







# Age and Weight as Determinants of Hypertension in Young Adults

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**Abstract.** Obesity and age in younger are associated with an increased risk of hypertension in the general population. However, little is known regarding the potential relationship between obesity and age with the risk of hypertension in adults. Obesity is a risk factor for cardiovascular disease and total mortality. Moreover, excessive weight and weight gain increases the risk of developing hypertension. Our study was to assess the risk of hypertension among individuals with body weight and age in Deli Serdang. This study was conducted from November 2022 - February 2023 with 100 respondents in 5 areas of Deli Serdang district. Data were analyzed using regression. There is a significant relationship between body weight and age for the risk of hypertension ( $p$ -value = 0.00). It is advisable for young people to reduce body weight because they are at risk for hypertension.

**Keywords:** age, hypertension, weight, young adult.

## 1 Introduction

Hypertension is one of the most significant risk factors for many cardiovascular diseases. At different stages of hypertension development, various pathophysiological processes can play a key role in the manifestation of the hypertensive phenotype and of comorbid conditions. Accordingly, it is thought that when diagnosing and choosing a strategy for treating hypertension, it is necessary to consider age, the stage of disorder development, comorbidities, and effects of emotional–psychosocial factors. Nonetheless, such an approach to choosing a treatment strategy is hampered by incomplete knowledge about details of age-related associations between the numerous features that may contribute to the manifestation of the hypertensive phenotype.

The consequences of Myocardial Infarction can be devastating, especially for young and middle-aged patients, because it has a greater potential impact on the patient's psychology, work ability and socio-economic burden. Previous studies have pointed out the differences between young and elderly MI patients. Compared with elderly MI patients, young MI patients have a larger proportion of men, a higher incidence of smoking and hyperlipidemia, a lower incidence of CHD, diabetes and

hypertension, and their prognosis is better than that of elderly patients [1]. Therefore, it is imperative to evaluate the risk factors of these CHD patients. Considering that there are many middle-aged and young people with CHD in recent years [2] and as the main labor force of society, middle-aged and young people are at the core of work and family. If accompanied with CHD, it will have a great impact on their work and life, increase the economic burden and bring calm pressure to the society. Therefore, it is of great significance to screen out the middle-aged and young people with high risk of CHD and take active and effective prevention and control measures.

In 2015 to 2018, the prevalence of hypertension was 4.6% in children aged 8 to 12 years and 3.7% and adolescents aged 13 to 17 years. Hypertension during youth tracks into adulthood and is associated with cardiac and vascular target organ damage, such as thickening of the arteries, increased arterial stiffness, and decreased endothelial function. With increasing evidence that the target organ damage might become irreversible independent of blood pressure control,<sup>3,4</sup> preventing sustained hypertension and associated target organ damage in children is essential. Obesity may be the most potent modifiable risk factor for hypertension during childhood [2].

Hypertension increases disproportionately in youths who are severely obese with a sex- and age-specific body mass index (BMI; calculated as weight in kilograms divided by height in meters squared) above the 97th percentile.<sup>15</sup> However, 2 current knowledge gaps exist. First, normal body weight in youths has a wide range from the 5th to the 85th percentiles of BMI for age,<sup>16-18</sup> and, to our knowledge, no data exists to assess the health risk associated with low or high normal body weight. Second, data are lacking to differentiate between the risk of hypertension during childhood associated with baseline body weight and the risk associated with additional gain in body weight over time. The object of this study was to look at the Age and Weight as Determinants of Hypertension in Young Adults.

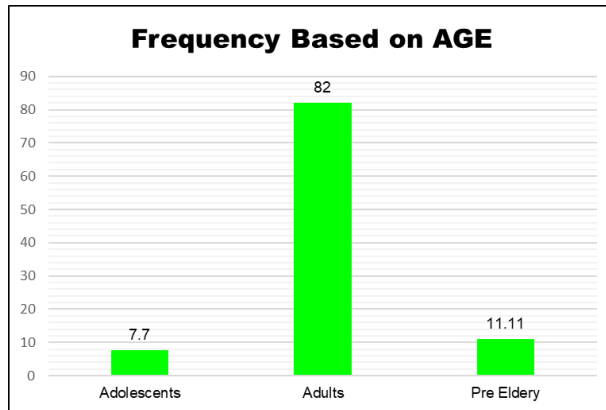
## 2 Methods

This study was conducted from November 2022 - February 2023 in Deli Serdang district. The criteria for this study were respondents who were young between 20-45 years old, did not have a history of hypertension, could communicate well, the sample was taken by purposive sampling method. 100 respondents were selected after screening from 5 districts in the Deli Serdang area. The variables in this study were age, weight associated with the incidence of hypertension, the data was taken after the proposal was approved by the faculty. After obtaining permission from the health Office of the Deli Serdang district, the researcher will give the permission letter to five (5) Health Center then the researcher coordinates with the Health Center to identify research respondents who match the predetermined criteria and screening conducted for hypertension. The collection of 100 respondents was carried out by the researcher coming every week to the designated area. Respondents who met the criteria and had been screened were taken in the 5 regions, resulting in a sample of 100. The instruments used in this research were age and weight questionnaires on 30 different respondents with a reliability value of 0.964 and validity of 1. CVI values range between 0 and 1, where

the CVI value of 0.857 can be said to be valid. data were classified based on WHO age and weight (thin, <50 kg, normal 50-60 kg, and obese above 70 kg).

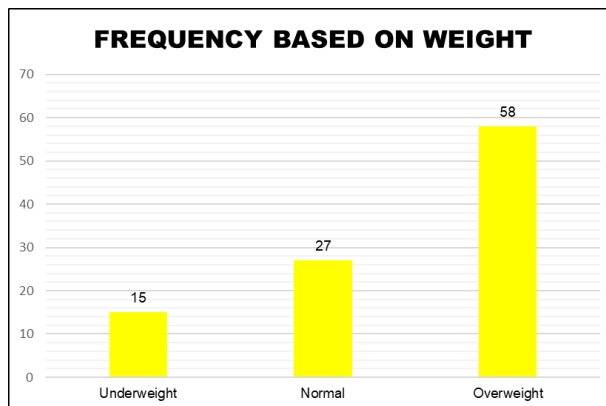
The following information was supplied relating to ethical approvals i.e., approving body, the ethics committee at Faculty of Nursing USU with number 3004/X/SP/2022.

### 3 Results



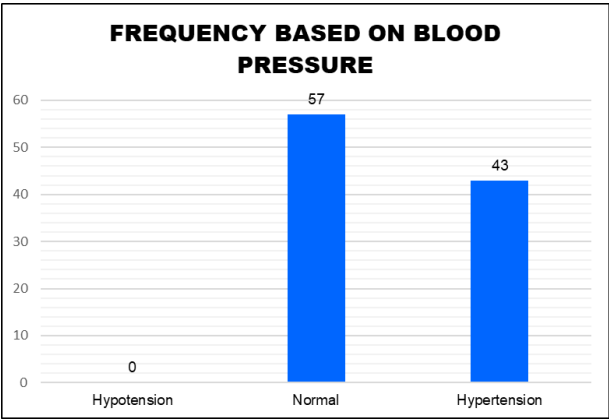
**Fig. 1.** Distribution of respondents by age (n = 100)

From Figure 1, the data showed that most of respondents are pre-elderly 82,2%, adults 11,11%, and adolescents 7,7%.



**Fig. 2.** Distribution of respondents by weight (n = 100)

Figure 2 informed that most of respondents was overweight 58%, 15% was under-weight, and 27% was normal 27%.



**Fig. 3.** Distribution of respondents by blood pressure (n = 100)

Based on Figure 3, most respondents have hypertension 43% and respondents who had normal result was 57%.

**Table 1.** Analysis of Age Relationship with Blood Pressure (n = 100)

Age	Blood Pressure				p-value
	Normal	%	Hypertension	%	
Adolescents	7	0	0	0	0.010
Adults	47	57.3	35	42.7	
Pre-elderly	3	27.3	8	72.7	

The results of the chi-square test table, namely Pearson chi-square, obtained a sig. value of 0.01 <0.05, then reject Ho. It can be concluded that there is a relationship between age and hypertension (Table 1).

**Table 2.** Analysis of Weight relationship with Blood Pressure (n = 100)

Weight	Blood Pressure				p-value
	Normal	%	Hypertension	%	
Underweight	14	93.3	1	0	0.000
Normal	24	57.3	3	42.7	
Overweight	19	57.7	43.5	72.7	

The results of the Chi-Square Test table, namely pearson chi-square, obtained a sig. value of 0.00 <0.05, then reject Ho. It can be concluded that there is a relationship between body weight and hypertension (Table 2).

## 4 Discussion

Hypertension, also known as high or raised blood pressure, is a condition in which the blood vessels have persistently raised pressure. The vessels transport blood from the heart to every area of the body. The heart pumps blood into the vessels with each beat. When blood is pumped by the heart, it presses on the walls of blood vessels, or arteries, creating blood pressure. The heart must pump more forcefully the higher the pressure [3]. Ability to vasodilate normally and loss of balance are the main causes of hypertension, especially in high-risk patients. In this process, the contact between the smooth muscle cell and the endothelium cell is crucial. The endothelium is a collection of cells that elaborate substances like angiotensin II, nitric oxide (NO), endothelin, and prostaglandins, which are crucial in controlling vascular homeostasis. The disease known as hypertension is intricate and multidimensional, with numerous underlying causes [4]. The confounding effects of overweight and obesity, metabolic and genetic factors, racial and ethnic predispositions, socioeconomic status, cultural influences, growth rate, and pubertal stage, in addition to the importance of diet and nutrition, make diagnosis extremely difficult. Adolescents with hypertension are significantly more likely to have the condition than to have it diagnosed; research indicates that at least 75% of cases go undetected [2]. Obesity has been posited as the cause of hypertension, but the fact that there are metabolically obese normal weight (MONW) people, as well as overweight and obese people who are metabolically normal, would argue that there may not be a simple cause-and-effect relationship between them. The fact that they can appear independently as well as together would indicate that they might both be signs that something has gone wrong metabolically, and therefore perhaps both of them are effects. Moreover, the obesity and hypertension epidemics have arisen concurrently with significant changes in family structures that have resulted in increased consumption of fast foods and prepared foods, and therefore sodium, trans-fats, and high-fructose corn syrup, as well as more automation of activities that formerly required physical labor to accomplish, and a more fast-paced and deadline-driven environment in almost every facet of life [2].

In this study, we found that weight were strong independent predictors for the development of hypertension. Coronary heart disease (CHD) is the world's leading cause of death. Its incidence and fatality rates are higher in Asian countries than in Western countries [5], [6]. Most of the previous epidemiological data came from the elderly (>65 years old), but due to obesity and poor lifestyle, the incidence rate of CHD increased rapidly in young and middle-aged patients. Hypertension affected 31.1% of adults worldwide [7]. Hypertension is the independent, direct and controllable risk factor for cardiovascular disease and cardiovascular disease is the leading cause of mortality around the world, especially in the low- and middle-income countries including in Indonesia [8].

Adolescents, who are at the stage of rapid growth, have increased blood flow, and their blood pressure is inevitably increased. Hispanic adolescents but had less accuracy among African American adolescents. Obesity can lead to hypertension, and hypertension can severely affect the structure and operational functions of important organs, which is likely to cause irreversible permanent damage. The damage to target organs

that hypertension can cause can last for a lifetime and may be aggravated in adulthood. According to a relevant survey report, the prevalence of hypertension caused by obesity among adolescents has been increasing, and it's very likely to develop into adult hypertension. Babinska et al and Ren et al found that the risk of hypertension in adolescents is proportional to the degree of obesity and that obesity can also increase the incidence of hypertension in adults. The pathogenesis of hypertension is complex, and many factors can affect it. A single cause of hypertension is rare. Colin-Ramirez et al found that in addition to obesity and hyperlipidemia, daily habits, such as sleep quality, diet and lack of exercise, can also be factors affecting the incidence of hypertension.

## 5 Conclusion

The current study found that obesity indicators in the hypertension group were significantly higher than those in the younger people. For younger people, hypertension is related to weight affecting the risk of hypertension.

## Author's Contribution

NFS collected data respondent, searched for references, and prepared draft manuscripts. FA provided input for data screening and number of respondents as well as manuscript supervisor, SRS and TA for manuscript editing input and final harmonizer.

## Acknowledgement

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