



Risk Factors for Non-Communicable Diseases Among Adolescents in The City Yogyakarta

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ABSTRACT

Background: Non-Communicable Diseases (PTM) is the leading cause of death in Indonesia. In the past, PTM was synonymous with old age disease, but now many young people suffer from this disease. PTM in adolescents is triggered by unhealthy lifestyles, such as smoking behavior, consumption of foods with unbalanced nutrition, lack of physical activity, and consuming alcoholic beverages. According to the results of the Global School-based Student Health Survey (GSHS) or a school-based global health survey in 2015, it is known that the current lifestyle of adolescents is at risk of non-communicable diseases. Furthermore, the use of e-cigarettes (vape) has targeted SMA and SMK teenagers. Research from dr Hamka University Jakarta shows that the prevalence of adolescent e-cigarette users reaches 11.9 percent or 1 in 8 people. Meanwhile, there are around 30,000 e-cigarette users in Yogyakarta. Today's vape has a healthier image than regular cigarettes, even though the risks for the two products are actually the same. This needs attention because the tendency to use e-cigarettes can increase the risk of PTM. One way to prevent and control PTM is early detection of PTM risk factors. **Research Objective:** was to describe the risk factors for PTM in adolescents **Research Methods:** This study used quantitative methods with cross sectional design. PTM risk factor data collection by direct measurement of blood pressure, blood sugar, and body mass index. Furthermore, a survey was carried out with a questionnaire on the patterns of e-cigarette use and the risk factors for PTM. The study population was all high school and vocational high school adolescents in the city of Yogyakarta. The number of SMA and SMK schools in

Yogyakarta City is 74 while there are 209 adolescents as the research sample from 7 randomly selected schools with a distribution of 1 SMAN, 3 SMAS, 1 SMKN, and 2 SMKS.

Research Results: Most of the consumption of vegetables and fruit was in the bad category, namely <5 servings per day as many as 165 (78.6%). Most of the consumption of soft drinks is in the bad category (almost every day and every day) as much as 111 (52.9%). Most of the fast food consumption is in the bad category (almost every day and every day) as many as 155 (73.8%). Physical activity is mostly in the risk category, namely physical activity at least 60 minutes per day which is done 1-2 times per week as much as 113 (53.8%)

Keywords: risk factors for non-communicable diseases, adolescents

I. INTRODUCTION

Indonesia is currently facing a double burden of diseases, namely infectious diseases and non-communicable diseases (PTM). PTM used to be associated with diseases of the elderly, but the disease can strike at a young age. According to the results of the Global School-based Student Health Survey (GSHS) or a school-based global health survey in 2015, it is known that the current lifestyle of adolescents is at risk of non-communicable diseases. GSHS data shows unhealthy eating patterns such as teenagers consuming fast food in one day (53%), less consumption of vegetables and fruit (78.4%),



soft drinks (28%), less physical activity (**67.9%**), **have** smoked (22.5%), and consumed alcohol (4.4%). This is in line with the 2013 Riskesdas results, which showed that 26.1% of teenagers did not do physical activity. The population aged 10 years and over consume less vegetables and fruit as much as 93.5% and the population aged 15 years and over who smoke around 36.3% [1].

There are four types of PTM, namely cardiovascular disease, cancer, diabetes, and chronic respiratory disease which causes the most deaths in Indonesia [2]. Basic Health Research Data (Riskesdas) in 2013 recorded that 2.5% of stroke patients had suffered from a stroke since the age of 18-24 years. In addition, PTM found in school-age children and adolescents was cancer by 0.6%, asthma by 5%, and obesity or overweight by 10% [3] [4]. Furthermore, the use of e-cigarettes or vape has become a trend in today's teens. Research from dr Hamka University Jakarta shows that the prevalence of adolescent e-cigarette users reaches 11.9 percent or 1 in 8 people. Meanwhile, there are around 30,000 e-cigarette users in Yogyakarta. E-cigarettes became known and widely circulated in Indonesia about 5 years ago. Electric cigarettes, also known as the Electronic Nicotine Delivery System (ENDS), are a tool that functions to convert chemical substances into vapor and pass them to the lungs using electric power. Some people think that e-cigarettes are safer than tobacco cigarettes in general so that more people who consume tobacco cigarettes switch and try e-cigarettes [6]. On the other hand, a study in America found that e-cigarette users were 56 percent more likely to have a heart attack and 30 percent more likely to suffer a stroke than non-users. Coronary artery disease and circulation problems, including blood clots, were also significantly higher among those who used these objects, 10 percent and 44 percent, respectively [7]

To manage non-communicable diseases, the government made a policy that is to

develop and strengthen active early detection (screening) activities, increase public access to early detection services through PTM Posbindu activities. In addition, people are invited to behave CERDIC, namely regular health checks, get rid of cigarette smoke, be diligent in activities, a healthy diet with balanced calories, adequate rest and managing stress [5]. Early detection is a strategy used in the population to assess risk factors for disease in individuals with or without symptoms and to screen for disease. Preventing and controlling risk factors is relatively cheaper when compared to the cost of PTM treatment. The activities for early detection of PTM risk factors include: measurement of blood pressure, blood sugar, body mass index and risk behavior interviews.

II. LITERATURE REVIEW

A. Non-Communicable Diseases

Non-communicable disease is a chronic disease with a long duration with generally slow healing or control of clinical conditions. An unhealthy lifestyle such as an unhealthy diet, lack of physical activity, and smoking results in an increase in the prevalence of high blood pressure, high blood glucose, high blood fat, overweight and obesity which increases the prevalence of heart and blood vessel disease, obstructive pulmonary disease chronic, various types of cancer are the biggest cause of death [8]. Hypertension is an increase in systolic blood pressure of more than 140 mmHg and diastolic blood pressure of more than 90 mmHg on two measurements with an interval of five minutes in a state of rest / calm. Causes of hypertension include atherosclerosis (thickening of the artery walls that causes loss of elasticity of the blood vessels), heredity, increased blood pumped to the heart, kidney disease, adrenal glands, and the sympathetic nervous system. Hypertension

based on its causes is divided into 2 types, namely primary and secondary hypertension [9]. Based on the JNC (The Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure) VII makes a division of hypertension which can be seen in the table below Maintaining the Integrity of the Specifications

Table I. Classification of Hypertension According to JNC-VII

Classifikasi of Hipertension	Classifikasi	
	Sistolik (mmHg)	Distolik (mmHg)
Normal	< 120	< 80
Pre Hipertensi	120 - 139	80 – 89
Hipertensi derajat 1	140 - 159	90 – 99
Hipertensi derajat 2	≥ 160	≥ 100

The risk of hypertension complications increases in the presence of risk factors for heart and other blood vessel diseases such as high cholesterol and blood sugar levels (diabetes) [3]. Diabetes Mellitus (DM) or abbreviated as Diabetes is a health disorder in the form of a collection of symptoms caused by an increase in blood sugar (glucose) levels due to insufficient or insulin resistance with glucose levels at > 200 mg / dl [10].

Type of DM is type 1 diabetes which is caused by no insulin production at all, type 2 diabetes which is caused by insufficient and ineffective insulin work, gestational diabetes that occurs during pregnancy and other types of diabetes which are caused by drug use, other diseases, etc. The main symptoms of DM are frequent urination, hunger and thirst [11].

Stroke is a sudden illness that is characterized by partial paralysis of the body, slurred speech and can be

accompanied by decreased consciousness caused by impaired blood circulation to the brain due to blockage or rupture of brain blood vessels. [11]. Coronary heart disease is a heart disease that occurs due to narrowing of the blood vessels in the heart which can cause a heart attack. Symptoms and signs are pressure, such as being under a heavy load, pain, pinching, or burning in the chest, such as choking or shortness of breath. [11]

B. Risk Factors Behavioral risk Non-communicable disease

Risk factors associated with major non-communicable diseases in Indonesia such as smoking, lack of physical activity, less consumption of vegetables and fruits, consumption of alcohol and obesity: [11]. 1) Smoking, cigarettes are processed tobacco leaves with or without using additives. Cigarettes and other tobacco products consumed by humans are generally the leaves of the tobacco plant (*Nicotiana tabacum*, *Nicotiana rustica*). In processed tobacco leaves, there are 2,550 chemicals. Some of these chemicals quickly cause health problems, lung damage, and can weaken stamina. 2) Lack of physical activity. Physical activity includes all daily activities including sports, activities at home, workplace, and activities while traveling such as going from home to work [12]. Lack of physical activity can increase LDL levels and lower HDL levels and are a risk factor for heart disease [13]. 3) Less Consumption of Vegetables and Fruits. Lack of consuming types of food derived from vegetables and fruits can affect blood cholesterol levels [12]. Consumption of vegetables and fruit is categorized as sufficient, namely 5 servings per day in a week, while it is categorized as insufficient if there are less than 5 servings per week [14]. Consumption of vegetables and fruit



can lower blood cholesterol levels and reduce the risk of coronary heart disease. 4) Alcohol consumption. The dangers of alcohol consumption to health are weakening the heart muscle and increasing the risk of heart attack, stroke and hypertension, inflammation of the pancreas, brain damage, lung infections, liver damage and kidney damage. 5) Obesity Obesity is the accumulation of excess fat due to an imbalance between energy intake and energy used for a long time. Excess BMI or obesity indicates a fair amount of fat stored in the body and in the blood [16]. A person is said to be obese if he has a Body Mass Index (BMI) of 25 kg / m².

C. Adolescence

Adolescence is a period in which the individual develops from the first time the individual shows secondary sexual signs until the moment he reaches sexual maturity. The age limit for adolescents varies according to the socio-culture of the local area. WHO divides age into 2 parts, namely early adolescents 10-14 years and late adolescents 15-20 years. [17]. Adolescents at this stage experience many changes, namely changes in emotion, body, interests, behavior patterns with problems in adolescence [18].

D. Definition of Electric Cigarettes

Electronic Cigarettes (ECs) or Electronic Nicotine Delivery System (ENDS) is a tool that functions to convert chemical substances into vapors and flow them to the lungs, where these chemicals are a mixture of substances such as nicotine and propylene glycol. ECs products have not been regulated or monitored so the substance content of each brand varies widely. Both the type and content of each type of substance, the actual content is not known [19].

E. E-Cigarette Use Patterns in Adolescents

The pattern of using e-cigarettes can be divided into, using only e-cigarettes, using e-cigarettes and conventional cigarettes and only using conventional cigarettes and even just experimenting with using e-cigarettes [20]. There are four patterns of e-cigarette use among high school adolescents, namely: not using e-cigarettes, using only e-cigarettes, using only conventional cigarettes and using e-cigarettes and conventional cigarettes. Usually adolescents who use e-cigarettes only, conventional cigarettes and use e-cigarettes and conventional cigarettes are more likely to use marijuana with a relatively higher frequency than the nonsmokers group [21].

III. METHOD

The type of research used is descriptive observational because researchers want to describe new cases of diabetes mellitus and hypertension in Yogyakarta city youth. The design used was cross sectional because the observations of the subjects were carried out at a certain time or period of time. This research was conducted in May-June 2020 at SMA, SMKN and SMKS Yogyakarta city.

The population in this study were all 74 schools in the city of Yogyakarta. With the following details, public SMA (11), Private SMA (32), State SMK (8) and Private SMK (23). To determine the number of samples using a confidence level of 99%, 10% precision and a population proportion of 0.50 (Lemeshow, et., 1997) in order to obtain a total sample of 167 adolescents. Then to increase the validity of the data the number of samples was added 25% of the minimum sample size so that the total sample was 209 adolescents. If the average number of students per school is 30 people, then 7 schools are needed to meet the sample size. By considering the number of schools, there are

1 SMAN, 3 SMAS, 1 SMKN, and 2 SMKS. The school was determined by lottery. Data processing using a computer system with the stages of editing, data coding, data entry, data cleaning and data analysis. Data analysis in this study is in the form of Univariate analysis, which only describes or describes the discovery of new cases of diabetes mellitus and hypertension.

IV. RESULT

A. Distribution of Respondent Characteristics

The total number of respondents in this study amounted to 210 people. The characteristics of the respondents studied included school of origin, class, age and gender. The characteristics of the research respondents can be seen in the table below:

Table II. Respondent Characteristics school origin

Variable	Amount (n)	Percentage (%)
Class		
Class 10	7	3,3
Class 11	71	33,8
Class 12	132	62,9
School Origin		
SMK 1 BOPKRI	30	14,3
SMA N 10 YK	30	14,3
SMTI YK	33	15,7
SMK/SMF INDONESIA	30	14,3
SMA TAMAN MADYA JETIS	30	14,3
SMK N 6 YK	30	14,3
SMA MA ARIF	27	12,9
Responden Age		
Age 15	3	1,4

Variable	Amount (n)	Percentage (%)
Age 16	68	32,4
Age 17	97	46,2
Age 18	25	11,9
Age ≥ 19	17	8,1
Gender		
Male	106	50,5
Female	104	49,5

Based on the table above, it can be seen that based on the origin of the school, there are more than 33 SMK/SMF Indonesia (15.7%). Based on the class, most of the 12th grade were 132 (62.9%). Based on age, most of them were 17 years old as much as 97 (46.2%) .Based on gender, most of them were male as many as 106 (50.5%).

B. Univariate Analysis

In the following tables, descriptive results are presented for all the variables studied, namely consumption of fiber (eating fruit and vegetables) soft drinks, fast food, physical activity (doing physical activity, walking school bikes,) sports (participating in sports classes. , sports, apart from school) a lot of time to sit, games, watch, chat, smoke, smoke vapor.

Table III. Consume Fibrous Foods.

No	Fibrous Foods	Amount (n)	Percentage (%)
1	Consume fruit		
	1-2 time a day	94	44,8
	3-4 time a day	29	13,8
	5 or more times a day	4	1,9
	Less than once a day	74	35,2
	Never	9	4,3



2	Consume Vegetable		
	1-2 time a day	119	56,7
	3-4 time a day	45	21,4
	5 or more times a day	11	5,2
	Less than once a day	29	13,8
	Never	6	2,9

Based on the table above, it can be seen that based on fruit consumption, most of them consume 1-2 times a day as many as 94 (44.8%), then less than once a day as many as 74 (35.2%). Based on vegetable consumption, most of them consumed 1-2 times a day as much as 119 (56.7%).

Table IV. Consumption of Soft Drinks and Fast Food

No	Variable	Amount (n)	Percentage (%)
1	Consumption softdrink		
	1-2 time a day	30	14,3
	3-4 time a day	6	2,9
	5 or more times a day	1	0,5
	Less than once a day	74	35,2
	Never	99	47,1
2	Fast food		
	1-2 time a day	43	20,5
	3-4 time a day	10	4,8
	5 or more times a day	4	1,9
	Less than once a day	98	46,7
	Never	55	26,2

Based on the table above, it can be seen that most of them never drink soft drinks such as Coca Cola, Sprite, Fanta, Big Cola as much as 99 (47.1%), 74 (35.2%) less than once a day, then drink 1-2 30 times a day (14.3%).

Based on the table above, it can be seen that most eat fast food such as KFC flour fried chicken, Texas Fried Chicken, California Fried Chicken, McDonald's, Burger King, AW, pizza, and others less than once a day as much as 98 (46.7%) then never eat fast food as much as 55 (26.2%), then those who eat 1-2 times a day are 43 (20.5%)

Table V. Physical Activity

No	Variable	Amount (n)	Percentage (%)
1	Physical activity 60 minutes a day		
	1-2 day	96	45,7
	3-4 day	40	19
	5 -6 day	14	6,7
	Everyday	43	20,5
	Never	17	8,1
2	Walk or ride a bicycle from/ or to school		
	1-2 day	58	27,6
	3-4 day	15	7,1
	5 -6 day	11	5,2
	Everyday	16	7,6
	Never	110	52,4
3	Take a weekly exercise class		
	1-2 day	145	69
	3-4 day	4	1,9

	5 day or more	20	9,5
	Never	41	19,5
4	Exercising		
	Less than 1 hour	118	56,2
	More than 1 hour	92	43,8
5	Sports other than school		
	1 time	53	25,2
	2 times	63	30
	3 times	31	14,8
	More than 3 times	36	17,1
	Never	27	12,9
6	Leisure time		
	Less than 1 hour	20	9,5
	1-2 hour	40	19
	3-4 hour	73	34,8
	5-6 hour	38	18,1
	7-8 hour	20	9,5
	More than 8 hour	19	9

1. For 1 week, who did physical activity as a whole at least 60 minutes a day, mostly 1-2 days, as many as 96 (45.7%). Other types of sports/physical activity: kite playing, mountain climbing, jogging, futsal, fishing, skipping, walks, push ups, muang thai, to the fields, abdominal exercises, dancing, table tennis, swimming, volleyball, gymnastics , dancing, playing pigeon kolongan, stretching, baseball, workout and basketball
2. During 1 week, most of the 110 (52.4%) never walked or rode a bicycle from / or to school.
3. During the school year, 145 (69%) of

the sports class attended each week mostly.

4. The duration of doing sports at school is mostly less than 1 hour as many as 118 (56.2%)
5. Within 1 week, most of those who did sports other than school were twice as many as 63 (30%)
6. Time spent specifically or normally sitting and watching television, playing computer games, chatting with friends, doing other activities while sitting or playing the play station is mostly 3-4 hours as many as 73 (34.8%).

Table VI. Risk Factor Communicable Disease

No	Risk Factors	Amount (n)	Percentage (%)
1	Consume Vegetables and Fruits		
	Bad (<5 servings per day)	165	78,6
	Good (≥ 5 servings per day)	45	21,4
2	Drink soft drinks		
	Bad (almost every day and every day)	111	52,9
	Good (never)	99	47,1
3	Eat fast food		
	Bad (almost every day and every day)	155	73,8
	Good (never)	55	26,2
4	Physical activity		
	Risky	113	53,8
	No risk	97	46,2



Based on the research results, most of the consumption of vegetables and fruit was in the bad category, namely <5 servings per day as many as 165 (78.6%). Most of the consumption of soft drinks is in the bad category (almost every day and every day) as many as 111 (52.9%). Most of the consumption of fast food is in the bad category (almost every day and every day) as many as 155 (73.8%). Physical activity is mostly in the risk category, namely physical activity at least 60 minutes per day carried out 1-2 times per week as many as 113 (53.8%) while those who smoke are 85 (40.5%).

V. DISCUSSION

Non-communicable disease (PTM) is a chronic disease with a long duration with generally slow healing or control of clinical conditions. An unhealthy lifestyle such as an unhealthy diet, lack of physical activity, and smoking results in an increased prevalence of high blood pressure, glucose, high blood fat, overweight and obesity which increases the prevalence of heart and blood vessel disease, chronic obstructive pulmonary disease, various types of cancer are the biggest cause of death [1]. Behavioral risk factors associated with major non-communicable diseases in Indonesia include less consumption of vegetables and fruit, consumption of soft drinks and consumption of fast food, lack of physical activity and smoking. Based on the research results, the consumption of vegetables and fruit was in the bad category, namely <5 servings per day as much as 78.6%. The 2018 Riskesdas DIY data also shows the proportion of eating less fruit / vegetables and the average consumption of fruit and vegetables per day in the 15-19 year age group is 96.4% with an average consumption of vegetables and fruit of 1.6 servings / day (2) . This shows that the consumption of fibrous food is still low so that it can cause difficulty defecating, obesity,

uncontrolled blood pressure, uncontrolled blood glucose levels, narrowed blood vessels [3].

In Indonesia, based on the results of basic health research research (Riskesdas, 2010), there are still many people who do not consume enough vegetables and fruits, around 93.6%. Riskesdas data in 2013 recorded that people over 10 years of age who consumed less than 5 servings of fruits and vegetables a day were 93.5%, while the proportion of consuming more than 5 fruits and vegetables per day in the Riskesdas data was still low, namely only 3.3%. Consumption of vegetables and fruits is an important part of achieving a balanced nutrition. According to the Guidelines for Balanced Nutrition according to Permenkes No. 41 of 2014 to consume 3-4 servings of vegetables and fruit every day and 2-3 servings of fruit every day or half a plate containing fruits and vegetables (more vegetables) at every meal [4]. The behavior of consuming vegetables and fruit in adolescents is also influenced by several factors such as age, gender, preferences / preferences for vegetables and fruit, cultural background, pocket money, availability of vegetables and fruit at home and the influence of parents and peers [5].

The results of the study for the consumption of soft drinks were mostly in the bad category (almost every day and every day) as many as 111 (52.9%). Soft drinks are non-alcoholic drinks that contain soda referred to as carbonated soft drinks or better known to the public as soft drinks. According to the Australian Beverages Council, soft drinks (soft drinks) are carbonated drinks that are added with flavorings and sweeteners such as sugar. Soft drinks consist of sugar-sweetened soft drinks and non-healthy soft drinks. Sugar-sweetened soft drinks are soft drinks with sweeteners derived from sugar, while non-sugar soft drinks are soft drinks with sweeteners derived from artificial sweeteners [6]. The high phosphate content in soft drinks can destroy important minerals in the body and serious mineral deficiencies can cause heart

disease (magnesium deficiency), especially osteoporosis (calcium deficiency), and many more [7]. The behavior of consuming soft drinks among young school students is related to knowledge, peer influence, access and the effect of advertising [8]. Another study states that there is an effect between consumption of non-carbonated soft drinks on the incidence of obesity in SMAN 2 Kota Banda Aceh [9].

The results of the research for fast food consumption were mostly in the bad category (almost every day and every day) as many as 155 (73.8%). Fast food or fast food is known to the public as junk food. Literally, junk food is defined as junk food or non-nutritious food because these foods are considered to have no nutritional value for the body. Eating junk food is not only pointless, it can also damage your health. Health problems due to eating junk food such as obesity or obesity, diabetes, hypertension, coronary heart disease, stroke, cancer, and so on [10]. Fast food is food that is not good for teenagers if consumed too often. Some of the factors that cause many adolescents to consume fast food are knowledge, peer influence, comfortable places to hang out, fast and practical, pocket money, low prices, and brands of fast food. If fast food is consumed in excess, it will have an impact on adolescent health problems such as obesity, increasing risk factors for hypertension, diabetes, cancer, heart disease, and stroke [11].

The results of the study for physical activity were mostly in the risk category, namely physical activity at least 60 minutes per day carried out 1-2 times per week as many as 113 (53.8%). This lack of physical activity is supported by the results of research which showed that 110 (52.4%) never walked or rode a bicycle from / or to school for 1 week, if they went to school most of them used vehicles. Physical activity is said to be sufficient or good, namely doing physical activity at least 60 minutes a day for ≥ 3 days a week. Physical activity is any movement of

the body that can increase energy expenditure or energy that can be done in various situations and places. Sports is a form of physical activity that contributes to energy expenditure by 20-50%. Every time you do sports, there is a burning or an increase in metabolism in the body which makes the body heat and sweat [12].

Sports activities at school are also still lacking during the school year, 145 (69%) take part in sports classes every week (69%) and the length of time doing sports at school is mostly less than 1 hour or less than 60 minutes (118.56.2%). Besides that, most of those who do sports other than going to school are twice as many as 63 (30%). Lack of physical activity such as exercise can lead to excess energy which then becomes fat stores in the body. Adolescents who have high sitting habits are recorded as being obese by 87.3% [13]. One form of activity that spends high sitting time is playing the internet or social media, watching television, playing games, chatting that doesn't move much. The results showed that in 1 week, the time spent specifically or normally to sit and watch television, play computer games, chat with friends, do other activities while sitting or play the play station is mostly 3-4 hours as many as 73 (34.8%). The results of other studies state that the high intensity of social media use can have a negative impact on adolescents, one of which is a decrease in physical activity, namely sports in adolescents. Low exercise habits can lead to metabolic imbalances in the body and are at risk for weight gain and obesity [14]. This lifestyle has an impact on the possibility of heart disease, hypertension, diabetes and stroke. If adolescents never do physical activity, while the calories that enter the body are many, the calories will be saved and the teenager will be obese or overweight. In these conditions, non communicable disease that can be affected is diabetes mellitus [15].



VI. CONCLUSION

The description of the risk factors for PTM in adolescents and the description of the patterns of e-cigarette use among adolescents in Yogyakarta, namely

1. Most of the consumption of vegetables and fruit is in the bad category, namely <5 servings per day as much as 165 (78.6%).
2. Most of the consumption of soft drinks is in the bad category (almost every day and every day) as many as 111 (52.9%).
3. Consumption of fast food is mostly in the bad category (almost every day and every day) as many as 155 (73.8%).
4. Physical activity is mostly in the risk category, namely physical activity at least 60 minutes per day carried out 1-2 times per week as many as 113 (53.8%)

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