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ORIGINAL ARTICLE

FAMILY HISTORY, KNOWLEDGE, AND RESTING PATTERNS ASSOCIATED WITH HYPERTENSION: CASE-CONTROL STUDY

Riwayat Keluarga, Pengetahuan, dan Pola Istirahat terkait dengan Hipertensi (Studi Case-Control)

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ABSTRACT

Background: Non-communicable diseases are the leading cause of death worldwide, responsible for approximately 75% of global mortality. Hypertension, a significant contributor to NCD-related deaths, affects an estimated 1.28 billion adults globally and is often referred to as "The Silent Killer." The increasing prevalence of NCDs, including hypertension, poses significant challenges to the global health system. In Ponorogo Regency, hypertension cases surged from 41,841 in 2021 to 126,668 cases in 2023. Analyzing the risk factors of hypertension is essential to mitigate its health impact on the community. **Purpose:** To analyze the risk factors of hypertension cases in the Plosojenar Village, Ponorogo Regency community. **Methods:** This quantitative study employed a case-control design with 154 participants. The case group comprised 77 individuals with hypertension, and the control group included 77 non-hypertensive individuals, selected through random sampling at a 1:1 ratio. Data were collected from January to April 2024 using questionnaires. Bivariate analysis was conducted using Chi-square and Fisher's tests. **Results:** This study found a significant association between family history OR 13.67 (95%CI = 5.63 - 39.17); p = 0.00, level of knowledge OR 26.25 (95%CI = 3.96 - 1.11); p = 0.05, and rest habits OR 0.18 (95%CI = 0.03 - 0.70); p = 0.08 to hypertension cases. This study also showed no significant relationship between attitude OR 0.88 (95%CI = 0.32 - 2.37); p = 1 with hypertension cases. **Conclusion:** Family history, knowledge level, and rest habits are significantly associated with hypertension. Targeted interventions addressing these factors may help reduce hypertension cases.

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ABSTRAK

Latar Belakang: *Penyakit tidak menular adalah penyebab utama kematian di seluruh dunia, yang bertanggung jawab atas sekitar 75% kematian global. Hipertensi, kontributor signifikan terhadap kematian terkait PTM, mempengaruhi sekitar 1,28 miliar orang dewasa di seluruh dunia dan sering disebut sebagai "Pembunuh Diam-Diam". Meningkatnya prevalensi PTM, termasuk hipertensi, menimbulkan tantangan yang signifikan bagi sistem kesehatan global. Di Kabupaten Ponorogo, kasus hipertensi melonjak dari 41.841 pada tahun 2021 menjadi 126.668 kasus pada tahun 2023. Menganalisis faktor risiko hipertensi sangat penting untuk mengurangi dampak kesehatan pada masyarakat.* ***Tujuan:*** *Untuk menganalisis faktor risiko kasus hipertensi pada masyarakat Desa Plosojenar Kabupaten Ponorogo.* ***Metode:*** *Penelitian kuantitatif ini menggunakan desain kasus-kontrol dengan 154 partisipan. Kelompok kasus terdiri dari 77 orang dengan hipertensi, dan kelompok kontrol terdiri dari 77 orang non-hipertensi, yang dipilih secara acak dengan rasio 1:1. Data dikumpulkan dari Januari hingga April 2024 dengan menggunakan kuesioner. Analisis bivariat dilakukan dengan menggunakan uji Chi-square dan Fisher.* ***Hasil:*** *Penelitian ini menemukan hubungan yang signifikan antara riwayat keluarga OR 13,67 (95%CI = 5,63 - 39,17); p = 0,00, tingkat pengetahuan OR 26,25 (95%CI = 3,96 - 1,11); p = 0,05, dan kebiasaan istirahat OR 0,18 (95%CI = 0,03 - 0,70); p = 0,08 dengan kejadian hipertensi. Penelitian ini juga menunjukkan tidak ada hubungan yang signifikan antara sikap OR 0,88 (95%CI = 0,32 - 2,37); p = 1 dengan kasus hipertensi.* ***Simpulan:*** *Riwayat keluarga, tingkat pengetahuan, dan kebiasaan istirahat secara signifikan berhubungan dengan hipertensi. Intervensi yang ditargetkan untuk mengatasi faktor-faktor ini dapat membantu mengurangi kasus hipertensi.*

INTRODUCTION

Non-communicable diseases (NCDs) are the leading cause of death worldwide, accounting for approximately 75% of all deaths. Among these, cardiovascular diseases (CVDs) represent the most significant contributor, claiming an estimated 17,9 million lives annually (1). Hypertension, a significant risk factor for CVDs, is often referred to as "The Silent Killer" due to its asymptomatic nature and severe complications if left untreated. Hypertension is diagnosed when blood pressure consistently reaches or exceeds 140/90 mmHg, confirmed through multiple measurements at different times. If inadequately managed, hypertension can lead to chronic kidney disease, heart disease, coronary artery disease, stroke, and mortality. Globally, an estimated 1.28 billion adults aged 30–79 years are affected by hypertension, with two-thirds of these cases found in low- and middle-income countries (2).

In Southeast Asia (SEA), which consists primarily of middle-income countries, approximately one-third of adults are diagnosed with hypertension, contributing to around 1,5 million deaths annually (3). Indonesia, as one of the middle-income countries and the most populous nation in Southeast Asia, reports that 1 in 3 adults suffers from hypertension, highlighting its exceptionally high prevalence (4). The prevalence of hypertension in Indonesia shows significant differences depending on the diagnostic method used. Based on a doctor's diagnosis, the prevalence among individuals aged ≥18 years is 8.60%, while measurement-based assessments reveal a much higher prevalence of 30.80%. This disparity underscores the importance of improved screening and diagnostic methods to identify and manage cases effectively. Furthermore, hypertension is no longer confined to older populations. Data from the SKI report indicate that among individuals aged 15–24 years, the prevalence of hypertension based on doctors' diagnoses is 0.30%, but measurement results show it reaches 9.30%. This shift marks the transition of hypertension from a geriatric condition to a broader health issue affecting people across different age groups (5).

East Java is one of the provinces in Indonesia with the highest prevalence of hypertension, recorded at 34.30%. Hypertension also represents

the leading cause of maternal mortality, contributing to 9.62% of all maternal deaths in 2021 (6). Consistent with the global and national escalation in hypertension prevalence, Ponorogo Regency demonstrates a significant and increasing burden of hypertension (7). The incidence surged markedly, rising from 41,841 cases in 2021 to 126,668 cases in 202(8–10). Despite this substantial increase, healthcare coverage for hypertension in Ponorogo Regency in 2023 accounted for only 43.40% of the projected 291,738 cases among individuals aged ≥15. This disparity between estimated and detected cases underscores systemic inefficiencies in routine early screening and highlights the urgent need for targeted and evidence-based public health interventions.

Hypertension arises from a combination of reversible and irreversible factors. Reversible factors include unhealthy diets, physical inactivity, and smoking habits, which can be mitigated through lifestyle changes. Irreversible factors, such as genetics, gender, and age, increase susceptibility but cannot be modified. These factors underline the multifactorial nature of hypertension and the complexity of its management. Previous research has highlighted various relationships between these factors and hypertension (11). Other studies show that there is a link between gender, smoking habits, and hypertension among office employees (12). There is a a strong association between physical activity and hypertension among Minangkabau ethnic women (13). Age and genetic factors play a significant role in hypertension among pregnant women (14).

Building on these findings, a preliminary study using the Survey Mawas Diri (SMD) in Plosojenar Village, Ponorogo Regency, found that 34.40% of households sampled had at least one family member suffering from hypertension. This highlights the urgency of addressing hypertension in this community, particularly considering the low healthcare service coverage and the increasing prevalence of complications among younger populations. Based on previous research findings, this study aims to analyze specific risk factors such as family history, knowledge level, and rest patterns contributing to hypertension in Plosojenar Village, Ponorogo Regency. This approach addresses gaps in understanding the causes of hypertension and provides evidence-based recommendations to support more effective hypertension management in the region.

METHODS

This research type is quantitative with a case-control study design. The case group in the study was the people of Plosojenar Village who have hypertension, with a total number of 77 people. Meanwhile, the control group who did not have hypertension was 77 taken 77 people. The two samples were determined by simple random sampling, which gave a total sample of 154 participants. The dependent variable of this study is the occurrence of hypertension, both hypertension category level 1 (blood pressure 140/90 - 159/99) and hypertension level 2 (blood pressure >160/>100). The independent variables include family history (both from the descendants up (parents), spouses, and descendants down (children) who suffered from hypertension), knowledge (categorized into groups of less (score 4-11) and sound (score 12-18) based on the results of the questionnaire), attitudes (categorized into negative (score 7-17) and positive (score 18-28) based on the results of the questionnaire data), and resting habits (categorized into negative (score 3-7) and positive (score 8-12) habits based on the results of the questionnaire).

The study used primary data collection techniques that were structured interviews using the KAP (knowledge, attitude, practice) questionnaire instrument related to hypertension, which consists of 18 knowledge statements, 7 attitude statements, and 15 behavioral habit statements. This instrument used a Guttman scale (correct answer equals 1 point and wrong answer gets 0 points) in knowledge and a Likert scale in the section on attitude and behavior. Each value of 1-4 from the Likert scale is adjusted based on favorable and unfavorable statements. The validity test shows that all statements are valid because the R count of each statement > R table. Based on the reliability test, it is known that the average instrument test results include moderate reliability with a value of 0.47. The analysis of the research study used bivariate tests with chi-square and Fisher as an alternative if it does not comply with the requirements of the chi-square test. Data analysis used the R studio 4.3.2 application to test the relationship between risk factor variables (independent) and hypertension cases (dependent variables).

The Universitas Airlangga Faculty of Public Health Research Ethical Clearance Commission approved this study in an approval letter numbered 237/EA/KEPK/2023.

RESULTS

Relationship Between Resting Habits and Hypertension Cases

Based on the practice questionnaire in the resting habits section, the case group had a more excellent average value of 242.33 (more positive attitude) than the control group, which only amounted to 225. The resting habits analyzed in this study include sleep disorders, daytime nap schedule, and the regularity of night sleep. Based on the analysis using Fisher's bivariate test, it is clear that there is a significant relationship between resting habits and the occurrence of hypertension. This can be seen from the results of Table 1, which shows a p-value of 0.008 or <0.05. The result of the OR value is 0.18 (95%CI = 0.03 - 0.70), so it can be interpreted that negative rest habits are more protective than positive sleep habits towards the incidence of hypertension. Respondents who always experience insomnia > 2 times, always take a nap > 1 hour every day, and never sleep regularly at night are protective factors for hypertension cases.

Relationship Between Knowledge Level and Hypertension Cases

In the factor analysis of knowledge level, there are 18 favorable and unfavorable statement items, with the maximum points obtained being 18 while the minimum value obtained by the respondent is 4. Therefore, the level of knowledge categorization is lower, with a score of 4-11, while the good category scores are 12-18. The average knowledge score of the case group was 12.96, while the control group was 15.37. It can be indicated that the control group had a higher level of knowledge than the case group. Based on the analysis using Fisher's bivariate test, it is found that there is a significant relationship between the level of knowledge and the incidence of hypertension. This is based on the results of Table 1, which show that the p-value is 0.005. The OR analysis results showed a value of 26.25 (95%CI = 3.96 – 1.11). It can be interpreted that a low level of knowledge is 26.25 more risky than a high level of knowledge. The extensive range between the lower and upper levels of CI can be due to high data variability or unequal distribution and recall bias because it is a retrospective study.

Relationship Between Family History and Hypertension Cases

The characteristics of family history are grouped into 2 categories: a family history from parents, children, and spouses or no family history of hypertension. Based on the Chi-square bivariate test in Table 1, the results of the p-value of 0.00 were analyzed. It can be interpreted that respondents who have a family history of hypertension are 13.67 times more at risk (95%CI = 5.63 - 39.17) than respondents without a family history of hypertension for the incidence of hypertension cases.

Relationship Between Attitude and Prevalence of Hypertension Cases

In this study, the attitudes include the perceptions or opinions of the respondents related to routine blood pressure checks, avoiding cigarette smoke, and compliance with taking anti-hypertensive medicine. The attitudes section consists of 7 statement items with an average value of 19.71 for the case group and 20.14 for the control group. This indicates that the control group tends to have more positive attitudes regarding the prevention and treatment of hypertension than the case group. The results of the bivariate test with Fisher analysis in Table 1 show a p-value of 1, so it can be interpreted that there is no relationship between respondents' attitudes and cases of hypertension. The OR value based on the test results is 0.88 (95%CI = 0.32 - 2.37), so the negative attitude of respondents is a more protective factor than a positive attitude towards the incidence of hypertension. However, this result is not statistically significant because the confidence interval (CI) includes a value of 1 or is interpreted as equal between the case and control groups.

Table 1
Risk Factors for Hypertension in Plosojenar Village, Ponorogo Regency in 2024

Variable	Hypertension		Non-hypertension		Total		p-value	OR	CI
	n	%	n	%	n	%			
Resting Habits									
Negative	3	3.90	14	18.18	17	11.04	0.00*	0.18	0.03-0.70
Positive	74	96.10	63	81.82	137	88.96			
Knowledge Level									
Less	20	25.97	1	1.30	21	13.64	0.01*	26.25	3.96 – 1.11
Good	57	74.03	76	98.70	133	86.36			
Family History									
Yes	42	54.55	6	7.79	48	31.17	0.00*	13.67	5.63 – 39.17
No	35	45.45	71	92.21	106	68.83			
Attitude									
Negative	9	11.69	10	12.99	19	12.34	1.00	0.88	0.32 – 2.37
Positive	68	88.31	67	87.01	135	87.66			

DISCUSSION

Analysis of the Relationship between Resting Habits and Hypertension Cases

According to the factor analysis of rest habits, it is clear that there is a relationship between rest habits and the incidence of hypertension cases. Surprisingly, negative rest habits appear more protective than positive ones in preventing hypertension. The finding contrasts with the general theoretical framework, which suggests that proper rest habits, such as regular and adequate sleep, reduce the risk of hypertension. This align with the research by Salman et al (15), which indicated a significant relationship (p-value = 0.03) between rest habits and hypertension cases in the elderly (OR 0.58). Adequate rest is emphasized in government programs such as CERDIK to prevent hypertension by managing risk factors. Poor sleep quality can affect cortisol levels and the sympathetic nervous system, contributing to the development of hypertension. This variable of rest habits includes sleep disturbances, which usually suffered by 2.60% of respondents and are experienced with frequent quantity in 16.88% of respondents in the case group. self-reported problem sleeping and sleep disorders are correlated with the increased risk of hypertension (16).

In the statement of taking a nap for >1 hour, 27 respondents from the case group answered always and often. napping ≥ 90 minutes/day is associated with a higher risk of incidence, and the risk will decrease if the daytime sleep becomes 1-59 minutes/day. Positive resting habits should be able to prevent hypertension. A total of 18 respondents answered questions related to ever and never sleeping 6-8 hours a night regularly. The control group's score on the sleep regularity statement was higher than the case group. This shows that the control group tends to be more organized when sleeping at night than the case group (17). Respondents who sleep > 8 hours/day are 30.10% more at risk than respondents who usually sleep (6-8 hours/day) for hypertension.

Given the contradiction between this study's results and existing theories, additional investigation is required to clarify these findings. Factors such as individual differences in physiological responses, confounding variables (e.g., stress or medication use), or cultural sleep practices in the study population could explain the unexpected protective effect of negative rest habits. Further studies should delve into these aspects to provide a more comprehensive understanding of the role of rest habits in hypertension prevention (18).

Analysis of the Relationship between Knowledge Level Factor and Hypertension Cases

The level of knowledge has a significant relationship with the incidence of hypertension in Plosojenar Village; those with knowledge levels are 26.25 times more at risk of having hypertension compared to those with good knowledge levels. The results of this study are aligned with a cross-sectional study in Lebanon which showed that hypertensive patients at Al Hayat Hospital had a limited level of knowledge related to hypertension (19). Basic knowledge related to hypertension is low among patients in Spanish primary and specialty health care (20). People with limited

knowledge will find it difficult to know the cause of increased blood pressure, and they continue to be exposed to other risk factors without being recognized. In addition, there are still many cases of non-compliance in taking hypertension medicine. This is basically because respondents have no adequate knowledge regarding prevention and treatment efforts for hypertension. Knowledge is significantly related to adherence to medicine. Hence, the results of this study, which are related to the level of knowledge of hypertension cases, align with theory and previous research (21).

Analysis of the Relationship of Family History Factors to Hypertension Cases

The results of the analysis revealed a significant relationship between family history and hypertension cases. Someone with a family history of hypertension will increase the risk by 13.67 times compared to having no history of hypertension. This result is consistent with other research on 12th-grade high school students in Palembang, which shows that adolescents with a family history of hypertension will be 2.7 times more at risk than adolescents without a family history of hypertension (22). Research in Pakistan using a case-control study design with a total sample of 400 respondents also showed a significant relationship between family history and hypertension cases (p-value <0.05) (23). Another study based on data from The Korea National Health and Nutrition Examination Survey confirmed that children who have one parent with hypertension would be 2 times more at risk than those who do not; meanwhile, if both parents suffer from hypertension, the child will be 4 times more at risk of being affected by hypertension than who do not have hypertensive parents. A family with the same lifestyle will undoubtedly be exposed to almost the same risk factors from their daily activities. From these risk factors, there is a possibility that the child will follow the history of hypertension of both parents. The probability of a child or descendant of both parents with hypertension is 50% (24).

Hypertension is associated with the symmetric gene that can trigger the formation of the aldosterone gene, causing increased fluid retention, which results in increased blood pressure (25). Hypertension can be inherited in the family due to the presence of dominant genes; there are various genetic syndromes associated with monogenic hypertension (26).

Analysis of the Relationship between Attitude Factors and Hypertension Cases

The analysis of the attitude variable showed that there was no relationship between the respondents' attitudes and hypertension cases. Based on the results of the KAP questionnaire in the attitude section, the control group still tends to be more positive regarding the prevention and treatment of hypertension than the case group. Notably, some respondents in the case group were identified as rejecting treatment, particularly when they perceived themselves as healthier. Individuals with hypertension often skip their medication schedules, including during travel. This reflects a rejection attitude toward the lifelong treatment of hypertension.

These findings contrast with a study conducted at Al Hayat Hospital, Lebanon, where hypertensive patients demonstrated an adequate attitude (19). Similarly, other studies reported positive attitudes among most hypertensive patients, with one study revealing a percentage of 83.30% (21). Consistent with these findings, research in Nepalese hospitals indicated that half of the hypertensive patients had a positive attitude (27). However, other study presented a contradictory result, suggesting that individuals with a negative attitude had a 2.8 times higher risk of hypertension compared to those with a positive attitude (28).

The lack of valid OR results suggests the possibility of bias or measurement inconsistencies. This discrepancy could imply that negative attitudes may appear protective due to confounding factors not accounted for in the study. Additionally, the inconsistent findings highlight the need for further analysis to clarify the standard definition of "attitude" and address potential biases, such as the inclusion of the value of 1 in the OR range, which may affect the interpretation of results. Further investigation into these aspects is critical to avoid misconceptions and provide accurate conclusions regarding the role of attitude in hypertension management.

CONCLUSION

This study identified a significant relationship between family history, knowledge, and rest habits with the prevalence of hypertension in Plosojenar Village, Ponorogo Regency. However, no significant relationship was found between respondents' attitudes and hypertension cases. The attitude factor could not be conclusively interpreted as a risk or non-risk factor. Similarly, this study did not provide sufficient evidence to classify resting

habits as a risk factor for hypertension. Tracing the closest relatives of people with hypertension is needed as part of early detection. Family awareness of checking blood pressure regularly at posbindu/ posyandu for the elderly needs to be increased. Village cadres and midwives need to provide routine education to the community, not only for the elderly but also for adolescents, because hypertension also begins to occur at a young age. The introduction of hypertension prevention programs from a young age, either through youth organization meetings, posbindu, or through social media, also needs to be implemented so that adolescents' knowledge of prevention, treatment, and complications of hypertension is getting higher. The increasing number of hypertension cases from the trend in the last three years and the low achievement of health services for hypertension patients indicate that there needs to be synergized between the government, health workers, and community leaders in providing information related to routine treatment of hypertension cases so that patients do not experience complications that cause death. Control and case groups in this study had quite diverse characteristics, so the confidence intervals for each variable were quite large. Conclusions or interpretations of results should be conducted with caution.

CONFLICT OF INTEREST

There is no conflict of interest in this research.

AUTHOR CONTRIBUTIONS

All authors took an active role in the preparation of this article. NRS: Conceptualization, Writing – Original Draft, Data Analysis; EQ: Writing-Review & Editing, Research Supervisor; RN: Data Collection, GS: Writing-Review & Editing

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