30.80%), while the prevalence of hypertension in the elderly (> 60 years) was higher in women than men. The prevalence of hypertension in adults was higher in men, due to the fact that men consume alcohol more often than women.

Shang et al (2016) show an increase of 10 mmHg in the blood pressure of respondents aged 40–49 years and 50–59 years in Xi'an Village, China. A study conducted by Mahiroh, Astutik, & Pratama (2019) explains that there is a positive relationship between being overweight or obese

and incidences of hypertension in Indonesia. Obese respondents had a four times greater risk of experiencing hypertension than respondents at a normal weight.

A study by Diana, Khomsan, Nurdin, Anwar, & Riyadi (2018) among adult males in Cianjur District found a significant relationship between smoking and hypertension. The majority of subjects in their study (83.90%) had a smoking habit and almost half (43.70%) had hypertension. This smoking behavior was due to the fact that many residents had been smokers since their school days.

A study conducted by Hardati & Ahmad (2017) showed that as many as 32.60% of respondents had a habit of light physical activity (<600 MET week). The results of a multivariate analysis show that physical activity has a significant effect on the incidence of hypertension in workers. Respondents engaging in light physical activity had a 1.25 times greater risk of experiencing hypertension compared to respondents engaging in strenuous physical activity. Most respondents to this survey habitually engaged in light physical activity due to the ineffective implementation of opportunities for physical activity in the work environment.

The results of a study conducted by Mafaza, Wirjatmadi, & Adriani (2016) show that there is a significant relationship between fat intake and hypertension (p value = 0.02). In the study, 25.90% of respondents had a fat intake above the nutritional adequacy rate (RDA) and their blood pressure was classified as hypertensive by the Vascular Cardiology Clinic at Airlangga University Hospital, Surabaya. Excess fat intake is a risk factor for hypertension. Respondents with fat consumption above the RDA have a 0.26 times greater risk of experiencing hypertension than do respondents whose fat consumption meets RDA recommendations.

The results of a study conducted by Shukuri, Tewelde, & Shaweno (2019) show that there is a significant relationship between age and nutritional status and the incidence of hypertension in adults in villages in Ethiopia. Respondents aged >70 years had a 1.91 times greater risk of experiencing hypertension than respondents aged 50–59 years. There is an increased risk if the respondent is overweight or obese; that is, such respondents are 4.29 times more likely to experience hypertension than respondents with a normal nutritional status.

The number of overweight citizens increases every year and many people have a smoking habit; thus, the high incidence of hypertension in East Java Province is the focus of this study. The aim of this study is to analyze the effect of age, smoking habit and nutritional status on incidences of hypertension in East Java Province.

METHODS

This is an analytical observational study that employs a cross-sectional study design. It uses secondary data on the incidence of hypertension in East Java, along with the relevant risk factors, derived from the 5th Indonesian Family Life Survey (IFLS). Data collection in IFLS-5 was carried out among all household members in East Java who were still at a productive age (15–64 years) making a total of 3,803 respondents. The variables observed were age, gender, nutritional status, smoking habit, physical activity, and consumption of high-fat foods. Hypertension status was obtained from the health measurement book (US), which measures blood pressure using a tensimeter on the respondent's left and right arms, repeating the measurement three times at three different times. Information on the respondents' characteristics (Smoking Habit (KM), Health Condition (KK), and Eating Frequency (FM)) was obtained from the cover section of book 3B. The respondents' characteristics included questions about gender (male and female), age (15–64 years), smoking habit (chewing tobacco, smoking tobacco using a pipe, or self-rolling and smoking cigarettes/cigars), physical activity performed by the respondents during the previous week (light (<600 MET-minutes/week), moderate (600–2999 MET-minutes/week), and strenuous (\geq 3000 MET-minutes/week)), consumption of high-fat foods (frequency of the consumption of high-fat foods during the last week). Variable nutritional status data based on body mass index by age (BMI/A) is available in the US book. The data analysis technique used in this study was a bivariate analysis, using the chi-squared test and a multivariate analysis with logistic regression. The 5th IFLS survey has received a test of ethical suitability from the RAND's Human Subjects Protection Committee (RAND's IRB) with number s0064-06-01-CR01 and the Ethics Committee of Gadjah Mada University Indonesia (RAND Corporation, 2015).

RESULTS

Relationship Between Gender and Hypertension

Table 1 shows that the proportion of male respondents who have normal blood pressure is almost the same as that of female respondents. A similar result was indicated in the high blood pressure category, in which the proportion of male respondents was almost the same as that of female respondents. More female respondents were classified as hypertensive than male respondents. The risk of hypertension among women increases from time to time, because women will experience various circumstances such as pregnancy, the use of contraception, and the menopause. These conditions can cause a significant decrease in the levels of estrogen and progesterone, both of which play a role in maintaining a stable blood pressure. The results of the chi-squared test indicate that there is no significant relationship between gender and hypertension.

Relationship Between Physical Activity and Hypertension

Respondents engaging in strenuous physical activity were more likely to exhibit a normal blood pressure than those in other categories of physical activity. An increase in the proportion of hypertension could be seen in each of the other categories (mild, moderate and severe nutritional status). This indicates that the lighter the physical activity, the greater the risk of hypertension to the respondents. Out of 676 respondents who experienced hypertension, 174 engaged in light physical activity (25.70%). This high proportion of respondents engaging in light physical activity indicates that the majority of respondents still have a sedentary lifestyle. The results of the chi-squared test showed no significant relationship between physical activity and hypertension (Table 1).

Relationship Between the Consumption of High-Fat Food and Hypertension

Table 1 indicate that respondents who rarely consume high-fat foods are more likely to have a normal blood pressure compared to other consumption categories. There is a decrease in the number of cases of hypertension in each category (rare, sufficient and frequent). Most of the respondents (66.40%) rarely consume high-fat foods. The results of the chi-squared test found that there was no significant relationship between the consumption of high-fat foods and the incidence of hypertension.

Relationship Between Age and Hypertension

There were more respondents in the adult age category who had normal blood pressure compared to other age categories, but at this age there was also a high incidence of hypertension (12%). This shows that hypertension does not only occur in the elderly, but can also occur in adulthood. The results of the chi-squared test show a significant relationship between age and hypertension (Table 1).

Relationship Between Nutritional Status and Hypertension

There were more respondents with a normal nutritional status based on BMI/A who had normal blood pressure than seen in other nutritional status categories. Overweight respondents were more likely to experience hypertension than respondents in other nutritional status categories. There was an increase in the proportion of hypertension from underweight and normal weight to overweight. This indicates that respondents with a higher BMI value have a greater risk of experiencing hypertension. Almost half (49.70%) of respondents with hypertension were overweight. The results of the chi-square test show a significant relationship between body mass index and hypertension, with a p value of 0.01 (Table 1).

Relationship Between Smoking Habits and Hypertension

More non-smoking respondents showed a normal blood pressure compared to respondents with a history of smoking and active smokers. Out of 676 respondents who experienced hypertension, 181 were active smokers. The prevalence of active smokers was 29.70%. There is a high number of smokers East Java Province; this is partly due to the relatively cheap tobacco and excise prices. The results of the chi-squared test indicate a significant relationship between smoking and hypertension, with a p value of 0.01 (Table 1).

Multivariate Analysis of Risk Factors for Hypertension

The results of the multivariate analysis in Table 2 show that age and nutritional status have a significant effect on incidences of hypertension in East Java Province. Furthermore, they show no significant effect was had by smoking habit on incidences of hypertension in East Java Province. Respondents in the adult age category had a 2.90 times greater risk of experiencing hypertension than respondents in the adolescent age category. Respondents in the elderly category had a 12 times

greater risk of suffering from hypertension than respondents in the adolescent age category. Respondents with a low nutritional status (BMI/A) had a 0.60 times greater risk of suffering from hypertension than respondents with a normal nutritional status. Overweight or obese respondents had a two times greater risk of experiencing hypertension than respondents with a normal nutritional status (Table 2).

DISCUSSION

Relationship Between Age and Hypertension

Evidence indicates that hypertension is closely related to age. The older a person is, the greater the risk of being contracted to this non-communicable disease. This study shows a relationship between age and incidences of hypertension. Respondents aged ≥ 46 years have a 12 times higher risk of developing hypertension compared to respondents aged 15–25 years. The results of this study are in line with a study conducted by Shang et al (2016), who reported a relationship between age and systolic blood pressure. An increase of 10 mmHg was indicated among respondents aged 40–49 years and 50–59 years. The older a person, the higher the blood pressure due to several factors such as decreased elasticity of blood vessels and kidney function, which act to balance blood pressure. The results of a study conducted by Sartik, Tjekyan, & Zulkarnain (2017) show that most hypertensive respondents were aged ≥ 40 years old (31.50%). Respondents aged ≥ 40 years had a 6.13 greater risk of experiencing hypertension than respondents aged < 40 years. The results of the analysis indicate that age is a dominant factor in the incidence of hypertension among residents of Palembang City.

Relationship Between Nutritional Status and Hypertension

The relationship between being overweight and hypertension is associated with disorders of the autonomic system, insulin resistance and abnormalities in the structure and function of blood vessels (Rohkuswara & Syarif, 2017). This study found that nutritional status is related to hypertension. Overweight respondents had a 1.69 times greater risk of experiencing hypertension than respondents at a normal weight. Being overweight was shown to have an effect on increased blood pressure, since overweight people tend to find it more difficult to perform physical activities. Overweight people should make more effort to engage in activities so that blood pressure

will decrease (Eusman, Ratnawati, & Elisabeth, 2019). A similar study was conducted by Vuvor (2017) which showed that, among Ghanaian adults aged 30–50 years, 28% of respondents who were overweight and/or obese also had high blood pressure. The results of this study are in accordance with a study conducted by Linderman et al (2018) which shows a significant relationship between BMI and blood pressure among 1.70 million Chinese adults. The increase in body weight and fat levels in the body shows correlations with plasma lipid levels, lipoproteins and insulin; this can, indirectly, trigger high blood pressure in a person.

Relationship Between Smoking Habits and Hypertension

The nicotine content in cigarettes can cause an increase in heart rate and blood pressure. The nicotine in cigarettes will trigger the body to signal the brain to release the adrenaline hormone. This hormone makes the diameter of the blood vessels in the body smaller, so there is a risk of hypertension (Supriyono, 2019), however, the current study has shown a different result; that smoking habit is not significantly related to incidences of hypertension.

The results of current study are different to the findings of a study conducted by Diana, Khomsan, Nurdin, Anwar, & Riyadi (2018); most respondents (83.90%) to this study had a smoking habit and almost half (43.70%) experienced hypertension. The results of the chi-squared test analysis among adult males in Cianjur Regency showed a significant relationship between smoking and hypertension. Similar results were reported in a study conducted by Sriani, Fakhriadi, & Rosadi (2016), which showed a significant relationship between smoking habits and incidences of hypertension among people aged 18–44 years at Public Health Center of Sungai Besar Banjar Baru Selatan. Hypertension was more common in respondents who smoked (81.35%) than in non-smoking respondents (22%). The majority of school-aged children in Sungai Besar smoke due to peer pressure, imitating others who are already smoking, and willingness to experiment.

The absence of a relationship between smoking habit and hypertension in the current study is due to the confounding factors of nutritional status and age. The findings of a study conducted by Arifin, Suradi, & Hanim (2019) show a relationship between nutritional status and smoking habits.

Table 1
Characteristics of Respondents in East Java Province

Risk Factor	Blood Pressure				<i>p value</i>
	Normal		Hypertension		
	n	%	n	%	
Gender					
Male	1.428	82.40	304	17.60	0.77
Female	1.699	82.00	372	18.00	
Age (year)					
Adolescent (15-25)	802	96.40	30	3.60	0.01
Adult (26-45)	1.529	88.00	209	12.00	
Elderly (≥ 46)	796	64.60	437	35.40	
Nutritional Status					
Normal	1.809	85.70	301	14.30	0.01
Underweight	408	91.30	39	8.70	
Overweight	910	73.00	336	27.00	
Smoking Habit					
Non smoker	2.064	82.20	448	17.80	0.01
The former smoker	111	70.30	47	29.70	
Active smoker	952	84.00	181	16.00	
Physical Activity					
Strenuous	1.231	82.00	270	18.00	0.55
Moderate	1.029	81.60	232	18.40	
Light	867	83.30	174	16.70	
Consumption of High-Fat Foods (day/week)					
Rare (0-2)	2.527	81.50	572	18.50	0.06
Sufficient (3-5)	474	85.70	79	14.30	
Frequent (6-7)	126	83.40	25	16.60	
Total Respondent	3.127	82,20	676	17,80	

Source: RAND Corporation (2015)

Table 2
Multivariate Analysis of Risk Factors for the Incidence of Hypertension in East Java Province

Faktor Risiko	S.E	Sig.	Exp (B)	CI 95%	
				<i>Lower</i>	<i>Upper</i>
Age (year)					
Adolescent (15-25)		0.01	Ref		
Adult (26-45)	0.20	0.01	2.94	1.97	4.38
Eldery (≥ 46)	0.19	0.01	12.26	8.31	18.10
Nutritional status					
Normal		0.01	Ref		
Underweight	0.18	0.01	0.64	0.44	0.92
Overweight	0.09	0.01	2.05	1.69	2.49
Smoking habit					
Non smoker		0.17	Ref		
The former smoker	0.19	0.10	1.38	0.93	2.03
Active smoker	0.10	0.55	0.94	0.76	1.15

Source: RAND Corporation (2015)

The results of a study conducted by Gao, Shi, & Wang (2017) indicate that age is significantly related to smoking habits. The absence of differences in the risk of hypertension among respondents who are active smokers and non-

smoking respondents in this study could also be due to its use of a cross-sectional design. The cross-sectional design has a weakness, in that it lacks a clear temporal relationship, which creates a bias in the causal aspect of smoking on

hypertension (Rohkuswara & Syarif, 2017). The results of the current study are in accordance with a study conducted by Sukma, Yuliawati, Hestningsih, & Ginandjar (2019) who also reported no significant relationship between smoking habits and the incidence of hypertension among people of a productive age at Public Health Center of Ngemplak, Semarang. Another reason for this result is that the majority of respondents in the current study are women; smoking is not shown to be related to hypertension because women are more likely to be non-smokers.

Research Limitations

The strengths of this study arise from two aspects: the use of secondary data derived from the 5th IFLS, which minimized the bias, and the fact that blood pressure measurements were taken on both the left and right arms, repeated three times, making the hypertension category data more valid. The main limitation of this study is due to the limitation information from IFLS-5 data, which was based on self-reports and, as such, had the possibility of being insufficient or excessive (except for the blood pressure data measured by the surveyors). Additionally, this study is not considered to be representative of the Province of East Java, because it used an Indonesian database. Thus, there is a need to conduct further study using representative samples from the Province of East Java.

CONCLUSION

Based on the current study's analysis of the risk factors that affect the incidence of hypertension in East Java Province (2014 IFLS-5 data), it can be concluded that there is a significant relationship between age and nutritional status on incidences of hypertension and no significant relationship between smoking habits and incidences of hypertension. Age was revealed to be the dominant factor affecting incidences of hypertension in East Java Province. It is expected that adults and the elderly in East Java always maintain a healthy lifestyle. Health checks at a young age as well as an increase in behavior related to the People's Healthy Lifestyle Movement (GERMAS) in daily life need to be carried out regularly in order to decrease the prevalence of hypertension in East Java Province.

CONFLICT OF INTEREST

The researcher has stated that there is no conflict of interest in this study.

AUTHOR CONTRIBUTIONS

WNP: Author, Concept Designer, Proposal Compiler, Analyst, Editor. BSW: Software. RI, DI: Supervisor, Reviewer.

ACKNOWLEDGMENTS

We would like to express our sincere gratitude to RAND Corporation, which provided the data on the 2014 5th Indonesian Family Life Survey that has been used in this study.

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