

## FACTORS AFFECTING THE INCIDENT OF HYPERTENSION IN ADOLESCENT AT CHRISTIAN HIGH SCHOOL BANJARMASIN

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**Abstract:** Hypertension is a condition when the blood pressure at blood vessels increase in chronically elevated which also a disease characterized by the occurrence of normal blood pressure can cause various complications in other diseases. Adolescent is defined as the period of transition between the period of childhood development to adulthood. The factors that cause hypertension in adolescents, such as the diets of adolescents erratic, physical activity, and psychosocial factors change. This research aims to know the factors have an effect on the occurrence of hypertension in adolescent of SMA Kristen Banjarmasin. The design of this study is analytic observational study with cross sectional approach. The population in this study amounted to 59 people. From the results of studies using chi square test with with a confidence level of 95% found no effect of gender on the occurrence of hypertension in adolescents ( $p= 0,200$  ;  $OR= 2,549$ ); There is the affecting of body mass index against the occurrence of hypertension in adolescents ( $p= 0,0001$ ;  $OR= 18,958$ ); There is the affecting of physical activity against the occurrence of hypertension in adolescents ( $p = 0.0001$ ;  $Or = 18.083$ ); There is the affecting of the stress of events hypertension in adolescents ( $p = 0.0001$ ;  $Or = 93,333$ ). It can be concluded that there is no affecting of gender against the occurrence of hypertension in adolescent, there is the affecting of body mass index, physical activity and stress against the occurrence of hypertension in adolescent of SMA Kristen Banjarmasin.

**Keywords:** Hypertension, adolescent, gender, body mass index (BMI), physical activity, stress.

### INTRODUCTION

Hypertension is a condition when the blood pressure in the blood vessels chronically elevated. Hypertension is also a disease characterized by the occurrence of normal blood pressure can cause a variety of complications to some other diseases, such as heart disease, stroke and kidney. This can happen because the heart work harder to pump blood to meet for oxygen and body's nutrients (Trihono, 2013; WHO, 2005; Suhardi, 2014). According to the World Health Organization

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(WHO) and the International Society of Hypertension (ISH), there are currently 600 million people with hypertension worldwide and 3 million die annually (WHO, 2005; Rahajeng E, 2009). Based on the results Riskesdas of 2013 cases of hypertension in Indonesia of the results as much as 25.8%. This has resulted in changes in disease patterns from infectious diseases to non-communicable diseases, including degenerative diseases and man made diseases are a major factor of morbidity and mortality issues. The prevalence of hypertension in Indonesia in 2013 based on the results of measurements on the age  $\geq 18$  years of 25.8% (Rahajeng E, 2009; Respati, 2012). Based Riskesdas in 2013, the analysis is limited hypertension at the age of 15-17 years according to the Joint National Committee (JNC) VII decreased national prevalence of 5.3% (males 6,0% and females 4.7%) (Respati 2012; Fattah LA, 2012).

Youth (Adolescence) is defined as the period of transition between childhood development to adulthood that includes changes in the biological, cognitive and social emotional. Adolescence includes ages between 11 and 20 years old. Adolescence is divided into early adolescence (13 to 16 or 17 years) and late adolescence (16 or 17 years to 20 years). Changes in the biological, cognitive and social emotional that occur range from the development of sexual function, the process of abstract thinking until the autonomy (Emilia E, 2009; Sargowo, 2011).

Factors that cause hypertension in adolescents also have hypertension, such as the diets of adolescents uncertain, changes in the psychosocial factors that are characterized by changes in the transition childhood to adulthood and higher nutritional needs for rapid growth. Sometimes teenagers indiscriminate in food consumption among others like salty foods. In addition, overweight and obesity in adolescence is associated with degenerative disease is one of hypertension in younger age. This causes hypertension is not only attacks in old age, but teenagers can also experience. In this transition period adolescents prone to having problems and high risk behavior, such as smoking, drinking alcoholic beverages and others. The risky behaviors is one of the causes of hypertension (Emilia E, 2012; Fitriana, 2013).

Many of the diseases suffered by adolescents one of which is hypertension because it caused physical activity less will affect the body mass index, because the energy expended less compared with that consumed it will affect the IMT, which one disease is hypertension (Fitriana, 2013; Budisetio 2011 ). This is corroborated by research Agnesia NK (2012), said that the nutritional status of adolescents are affected by IMTnya 25-27 say nutrition / obesity and hypertension, which means that obese adolescents are at risk of hypertension 9.051 times greater than the adolescents who are not obese. In addition, stress can also affect the health of adolescents, especially in hypertensive disease (Competitiveness, 2005; Budisetio, 2011). Based on research H.S Johannes (2005), that the results of research on factors affecting hypertension in adolescents is etiology, essential hypertension,

pathogenesis, race, gender, family history or genetic factors, obesity and salt intake (Competitiveness JH, 2005).

Based on data from the Health Department Banjarmasin in 2014 the number of people with hypertension in adolescents are as many as 16 men and 24 women from 12 394 inhabitants most adolescents with hypertension in adolescents is in the region of Puskesmas S. Parman Banjarmasin as many as 4 men and 5 women, with most being in the schools in the region Puskesmas S. Parman Banjarmasin, namely Christian High school Banjarmasin. Based on the results of the initial survey and profile data S.Parman PHC health institutions in 2014 that the applicant did in Banjarmasin Christian High School is known that the school did not do physical education health sports (penjasorkes) as extra-curricular. Schools have not been trained cadre of adolescent health, so that health conditions are not monitored routinely included herein blood pressure, height and weight. S. Parman health center of the data obtained a total of 39 students who have a BB with a BMI over, when associated with less physical activity and activities in schools are crowded with little rest time risk of developing hypertension if left unchecked and prevented as early as possible. Based on that data, it is necessary to do research related to hypertension risk factors in adolescents.

## **RESEARCH METHODS**

This study design was observational analytic aimed to determine the factors that influence the incidence of hypertension in adolescents Christian High School Banjarmasin. The design study is cross-sectional to analyze the influence of the factors (independent variables) the effect of hypertension in adolescents (the dependent variable) (Musafaah, 2014). The population in this study were high school students who totaled 59 people. The target population in this study are all of high school students Christian Banjarmasin. The sample used in this study using techniques totally sampling with a sample of 59 respondents who met the inclusion criteria (Sapsford, 1996). The following inclusion criteria were used:

- a) Do not consume alcohol.
- b) Do not smoke.
- c) No menstruation for women.
- d) Not having a family history of hypertension.

The instrument used in this study was a questionnaire, spreadsheet, mikrotoise, scales and sphygmomanometer. The questionnaire used is adolescent behavior questionnaire containing questions about the behavior of hypertension ranging from knowledge of hypertension and how to prevent hypertension. The questionnaire used is a questionnaire that has been used in previous studies. Another instrument used is the sheet that contains the hypertension risk factor

identification of risk factors of hypertension in adolescents and tension tools for measuring blood pressure in adolescents. Data analysis was performed using univariate analysis to explain the distribution of frequencies and percentages of each variable. While the bivariate analysis to explain the factors influence the incidence of hypertension in adolescents using the chi-square test of 95% and odds ratio.

## RESULTS AND DISCUSSION

Based on the research results to the 59 respondents obtained the distribution of hypertension in adolescents can be seen in Table 1. According to Table 1 it can be seen that respondents who had hypertension of 16 people (27.1%) and respondents who are not hypertensive amounted to 43 (72.9%). Based on the research results to the 59 respondents obtained on the gender distribution of teenagers who can be seen in table 2.

According to the table 2 can be seen that the number of respondents by sex men totaled 27 people (45.8%) and women amounted to 32 (54.2%). Based on the research results to the 59 respondents obtained on the gender distribution of teenagers who can be seen in Table 3. According to Table 3 it can be seen that the respondents the number of respondents by the Body Mass Index (BMI) is not normal numbered 21 people (35.6%) and Mass Index body (IMT normal respondents amounted to 38 people (64.4%).

Based on table 4 it can be seen that the respondents the number of respondents by less physical activity, totaling 26 people (44.1%) and respondents who had enough physical activity totaled 33 (55.9%). Based on field data is less known that activities such as washing with a washing machine, take out the trash, watching TV. While activity quite like, wash by hand, hanging laundry, cooking, mopping the floor, sweeping the floor, cleaning the yard, clean up equipment, cleaning the house with much use of the hands, gardening, wipe the glass window. Based on the research results to the 59 respondents obtained on the gender distribution of teenagers who can be seen in Table 5.

Based on Table 5 it can be seen that the respondents stress were 17 people (28.8%) and respondents who were not stressed totaled 42 (71.2%). Based on field data known that stress is triggered by eating less food warm / balanced, less sleep than 7-8 hours a day, distance relatives / family far > 75 km, less attend social activities in the community, less gain spiritual psychological strength, do not have a friendly environment / acquaintances, neighbors less sociable, less exercise that causes sweating 2 times a week and less time in every day to cool down.

Based on table 6 it can be seen that of the 27 respondents were male sex there were 10 (37%) of respondents who experienced hypertension. The results of this study also showed that of the 32 respondents were female, there are 6 (18.8%) of

**Table 1**  
**Frequency Distribution of Respondents by Incident of Hypertension**

No	Incident of Hypertension	Frequency (people)	Percentage (%)
1	Hypertension	16	21,1
2	Not Hypertension	43	72,9
	<b>Total</b>	<b>59</b>	<b>100</b>

**Table 2**  
**Frequency Distribution of Respondents by Gender**

No	Gender	Frequency (people)	Percentage (%)
1	Male	27	45,8
2	Female	32	54,2
	<b>Total</b>	<b>59</b>	<b>100</b>

**Table 3**  
**Frequency Distribution of Respondents by Body Mass Index (BMI)**

No	BMI	Frequency (people)	Percentage (%)
1	Abnormal	21	35,6
2	Normal	38	64,4
	<b>Total</b>	<b>59</b>	<b>100</b>

**Table 4**  
**Frequency Distribution of Respondents Based Physical Activity**

No	Physical Activity	Frequency (people)	Percentage (%)
1	Less activity	26	44,1
2	Enough activity	33	55,9
	<b>Total</b>	<b>59</b>	<b>100</b>

**Table 5**  
**Frequency Distribution of Respondents by Stress**

No	Stress	Frequency (people)	Percentage (%)
1	Stress	17	28,8
2	Not stress	42	71,2
	<b>Total</b>	<b>59</b>	<b>100</b>

**Table 6**  
**Analysis of Effect of Gender on the Genesis of Hypertension in Adolescents**

No	Gender	Incident of Hypertension		Total	p-value	OR
		Hypertension	Not Hypertension			
1	Male	10 (37,0%)	17 (63,0%)	27 (100%)	0,200	2,549
2	Female	6 (18,8%)	26 (81,3%)	32 (100%)		

respondents who experienced hypertension. While respondents were not hypertension is more common in women 26 respondents (81.3%) compared to male respondents 17 (63.0%). The results of chi-square test with a confidence level of 95% and p-value = 0.200 means there is no influence of gender on the incidence of hypertension in adolescents. Results OR of 2.549 which means that boys are more at risk of hypertension 2,549 times greater for hypertension compared with women.

The results are consistent with research Erliana NS (2012) which states that gender is no significant relationship with hypertension p-value = 0.161 (Syahrini EN 2012). The high risk men for hypertension as found men more likely to have the possibility of hypertension in women, often triggered by unhealthy behavior (smoking and alcohol consumption), depression and low status of the work of parents, feeling less comfortable to work and unemployment on the family (Rahajeng E, 2009). Hypertension based on gender can be influenced by psychological factors (Zuraidah, 2011). Based on the analysis in the field there are some young men who have hypertension triggered by stress and burden of thinking on his parents. This is in accordance with Aljannah R (2012) that found there were significant blood pressure of teenage boys is higher compared to girls (Rabaity A, 2012).

Based on Table 7 it can be seen that of the 21 respondents who are not normal BMI, there were 13 (61.9%) of respondents who experienced hypertension. The results of this study also showed that of the 35 respondents who are normal BMI 3 (7.9%) of respondents who experienced hypertension. While respondents were not hypertension is more common in normal BMI respondents 35 (92.1%) compared to respondents who are not normal BMI 8orang (38.1%). In this research note that respondents who had a normal BMI is not likely to risk for hypertension.

The results of chi-square test with a confidence level of 95% and p-value = 0.0001 means that there is the influence of BMI on the incidence of hypertension in adolescents. Results OR of 18.958 which means abnormal adolescent BMI greater risk of hypertension 18.958 times greater for hypertension compared with normal BMI.

**Table 7**  
**Analysis of the influence of Body Mass Index on Incident of Hypertension in Adolescents**

No	BMI	Incident of Hypertension		Total	p-value	OR
		Hypertension	Not Hypertension			
1	Abnormal	13 (61,9%)	8 (38,1%)	21 (100%)	0,0001	18,958
2	Normal	3 (7,9%)	35 (92,1%)	38 (100%)		

Body mass index (BMI) is directly related to blood pressure, especially systolic blood pressure. Values higher BMI > 25-27 says as obesity is associated with high blood pressure and prevalence of hypertension (Sargowo D, 2011; Zuraidah, 2012). Nutritional Status / IMT teenagers have been indirectly affected by eating habits. Primary hypertension can be caused by obesity. This is due to fat can cause blockages in blood vessels, thereby increasing blood pressure (Aisyiyah, 2009). It has long been known that the incidence of hypertension associated with obesity (Fitriana, 2013).

This study consistent with research Febby HDA and Nana P (2013) found no significant relationship between BMI and hypertension p-value of 0.0001. One of the risk factors that can be controlled hypertension is obesity. This is where the increased weight above ideal weight also increases the risk of hypertension (Nurwidayanti, 2013). Based on the results of the Framingham study says that about 10% of the weight gain associated with an increase of 7 mmHg systolic blood pressure (TDs). Better nutrition can lead to overweight and obesity. People with obesity with a body mass index > 25 kg / m<sup>2</sup> often have high blood pressure. Being overweight increases a person's risk of developing hypertension. The relative risk of developing hypertension in obese people five times higher than those of normal weight (Emilia, 2009; Sari DM, 2013).

The results are consistent with studies Eva N (2012) states that BMI is an indicator that most affect TDS and TSS p-value of 0.01 and a p-value 0.0001 (Salam MA, 2009). It is also consistent with research Megi AS (2009) states that found a significant association between obesity and hypertension p-value of 0.007, which obese children had 7.6 times the risk of suffering from hypertension (Taukhit, 2009). Obesity can increase the risk 3.4 times for hypertension in adolescents (Bustan MN, 2007; Suwarni, 2008). Obesity during adolescence not only lead to hypertension, but also can lead to the risk of cardiovascular disease in adulthood (Taukhit, 2009). It is also consistent with research Renny F, Nur IL and Vivi T (2012) that the test results are known statistiik Chi-Square (x<sup>2</sup>) obtained the value p-value of 0.001, which means there is a significant relationship between obesity and hypertension and also the value obtained OR which means that the risk of hypertension obese adolescents 12.32 times larger than teens who are not obese (Emilia E, 2009).

It is the greater body mass, the more blood is needed for oxygen and food kejarangan body. This is the volume of blood circulating through your blood vessels increases so that members greater pressure on the arterial walls. Many studies have shown an association between body mass index with hypertension and suspected peningkatan weight has an important role in the mechanism of the onset of hypertension (Salam MA, 2009).

Based on Table 8 it can be seen that of the 26 respondents were less physical activity with 14 (53.8%) of respondents who experienced hypertension. The results

of this study also showed that of the 33 respondents that physical activity is enough, 2 (6.1%) of respondents who experienced hypertension. While respondents were not hypertension is more common in respondents that activity quite 31 people (93.9%) compared to respondents who are less activities 12 (46.2%). The results of chi-square test with a confidence level of 95% and p-value = 0.0001 means that there is the influence of physical activity on the incidence of hypertension in adolescents. Results OR of 18.083 which means less physical activity adolescents at higher risk of hypertension 18.083 times more likely to hypertension than enough physical activity.

Based on the facts on the ground is known that teenagers do enough activities such as, washing by hand, hanging laundry, cooking, mopping the floor, sweeping the floor, cleaning the yard, clean up equipment, cleaning the house with many using their hands and wipe the glass window. In addition, physical activity is a teenager to do as much as 30 minutes 1 hour a day 6 days per week committed Christian High School teens besides learning activities in schools. This is consistent with research Renny F, Nur IL and Vivi T (2012) that known statistical test Chi-Square ( $\chi^2$ ) obtained p-value = 0.001 which means there is a significant relationship between inactivity activity with hypertension and found OR value also means the risk of hypertension youth who are actively doing activity 7.86 times greater than the active teenager activities, where activities such as regular exercise can lower peripheral resistance that will lower blood pressure (hypertension) and heart muscles thus become accustomed to when the heart must work harder for their particular condition (Emilia E, 2009).

Regular physical activity helps you lose weight and simultaneously lowers systolic and diastolic blood pressure. The minimal physical activity carried out for 30-60 minutes per day. Time physical activity do the job, such as sport and leisure time. The activities are categorized into active and inactive (10). Students unusual exercise have an increased risk of hypertension by 4.73 times compared with those who have the ideal exercise habits and regular exercise is not ideal with a risk of hypertension by 3.46 times compared with those who have the ideal exercise habits. Less physical activity/exercise 2.67 times risk of suffering from hypertension compared with frequent physical activity/exercise (Yulyius, 2014; Supariyasa, 2002).

Physical inactivity increases the risk of suffering from hypertension due to increased risk of being overweight. Inactive people also tend to have a heart rate that is higher so that the heart muscle has to work harder at each contraction. The harder and often the heart muscle to pump, the greater the pressure imposed on the arteries (Suwarni, 2008; Syahrini EN, 2012).

Blood pressure is influenced by physical activity. Blood pressure will be higher at the time of physical activity and lower when resting. Physical activity is a



movement made by the body's muscle and its supporting systems. During physical activity, muscles need energy to move beyond the metabolism, while the heart and lungs require additional energy to deliver nutrients and oxygen throughout the body and to remove the remains of the body (Syahrini EN, 2012).

Adolescents activities usually done outdoors so often influenced by peers, including in terms of food choices. Selection of food is no longer based nutrition just to socialize, for pleasure and in order not to lose status. Usually teens choose foods that do not require a long time to be processed. These foods are known as "fast food". Fast food often found in cafes, restaurants and school cafeteria and synonymous with large portions and high sodium content (Suoth M, 2014).

Based on Table 9 that the respondents hypertension is more common in respondents stress 14 people (82.4%) compared to respondents who were not stressed 2 (4.6%). While respondents were not hypertension is more common in respondents who do not stress 40 people (95.2%) compared to respondents who are less activity 3 (17.6%). The results of chi-square test with a confidence level of 95% and p-value = 0.0001 is the effect of stress on the incidence of hypertension in adolescents. P value of statistical test results obtained in Ho decision rejected ( $p < 0.05$ ), which means there is a significant effect of stress on the incidence of hypertension. Results OR of 93.333 which means adolescents are more at risk of hypertension stress 93.333 times greater for hypertension compared with no stress.

Based on the facts on the ground is known that teenage stress triggered by eating less food warm / balanced, less sleep than 7-8 hours a day, distance relatives / family far > 75 km, less attend social activities in the community, less gain strength spiritual psychological, have no environmentally friendly / acquaintances, neighbors less sociable, less exercise that causes sweating 2 times a week and less time in every day to cool down.

**Table 8**  
**Analysis of Effect of Physical Activity on Incident of Hypertension in Adolescents**

No	Physical Activity	Incident of Hypertension		Total	p-value	OR
		Hypertension	Not Hypertension			
1	Less activity	14 (53,8%)	12 (46,2%)	26 (100%)	0,0001	18,083
2	Enough activity	2 (6,1%)	31 (93,9%)	33 (100%)		

**Table 9**  
**Effects of Stress on Incident of Hypertension in Adolescents**

No	Stress	Incident of Hypertension		Total	p-value	OR
		Hypertension	Not Hypertension			
1	Stress	14 (82,4%)	3 (17,6%)	17 (100%)	0,0001	93,333
2	Not stress	2 (4,6%)	40 (95,2%)	42 (100%)		

Stress is likely through the activation of the sympathetic nerve (the nerve that works when we move). In increase sympathetic nerve activity resulting in increased blood pressure is erratic. Stress effect on hypertension suspected sympathetic nerve activity, which can increase blood pressure gradually. If prolonged stress can cause blood pressure remains high. This causes stress will increase vascular resistance increases peripheral vascular resistance and cardiac output. So it will stimulate the sympathetic nerve activity (Ekarini D, 2012).

## CONCLUSIONS AND RECOMMENDATIONS

Based on the results of statistical tests, it was found the result that there is no influence of gender on the incidence of hypertension in adolescents ( $p > 0.05$ ), there is the effect of body mass index (BMI) on the incidence of hypertension in adolescents ( $p < 0.05$ ), there are significant physical activity on the incidence of hypertension in adolescents ( $p < 0.05$ ), and there is the influence of stress on the incidence of hypertension in adolescents ( $p < 0.05$ ).

Psychological control, maintain a diet, and reducing exposure to cigarette smoke is required for teenage boys so as not to stress so as not to have hypertension. So that adolescents who experience abnormal BMI in order not to have hypertension should maintain a diet and sufficient activity.

Adolescents who experience less physical activity so as not to have hypertension should conduct sufficient activity at least 30 minutes a day to 3 times a week. In addition, adolescents who are experiencing stress in order not to have hypertension should maintain sleep patterns, social activities, recreation / entertainment, take the time to rest.

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