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Risk Factors for Non-Communicable Diseases and Ankle Brakhial Index in the Elderly Population of Padukuhan Konteng Sumberadi, Sleman, Yogyakarta

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Abstract

The incidence of stroke, diabetes mellitus and heart disease in the Special Region of Yogyakarta has increased, especially in the age of 18 years and above. Chronic non-communicable diseases can develop into Peripheral Arterial Disease. This study intended to determine the risk factors for non-communicable diseases, namely body mass index, blood pressure, total cholesterol, blood glucose and the value of the ankle brachial index in the elderly. The research sample of 51 people was selected based on purposive sampling. The results showed that the most respondents were women (56.9%), Majority in the age range of 60-69 years, with most respondents not smoking (54.9%). The distribution of Body Mass Index in 47.1% of respondents was in the normal category. Most of the respondents (58.8%) suffered from hypertension, the majority of respondents were in the normal category. The results of measuring blood glucose levels showed that the majority of respondents in the normal category, And the ankle brachial index value of the majority of respondents is in the normal category (80.4%). Regular monitoring of risk factors can prevent complications of non-communicable diseases, one of which is blockage of blood vessels which is indicated by an increase in the value of the ankle brachial index.

Background

Non-communicable diseases (NCDs) are a state of pain that has been felt by a person for a long time. The disease is not contagious to other people. Before being infected, individuals already have triggering factors but because they do not cause symptoms, sufferers do not feel the need to make lifestyle changes. Currently, non-communicable diseases are still a problem and need to be solved by many developing countries in the world. The 2018 Basic Public Health survey described an increase in the incidence of non-communicable diseases compared to the results of the 2013 basic health survey, and Yogyakarta is the province that ranked second in the incidence of stroke, third for people with diabetes mellitus and also heart disease. The people of Yogyakarta are also ranked second in Indonesia for hypertension sufferers at the age of 18 years and above (Kemenkes RI, 2018). This increase in the ranking illustrates that non-communicable diseases have become a common occurrence in the community and require additional measures to prevent and treat them so that they do not increase in prevalence. The increase in the incidence of non-communicable diseases is in line with changes in unhealthy lifestyles in society which results in increased blood pressure, blood glucose levels, changes in body mass index, lack of physical activity, increased frequency of smoking and alcohol consumption (Kemenkes, 2019).

Peripheral Arterial Disease (PAD) is an advanced problem that can occur in people with non-communicable diseases due to the atherosclerosis process. This usually occurs in people with diabetes mellitus and hypertension. Elderly age, chronic diseases (DM, hypertension), cholesterol values, obesity and smoking habits are risk factors for peripheral artery disease. One of the ways to detect PAD, the Ankle Brakhial Index (ABI) can be measured. Ankle Brakhial Index (ABI) is a form of examination to determine the comparison of foot systolic blood pressure (ankle) with arm systolic blood pressure (brachial). This examination is one of the reliable predictors to detect the early presence of peripheral artery disease caused by non-communicable diseases (Renovaldi & Afrijiyah, 2022).

Elderly health is one of the important focuses for the government as mentioned in the National Action Plan for Elderly Health 2020-2024. The National Action Plan for Elderly Health 2020-2024 aims to improve the health status of the elderly community, so that it remains dynamic and beneficial for families and communities through directed, synergistic, and comprehensive assistance in the health sector with the implementation of sustainable government programs. The target of this health improvement are individuals aged 45-59 years (pre-elderly), aged 60 years and above (elderly) and elderly 60-69 years old with health problems (high risk) as well as the elderly aged 70 years or older (Kemenkes RI, 2021)

Physiologically, the elderly have experienced a lot of decline in the function of the body's organ systems, so it is easy to have health problems in the body. Many elderly people experience non-communicable diseases. This is due to the lack of knowledge of the elderly and early detection of the emergence of non-communicable diseases. For the elderly who suffer from certain diseases, they should be able to implement a healthy lifestyle according to the type of disease. This aims to control the diseases suffered and hopefully can improve the quality of life of the elderly (Heryanah, 2015).

From the results of a preliminary study at the research site, it was found that most of the elderly in Konteng hamlet in Mlati Sleman suffer from high blood pressure, diabetes mellitus, and are obese. However, the elderly admitted that they rarely carry out health control, and are not compliant in taking the medicine that has been given by health facilities on the grounds that there are too many drugs that must be consumed. From this history, there is a possibility that non-communicable diseases that have been suffered can develop into peripheral arterial diseases that can cause impaired blood flow to the extremities due to atherosclerosis. Based on this assumption, it is necessary to make early measurements of risk factors for non-communicable diseases and the value of measuring the ankle brachial index in the elderly as an illustration of peripheral artery disease.

Methods

This research is a quantitative type of observational analysis. The research population is all elderly people in the village of Konteng Sumberadi Sleman Yogyakarta who actively participate in the elderly posyandu, The research sample of 51 people was selected based on purposive sampling with the inclusion criteria of the elderly who were present at the elderly posyandu during the research period, while the exclusion criteria were the elderly who had DM ulcers on the legs and experienced leg pain. The instruments used for risk factor data collection are scales, statute meters/ microtoise, digital sphygmomanometers, easytouch with glucose and cholesterol strips, gloves, and ultrasound doplers to measure the Ankle Brachial Index. The tool used has been calibrated before use.

Data collection was carried out in conjunction with the activities of the elderly posyandu. Previously, prospective respondents were given an explanation of the research procedure, and signed a willingness sheet to become a respondent. Furthermore, risk factors were measured including weight and height, which was then calculated for body mass index, current blood sugar and total cholesterol values were measured using the easytouch tool, blood pressure was measured with a digital sphygmomanometer and ankle brachial index in the lower extremities using Doppler ultrasound. The collected data is then processed and analyzed with a statistical program. This research has passed the ethical feasibility from the Health Research Ethics Commission (KEPK) of STIKES Wira Husada Yogyakarta and has received a certificate of ethical feasibility with number 554/KEPK/STIKES-WHY/XI/2023 dated November 14, 2023.

Result and Discussion

Tabel 1
Characteristics of Research Respondents

Kategori	Frequency	Percentage (%)
Sex		
Male	22	43,1
Female	29	56,9
Age (years old)		
60-69	30	58.8
70-79	16	31.4
>80	5	9.8
Smoking habit		
Smoke	22	43.1
Do not smoke	29	56.9
Total	51	100

Table 1 shows that the most respondents are women (56.9%), the majority in the age range of 60-69 years, with most respondents not smoking (54.9%)

Tabel 2
Body Mass Index of Respondents

Body Mass Index Category	Frequency	Percentage (%)
Mild degree of underweight	4	7.8
Severe degree of underweight	4	7.8
Normal	24	47.1
Mild degree of overweight	6	11.8
Total	51	100

The distribution of Body Mass Index (BMI) in table 2 shows that the majority of respondents have a BMI within the normal range (47.1%). BMI values reflect an individual's nutritional status. A normal body mass index is around 18.5 – 25.0. Meeting the nutritional needs of the elderly can help them adjust to the changes they experiencing. Many changes in the elderly can affect the nutritional needs of the elderly, including decreased function of the digestive system, reduced sensory response, dilatation of the esophagus, decreased amount of stomach acid, constipation or hardening of the stool and decreased absorption of food in the intestines (Setiyawati & Hartini, 2018).

The results of this study are similar to the results of research that has been conducted by Putri and Aryati (2022), namely the majority of respondents have a normal body mass index or normal category nutritional status (Putri & Aryati, 2022), However, the results of this study are not in line with a similar study by Priyantini et al in 2022 which found that the results of most respondents with diabetes mellitus were included in the BMI Overweight or overweight (Priyantini et al., 2022). In current study, most of the respondents were included in the normal nutritional status category, but it was also found that respondents were in the category of mild overweight. The body's metabolism tends to slow down in the elderly, if not accompanied by exercise or reduced food, then excess calories will be converted into fat which then triggers obesity. In addition to obesity overall, abdominal obesity is also dangerous because excess abdominal fat triggers an increased risk of coronary artery disease incidence (Sidaria et al., 2023)

Tabel 3
Blood Pressure of Respondents

Blood Pressure	Frequency	Percentage (%)
Normal	21	41,2
High	30	58.8
Total	51	100

The results of blood pressure checks the majority of respondents experienced high blood pressure (58.8%). Blood pressure in these respondents falls into the high category, exceeding 140/90 mmHg. While some respondents are already on routine hypertension medication, others have only recently been diagnosed with the condition. Prolonged high blood pressure places increased strain on the heart, making the process of pumping blood throughout the body more difficult. Over time, this condition can lead to an enlarged heart, damage to blood vessels, and impaired kidney function, ultimately causing it to become abnormal. Therefore, high blood pressure should be treated immediately. Therefore, high blood pressure should be treated immediately. Even after blood pressure returns to normal, it is still necessary to monitor and consume medication regularly to keep blood pressure under control (Harahap et al., 2018)

Tabel 4

Total Cholesterol of Respondents

Total Cholesterol	Frequency	Percentage (%)
< 200	27	52.9
200-239	19	37.3
> 240	5	9.8
Total	51	100

The results of total cholesterol measurements in the majority of respondents were in the normal category (<200mg/dL). Cholesterol is a type of fat synthesized by cells in the body, with the majority produced by liver cells (P2PTM Kemenkes RI, 2018). Total cholesterol is the total amount of fat in the body. Total cholesterol refers to the overall amount of fat in the body. The findings of this study differ from those of Prastiwi et al. (2021), who analyzed total cholesterol levels among the elderly at the South Denpasar I Health Center. In their study, the majority of respondents were categorized as being at the threshold or in the high range (31.9%) (Prastiwi et al., 2021). The results of the current study reveal that 37.3% of respondents have cholesterol levels in the threshold range (200–239 mg/dL). In older individuals, age-related changes in body organs, such as shrinkage of the liver and pancreas, occur. These changes reduce blood flow to the liver without affecting bile acid metabolism, alter the proportion of bile fats, and increase cholesterol secretion compared to younger adults (Suwarsi, 2017).

Tabel 5
Glucose Ad Random of Respondents

Glucose Ad Random	Frequency	Percentage (%)
<140	44	86.3
140-199	6	11.8
>=200	1	2.0
Total	51	100

The results of the blood glucose test/ Glucose Ad Random (GAR) found that many respondents were in the normal category (GAR<140mg/dL). This finding is similar to the results of a study entitled Overview of blood glucose in the elderly in the Tresna Wredha social home conducted by Reswan et al (2017) that is, as many as 85.19% of respondents had blood glucose at <140mg/dl. In the results of the GAR level examination, it was also found that 11.8% of respondents were included in the pre-diabetes category (140-199mg/dl) and 1 respondent (2%) who suffered from diabetes (>200mg/dl). The number of diabetic patients in Indonesia has risen significantly, reaching 2% in 2018. A survey of seemingly healthy individuals revealed that two-thirds were unaware they had diabetes. This highlights the importance of early diabetes screening, whether conducted independently or through healthcare providers, to enable timely diagnosis and treatment. Proper screening allows individuals with diabetes to reduce the risk of complications, including death and other related diseases (Unit Pelayanan Kesehatan Kemenkes RI, 2021).

Tabel 6

Ankle Brachial Index of Respondents

Categori of ABI measurement	Frequency	Percentage (%)
Severe PAD	2	3.9
Mild PAD	3	5.9
Normal	41	80.4
Abnormal Calcification	5	9.8
Total	51	100

The results of the measurement of the ankle brachial index (ABI) of the majority of respondents were in the normal category (80.4%). This indicates that the respondents did not have peripheral artery disease. ABI is a simple test to detect or rule out suspected peripheral artery disease with a low sensitivity of 69-79% and a high specificity of 83-99% (Casey et al., 2019). The results of this study are in accordance with research in the central Badung region that more respondents have normal ankle brachial index (50.71%) (Sukawana & Sukarja, 2021).

Peripheral Arterial Disease (PAD) is a situation in which there is a blockage in the artery that carries blood to the leg. PAP is part of atherosclerosis and is caused by the accumulation of fatty plaques on the walls of blood vessels. Peripheral artery disease generally causes blood vessels in the lower extremities to become blocked, thus restricting blood flow to the lower extremities. But this may also happen to other organs of the body, such as blood vessels in the arms, pelvis, and even kidneys (Conte; & Vale, 2018). The results of this study also showed that there were a small number of respondents who experienced abnormal calcification in the ABI examination (9.8%). This indicates that there is abnormal calcification/thickening of the peripheral blood vessel wall in the lower extremities (Susilo et al., 2021).

Most patients with peripheral artery disease do not display symptoms. However, when symptoms do occur, they often include leg pain during walking or other physical activities. This pain, typically in the form of muscle cramps, may be felt in the pelvis, thighs, or calves. The pain is usually mild and subsides quickly with rest, leading many sufferers to overlook these symptoms. In cases of severe blockage, the symptoms become more pronounced. Leg pain may persist even at rest. Furthermore, wounds on the legs may heal poorly, turn black (gangrene), and the feet may feel colder than the rest of the body (Mohler & R.Jaff, 2017). An increase in the ankle-brachial index indicates cardiovascular complications that frequently occur in patients with diabetes mellitus (DM) and hypertension, often due to vascular blockages and reduced vascular elasticity. These cardiovascular complications can be prevented by managing blood pressure and addressing risk factors associated with non-communicable diseases.

Conclusion

The description of risk factors for non-communicable diseases among the elderly in Sumberadi, Sleman, Yogyakarta, shows that the majority fall within the normal category, including body mass index, blood pressure, total cholesterol, random blood glucose levels, and ankle-brachial index (ABI) values within normal limits. Regular monitoring of these risk factors can help prevent complications of non-communicable diseases, one of which is vascular blockage, indicated by an increased ankle-brachial index.

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