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The interaction between cigarette smoking on the incidence of hypertension among adolescents

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Abstract

Background: Hypertension is a non-communicable disease known as the "silent killer" because it often has no symptoms but can lead to serious complications such as stroke, heart failure, and kidney disease. The prevalence of hypertension in adolescents is increasing, and one contributing risk factor is smoking. Cigarettes contain harmful substances such as nicotine, tar, and carbon monoxide, which can damage the cardiovascular system and trigger increased blood pressure.

Purpose: To determine the correlation between cigarette smokings and the incidence of hypertension in adolescents in Mojo Wetan Village at Sragen Regency.

Method: A quantitative approach with a descriptive correlation and cross-sectional design. The population of this study was all male adolescents aged 15–24 years who had a cigarette smoking in Mojo Wetan Village. The sample size was 39 respondents, selected using a total sampling technique. Data were collected using a cigarette smokings questionnaire and a calibrated needle sphygmomanometer. Data were analysed univariately and bivariately using Kendall's Tau test.

Results: The majority of respondents had a moderate cigarette smoking (43.6%), and most were in the normal blood pressure category (59%). The Kendall's Tau test showed a significant association between cigarette smokings and the incidence of hypertension in adolescents (p -value = 0.002) with a correlation coefficient of 0.406.

Conclusion: There is a significant correlation between cigarette smokings and the incidence of hypertension in adolescents in Mojo Wetan Village. The higher the cigarette smoking, the greater the likelihood of adolescents experiencing pre-hypertension or hypertension.

Keywords: Adolescents; Hypertension; Cigarette Smoking.

INTRODUCTION

Non-communicable diseases (NCDs) have become a major challenge in global health systems, contributing significantly to morbidity and mortality rates. One of the most common and dangerous NCDs is hypertension or high blood pressure (Arsa & Sulistya, 2021). Hypertension is often referred to as the "silent killer" because it typically shows no early symptoms, yet it can lead to severe complications such as stroke, heart failure, coronary heart disease, and irreversible kidney damage (Bachrun, Prayitno, Haryono, & Felantika, 2024). According to data from

the World Health Organization (WHO), more than 1.2 billion people worldwide suffer from hypertension, and this number is projected to exceed 1.5 billion by 2025. In Indonesia, the prevalence of hypertension has reached 34.1%. In Central Java Province, the prevalence stands at 30.4%, while in Sragen Regency, 250.035 individuals have been recorded as having hypertension. These figures indicate that hypertension is a serious public health concern and requires comprehensive and sustained efforts in prevention, health promotion, and treatment (Rahmatika, 2021).

Although hypertension is more commonly found in older age groups, recent trends indicate a growing number of cases among adolescents and young adults. This is particularly concerning, as adolescence is a transitional period marked by physical, emotional, and behavioral changes. During this time, unhealthy lifestyle habits often begin to form and may persist into adulthood (Tucker, Ellickson, & Klein, 2023). One of the main behavioral risk factors contributing to increased blood pressure in young people is smoking (Kumar, Kumar, Bhattacharjee, Somanna, & Jain, 2022). Cigarettes contain harmful chemicals such as nicotine, tar, and carbon monoxide, which can damage the cardiovascular system, constrict blood vessels, and raise blood pressure levels (Octaviane, Pakpahan, Maspupah, & Debora, 2022). The long-term impact of smoking during adolescence is potentially more severe than in adulthood, as the body is still undergoing development. If not addressed early, this habit may lead to chronic health problems later in life (Khatri, Khanal, Thakuri, Ghimire, & Jakovljevic, 2025). Therefore, focusing on behavioral risk factors such as smoking is essential in efforts to prevent hypertension among adolescents (Wahyuni, 2023).

Revealed an increase in the number of active smokers in the 15–24 age group nationwide. In Central Java Province, the percentage of smokers aged over 15 reached 28.55%. In Sragen Sub-district, which is part of Sragen Regency, the prevalence of smokers aged 15–19 was recorded at 14.17% (Bhattacharyya, Chattopadhyay, Mitra, & Crowe, 2024). These statistics show that smoking remains prevalent among adolescents, despite the existence of various health education programs and anti-smoking campaigns. This highlights the need for more effective interventions targeting youth smoking behaviour (Kurnianto, Kurniadi, & Hilmanto, 2020). Given the clear link between smoking and hypertension, stronger efforts are needed to reduce smoking among teenagers, including enhanced health education, stricter control over youth access to tobacco products, and promotion of healthy lifestyles (Arief, Amiruddin, Russeng, Kesumasari, Jafar,

Salamah, & Nugrahaeni, 2020). Research on the relationship between cigarette smokings and hypertension among adolescents is therefore highly relevant to provide evidence-based recommendations for future public health interventions (Lukitaningtyas & Cahyono, 2023).

RESEARCH METHOD

This study employed a quantitative approach with a descriptive correlational and cross-sectional design. This design was chosen to analyze the relationship between the independent variable (cigarette smokings) and the dependent variable (incidence of hypertension), both measured at the same time. The research was conducted in Mojo Wetan Village, Sragen Regency, Central Java, from June 3 to 5, 2025. The population consisted of 39 male adolescents aged 15–24 years with a history of smoking. Due to the relatively small population size and the fact that all subjects met the inclusion criteria, the study used a total sampling technique. Research instruments included a needle sphygmomanometer and stethoscope for measuring blood pressure (both calibrated), a 5-item cigarette smoking questionnaire, a blood pressure observation sheet, and secondary data obtained from the local youth population registry.

The research procedure consisted of four stages: (1) Preparation, where the researcher obtained permission from relevant local authorities and tested the validity and reliability of the instruments; (2) Preliminary Study, conducted on October 14, 2024, with 10 adolescents, which suggested that those who smoked more than six cigarettes daily tended to have high or pre-hypertension levels; (3) Data Collection, where respondents completed the questionnaire via guided interviews, and their blood pressure was measured following standard procedures (resting 5 minutes, using the non-dominant arm, and proper cuff placement); and (4) Data Processing, where all data were coded, entered into SPSS, and analyzed using univariate analysis (for frequency and distribution) and bivariate analysis using Kendall's Tau test to examine the correlation between cigarette smokings and hypertension incidence.

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RESEARCH RESULTS

Table. Frequency Distribution of Characteristics Respondent (N=39)

Variable	Results	Correlation coefficient	P-Value
Age (Mean±SD)(Range)(Years)(n/%)	(20.1±2.9)(15-24)		
15-19	16/41.0		
20-24	23/59.0		
Cigarette smoking (n/%)			
Never	6/15.4		
Fair (1-5 cigarettes/day)	16/41.0		
Heavy (Smoking tpically involves 20 more cigarettes daily)	17/43.6		
		0.406	0.002
Incidence of Hypertension (n/%)			
Normal	23/59.0		
Pre-hypertension	13/33.3		
Hypertension 1	3/7.7		

The study involved 39 respondents aged 15 to 24 years, with a mean age of 20.1 ± 2.9 years; the largest age group was 20-24 years old with 23 respondents (59.0%). Most respondents had a moderate cigarette smoking, with 17 people (43.6%), while 6 respondents (15.4%) did not smoke and none were classified as heavy smokers. Regarding hypertension incidence, the majority had normal blood pressure (23 respondents, 59.0%), but 13 (33.3%) were in the pre-hypertension stage and 3 (7.7%) had stage 1 hypertension. Kendall's Tau correlation analysis showed a statistically significant positive relationship between cigarette smokings and hypertension incidence, with a correlation coefficient of 0.406 and a p-value of 0.002, indicating that higher smoking intensity is associated with an increased risk of hypertension among the respondents. Based on table, this correlation value indicates that there is a fairly strong and positive relationship between cigarette smokings and the incidence of hypertension. Because the significance value is less than 0.05 ($p < 0.05$), then this relationship is declared statistically significant. Thus, the heavier the cigarette smoking practiced by adolescents, the higher the risk of hypertension.

DISCUSSION

The findings of this study reveal that the majority of respondents are young male adolescents aged between 15 and 24 years, with the most common age being 22 years. This age distribution aligns with the target population for assessing cigarette smokings and hypertension risk during adolescence and early adulthood, a critical period for establishing health behaviors (Abraham, Conner, Jones, & O'Connor, 2024). The mean age of 20.1 years indicates that the sample predominantly consists of late adolescents, which is important because this age group is at increased risk of developing lifestyle-related health problems, including hypertension, if harmful habits such as smoking persist (Hackworth, 2024).

Regarding cigarette smokings, the study shows that most respondents engage in moderate smoking, while a smaller proportion do not smoke at all, and none are classified as heavy smokers (Anggraenny, 2019). This pattern is significant as it suggests a notable prevalence of smoking among adolescents in Mojo Wetan Village. Smoking is a well-known risk factor for cardiovascular diseases, including hypertension, as the chemicals in cigarettes contribute to vascular damage and increased blood pressure. The absence of heavy smokers might be

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due to social or cultural factors, or self-report bias, but even moderate smoking poses health risks, especially during the crucial developmental phase of adolescence (Violent & Tanjung, 2024).

The correlation analysis found a statistically significant positive relationship between cigarette smokings and the incidence of hypertension, with a moderate correlation coefficient (0.406) and a p-value of 0.002. This result supports existing literature indicating that smoking elevates the risk of hypertension, even among younger populations (Martin-Moraleda, Mandic, Queralt, Romero-Blanco, & Aznar, 2022). Although most respondents still have normal blood pressure, a considerable portion has entered pre-hypertension and stage 1 hypertension stages (Rakisheva, Farmakis, Attanasio, Genis, Cohen-Solal, Gulati, Piepoli, 2025). These findings underscore the urgent need for early intervention and health education programs targeting smoking cessation and hypertension prevention among adolescents (Aragiannis, Kasiakogias, Iliakis, Sagris, Tatakis, Manta, & Tsioufis, 2025). By addressing cigarette smokings early, it may be possible to reduce the future burden of hypertension and related cardiovascular diseases in this population (Sapulete, Sapulete, Ottay, Sumampouw, Nelwan, Simanjuntak, & Kuhon, 2025).

CONCLUSION

Cigarette smokings in adolescents are dominated by the category of moderate smokers (43.6%). The incidence of hypertension in adolescents is mostly in the normal blood pressure category (59%), but there are also cases of pre-hypertension and stage 1 hypertension. There is a significant relationship between cigarette smokings and the incidence of hypertension in adolescents ($p = 0.002$).

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