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Lifestyle Risk Factors and Hypertension on Students: a Cross Sectional Study

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Abstract

The incidence of hypertension is likely to occur at an increasingly younger age. The incidence is mainly due to risk factors for unhealthy behavior and lifestyle in adolescents. The purpose of this study was to analyze behavioral and lifestyle risk factors that affect the incidence of hypertension in adolescents. This research design is a descriptive-analytic with *the cross-sectional study*. The subjects in this study were 407 respondents from 10 junior and senior high schools in Bima City. Independent variables were gender, age, some behaviors like smoking, alcoholic, drug abuse, exercise, and healthy diet, abdominal circumference, and body mass index. Whereas, the dependent variable covers the incidence of hypertension. Results: In this study, behavioral risk factors in adolescents that correlate with hypertension are body mass index, age, and smoking behavior. The *omnibus test* results p value = 0.018 (<0.05), which means that the independent variables affect the dependent variable simultaneously. Partially, the variables of BMI and age affect the incidence of hypertension. The IMT variable has the most dominant effect on the incidence of hypertension in adolescents. Adolescents with the Obese BMI group will have a risk factor for hypertension incidence 3.8 times higher than adolescents in the Normal BMI group after being controlled by the age variable. Further study is needed on how educational counseling for early detection of individual behavioral risk factors and healthy lifestyle changes to promote and prevent the occurrence of hypertension in adolescents.

Keywords: Adolescent Hypertension;Body-Mass-Index; Lifestyle-Behaviors;Risk-Factors

INTRODUCTION

A healthy lifestyle is essential for all individuals to be healthy and productive at every stage of life. Indonesia is currently included in a country with the majority of the population at the fruitful age stage in the early adolescent-adult group. This means that this condition requires various efforts to achieve optimal health status and prevent disease risk factors, especially in the non-communicable disease group (Kementrian Kesehatan RI., 2017). Hypertension is a non-communicable disease with a higher trend in early adolescence (Thomas et al., 2018).

Hypertension is an increase in blood pressure greater than or equal to 140/90 mmHg (NICE, 2022). To date, hypertension remains one of the most common risk factors for cerebrovascular disease/CVD in many countries. In Indonesia, hypertension and smoking are the main behavioral risk factors associated with CVD that can trigger the development of arteriosclerosis since adolescence (CDC, 2019). The primary behavioral risk factors in adolescents and adults that correlate with increased blood pressure are smoking behavior, high-salt foods, and non-behavioral factors, namely age (Mawardy, 2021).

The Indonesian Ministry of Health research results show that 5.3% of adolescents aged 15-17 years have hypertension, and the results of another study showed that 6.4% of adolescents aged 15-19 years have hypertension (Ministry of Health RI, 2019). Smoking is a risk behavior associated with CVD in adolescents and can be the beginning of adolescents' exposure to other risk behaviors such as alcohol use and drug abuse (Suryawan

ZF, 2019). Other associated behavioral risk factors are alcohol consumption, body mass index, cholesterol, physical inactivity, obesity, and unhealthy diet (Van Oort et al., 2020).

Risk factors for hypertension are associated with abnormal body weight parameters in early adolescents, central obesity, lack of physical activity, low-economic families, and family history of hypertension. The risk of hypertension can be identified in early adolescents by the initiative of community health workers to conduct early detection and management of public health problems by prioritizing early adolescents and families at high risk of hypertension (Manios et al., 2019).

Hypertension in children and adolescents will continue into adulthood, and children with hypertension are more likely to become hypertensive adults with high cardiovascular risk (Yang et al., 2020). Adolescents who are overweight, have low physical activity, have low economic background, and have a family history of hypertension are at risk of hypertension with cardiovascular problems. CVD risk can be prevented by recognizing the risk factors that individuals have. The risk of disease can be prevented only by changing behavior. So, efforts to recognize risk factors need to be made as a first step in preventing the risk and complications of the disease (Hannan et al., 2022).

Early detection and accurate blood pressure measurement are essential for diagnosing hypertension. Meanwhile, routine monitoring of blood pressure status a maximum of 1 time / six months needs to be done to recognize risk factors as a basis for

hypertension prevention efforts (Krist et al., 2021). Blood pressure is an essential component in CVD risk prediction, and it is, then, used to guide decisions to initiate treatment therapy and disease risk prevention efforts (Himmelfarb et al., 2016). Based on this, the purpose of this study is to analyze what behavioral risk factors are most dominantly correlated with the incidence of hypertension in adolescents.

METHOD

This study was a descriptive-analytic study with a cross-sectional study involving 407 respondents aged 14-19 years from 10 junior-high schools in Bima City and RegencyNTB, which were determined by cluster *random sampling*. Sample size estimation was calculated using the formula. Sample selection was based on the inclusion of not having cardiovascular disease, metabolic disorders (DM, struma), compos mentis consciousness, and willingness to become a respondent by filling out an informed consent. The procedure begins with stage one, obtaining approval from the school, assistance from counseling guidance teachers, and parental consent sheets for respondents aged less than 17 years, which are submitted before collecting research data in the second session.

Primary data collection used self-report questionnaires and blood pressure measurements with a standardized digital tensimeter, weight with a digital scale, height with a high meter, and abdominal circumference with a centimeter meter. Blood pressure measurements were taken twice with an interval of 15 minutes in a sitting position. Measurements were taken on the right arm, and the mean blood pressure was taken. BMI measurements were calculated using the

TB/BBx100% formula and categorized as normal/abnormal based on the Indonesian Ministry of Health guidelines. Data collection was in March-May 2022. This study has obtained ethical approval from the ethics commission of FK. University of Mataram with No: 042/UN18.F7/ETIK/2022.

RESULT AND DISCUSSION

The study's results presented in the table include the univariate frequency distribution of respondent characteristics based on gender, age, smoking behavior, alcoholic consumption, drug abuse, exercises, healthy diet, abdominal circumference, body mass index (BMI), and blood pressure. The results of bivariate analysis of correlation between variables and multivariate results. The results of the study can be seen in the following table:

Table 1. Characteristics of Respondents Based on Gender, Age, Abdominal Circumference, BMI, and Blood Pressure (n=407).

No	Variables	(n)	%
1.	Gender		
	• Man	95	47.9
	• Woman	211	51.8
2.	Age (year)		
	• <16 tahun	228	56.0
	• 16-20	179	44.0
	Mean 14.85 SD 1.72 min-max 14-20		
3.	BMI		
	• Normal	385	94.6
	• Obesity	22	5.4
4.	Abdominal Circumference	394	96.8
	• Normal	13	3.2
	• Obesity		
5.	Blood Pressure		
	• Normal	373	91.6
	• Hypertension	34	8.4

Table 1 presents that most of the respondents were female, as many as 211 people or 51.8%, in the age group < 16 years, as much as 56%. The incidence of obesity in adolescents was based on body mass index; a small proportion of respondents were obese, namely 22 people or 5.4%, and based on abdominal circumference, as many as 13 people or 3.2%. The incidence of hypertension in adolescents was 34 people, or 8.4%.

Table 2. Characteristics of respondents based on smoking, alcohol, drug abuse, exercise, and healthy diet behaviors (n=407).

No	Variables	n	%
1.	Smoking Behaviour		
	• Yes	65	16.0
	• No	342	84.0
2.	Alcohol Consumption		
	• Yes	25	6.1
	• No	382	93.9
3.	Drug Abuse		
	• Yes	43	10.6
	• No	364	89.4
4.	Exercises		
	• Yes	323	79.4
	• No	84	10.8
5.	Healthy Diet		
	• Yes	105	25.8
	• No	302	74.2

Based on table 2. shows behavioral risk factors in adolescents, namely smoking behavior of as many as 65 people or 16%, alcoholic behavior of 25 people or 6.1%, drugs as many as 43 people or 10.6%, exercise behavior of as many as 323 people or 79.4% and healthy diet behavior as many as 105 or 25.8%.

Table 3. Bivariate relationship between behavioral risk factors and the incidence of hypertension (n=407).

Variables	Normal		Hypertension		n	%	OR(95% CI min-max)	p-v
	n	%	n	%				
Age (year)								
• <16	218	95.6	10	4.4	228	56.1	3,38	0.002
• 16-20	155	86.6	24	13.4	179	43.9	(1,57-7,26).	
Gender								
• Woman	197	93.4	14	6.6	211	51.8	0.625	0.262
• Man	176	89.8	20	10.2	196	48.2	(0,31-1.27).	
Smoking Behaviour								
• No	321	93.1	24	6.9	345	84.8	2.57	0.031
• Yes	52	83.9	10	16.1	62	15.2	(1.16-5.69).	
Alcohol Consumption								
• No	350	92.3	29	6.7	379	93.1	2.62	0.060
• Yes	23	82.1	5	17.9	28	6.9	(0.93 – 7.41)	
Drugabuse								
• No	331	90.9	33	9.1	364	89.4	0.239	0.131
• yes	42	97.7	1	2.3	43	10.6	(0.03 – 1.79)	
Exercises								
• No	75	89.3	9	10.7	84	20.6	1.430	0.512
• Yes	298	92.3	25	7.7	323	79.4	(0.64 – 3.19)	
Healty Diet								
• No	277	91.7	25	8.3	302	74.2	0,96	1.000
• Yes	96	91.4	9	8.6	105	25.8	(0,43-2,13)	
BMI								
• Normal	358	92.7	28	7.3	386	94.8	5.11	0.001
• Obesity	15	71.4	6	28.6	21	5.2	(1.84-14.21).	
Abdominal Circumference								
• Normal	363	92.1	31	7.9	394	96.8	3,51	0.051
• Obesity	10	76.9	3	23.1	13	3.2	(0,19-13,43).	

Based on table 3. shows that the majority of respondents are female as much as 51.8%, in the age group < 16 years as much as 56.1%. Adolescents with hypertension in the age group 16-20 years were 13.4%. Behavioral risk factors that correlate with hypertension in adolescents are BMI *p value* 0.001, OR 5.11 (95% CI: 1.84-14.21), age *p value* 0.002, OR 3.38 (95% CI; 1.57-7.26), and smoking behavior *p value* 0.031, OR 2.57 (95%CI: 1.16-5.69). The

most dominant variable affecting the incidence of hypertension in adolescents is BMI. There is a difference in the proportion of hypertension among adolescents with obese BMI and adolescents with normal BMI. (There is a significant relationship between BMI and the incidence of hypertension). Adolescents with obese BMI have a risk of 5.1 times experiencing hypertension compared to adolescents with normal BMI.

Table 4. Multivariate Modeling

Variables	<i>B</i>	S.E	Wald	df	Nilai <i>p</i>	OR	95%CI	
							Min	Max
Age	1.093	0.398	7.538	1	0.006	2.983	1.367	6.509
BMI	1.337	0.535	6.237	1	0.013	3.809	1.334	10.879
Constant	-3.136	0.326	92.494	1	0.00	0.043		

Based on Table 4. it can be interpreted that the behavioral risk factors that influence the incidence of hypertension in adolescents are BMI and Age. Adolescents in the Obese BMI group will have a risk factor for hypertension incidence 3.8 times higher than adolescents in the Normal BMI group after being controlled by the age variable.

The research results of this study aim to analyze what behavioral risk factors are most dominant in influencing the increase in blood pressure in adolescents. The results showed that BMI and age were the most dominant factors correlated with the incidence of hypertension. The results are that blood pressure increases with age (Rokhmah, 2023; Hazrati Gonbad et al., 2022).

The results showed that adolescents with obese BMI will increase the risk of increasing blood pressure by 5.6 times compared to adolescents with normal BMI (Isfaizah & Widyaningsih, 2021; He et al., 2000). Studies in Malaysia show that BMI can be a predictor in assessing the risk of hypertension in adolescents. It is also supported by the results of a systematic review of meta-analysis in China, which shows that the trend of increasing blood pressure is higher in children and adults with obesity than in people with average or thin body weights (Lin et al., 2019).

Hypertension, especially blood pressure control and smoking behavior, is currently the main focus of efforts to control hypertensive non-

communicable diseases in Indonesia. The incidence of hypertension tends to increase at a younger age (Martiningsih et al., 2021). The mortality rate due to the increased blood pressure >115 mmHg is mostly 88% in countries with low and middle-income levels. Lifestyle management, especially a healthy diet, with vegetables, fruit, sodium control, and reduction of fast food, is very effective in controlling blood pressure increases (Zhou et al., 2021). This is expected to reduce the burden of health cost expenditure by individuals and health cost management by the government so that health costs can be prioritized on other factors in preparing human resources with a focus on improving a better quality of life from an early age towards healthy adolescents and productive early adulthood. A generation ready to race globally in a world that is getting smaller and smaller due to technological developments and disruption in all aspects of life.

The results of this study showed that the increase in blood pressure correlated with age and BMI. Adolescent hypertension is a severe problem for the nation. Hypertension in adolescents should be assessed as a risk factor to be aware of, which will correlate with other factors to productivity in the early adult stage. Age 14-18 is the maximum phase of physical growth development and maturity. In this phase, a person is at the peak of growth and development with high self-confidence. The belief in adolescents with very high ability and health tends to eliminate vigilance so that the increase in blood pressure must be recognized as a problem and solution in an effort to prevent

hypertension towards CVD complications (Fuchs & Whelton, 2020).

The primary strategy in CVD prevention is to make lifestyle changes to control blood pressure and total cholesterol and not smoke (Hussain et al., 2016). This means that efforts to lose weight and achieve a BMI within the normal range are the primary targets that must be made. The risk factors that each individual has are different. So, early detection of risk factors is very critical to do in order to make prevention efforts through appropriate promotional and preventive efforts according to individuals' risk factors (Spies et al., 2018; Tam et al., 2020).

Hypertension, as a significant risk factor for CVD, can be prevented by changing behavior. Changes from un/unhealthy behaviors to behaviors that support health or contribute to health can be done by habituation—healthy lifestyle habits since adolescence. Efforts to change healthy behavior require knowledge and high motivation for healthy living. As nursing care providers, nurses play a significant role in providing education, guidance, and counseling (Himmelfarb et al., 2016; Martiningsih et al., 2023). This effort can be made by maximizing self-care abilities and support from individuals' essential internal and external factors.

The limitation of this study is that blood pressure measurements were taken at school; office blood pressure measurement is needed to confirm the diagnosis of hypertension in at-risk groups. Further study is needed on how the counseling education method that adolescents want is related to an effort to early detection of individual behavioral risk factors and healthy lifestyle changes in terms of promoting and preventing hypertension in adolescents.

CONCLUSION

The incidence of hypertension in adolescents is increasing by age group. Behavioral risk factors in adolescents in this study that correlated with hypertension were body mass index, age, and smoking behavior. BMI had the most dominant effect on the incidence of hypertension. Simultaneously, the lack of positive behavior in exercise, unhealthy diet, and some behaviors related to smoking, drug abuse, and alcohol affect the incidence of hypertension. Partially, BMI and age affect the incidence of hypertension.

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