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BODY MASS INDEX STATUS WITH HYPERTENSION

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ABSTRACT

Hypertension is the leading cause of premature death in the world. It does not only attack the productive age but also attacks the elderly. Hypertension is known as "The Silent Killer" because it is often without complaints and there are complications. Body Mass Index (BMI) is very influential on blood pressure. Abnormal BMI has twice the chance of experiencing hypertension and triggers higher risk factors for hypertension than normal people. This research aims to determine the relationship between BMI and the incidence of hypertension in Ngablak Hamlet, Sitimulyo Piyungan Village, Bantul, Yogyakarta. This research was an analytic observational study with a cross-sectional research design. Sampling used the Accidental Sampling technique with 30 respondents based on the inclusion and exclusion criteria. Measuring instruments used to collect BMI data were weight scales and height measuring devices (cm) and measuring instruments used to measure blood pressure are stethoscopes and sphygmomannometers. Measurements consisted of systolic and diastolic blood pressure, weight, and height. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) 16.0 program. The results of this research showed a significance value of 0.044 ($p < 0.05$). thus, there was a significant relationship between BMI and the incidence of hypertension in Ngablak Hamlet, Sitimulyo Piyungan Village, Bantul Yogyakarta.

Keywords

Growth and Development, Toddler, Calcium, Pregnancy

INTRODUCTION

Hypertension is a condition in which systolic blood pressure is ≥140 mmHg and/or diastolic blood pressure is ≥90 mmHg with 2-3 visits 1 week in adults >18 years, often without complaints, then finding complicating diseases or complications arise (Unger et al. al., 2020). Hypertension is the main cause of premature death worldwide. The World Health Organization (WHO) states that the total number of cases of hypertension is 22% of the total world population. The African region is in the highest place at 27% and Southeast Asia is in the third highest place at 25% after the Eastern Mediterranean at 26% (Kemenkes RI, 2019).

The results of the 2018 Riskesdas (Basic Health Research) total number of cases of hypertension in Indonesia in the population aged > 18 years nationally was 34.11% higher than in 2013 of 25.8% in. This increase occurred in almost all provinces in Indonesia (Kemenkes RI, 2019). Results of Riskesdas of Yogyakarta City (2018), the total number of cases of hypertension in Yogyakarta was 9.94% or 32,248 cases (Dinkes Kota Yogyakarta, 2020). Bantul Regency from January to December 2020 recorded 87,422 cases. Data from 27 health

centers in the Bantul district, the health centers that contributed the most to the number of cases of hypertension occurred in the work area of the Piyungan health center, with 5,677 cases (Cardoso *et al.*, 2019).

Causes of hypertension are distinguished by essential/primary hypertension or the cause is unknown 90% and secondary hypertension or the cause can be found 10%. Hypertension has risk factors that cannot be modified including a family history of hypertension, age over 65 years, and co-morbidities such as diabetes or kidney disease. Modifiable risk factors consisted of an unhealthy diet (consumption of excessive salt, a diet high in saturated fat and trans-fat, low fruit and vegetable intake), physical activity, consumption of tobacco, alcohol, and a BMI above normal. (Kemenkes RI, 2019).

BMI is a simple screening tool/index to find out the ideal body weight range and predict body health. It is used to classify underweight, normal, overweight, and obese conditions in a person based on weight and height. BMI is an individual's weight in kilograms divided by the square of his height in meters (kg/m2) (CDC, 2022). The effect of BMI on increased blood pressure is multifactorial and exacerbates the increase in blood pressure (Kurniawan *et al.*, 2021).

Several studies have examined the relationship between BMI and the incidence of hypertension. The results have proven that BMI is the most dominant risk factor for influencing the occurrence of hypertension. From the results of research conducted by (Yulia, Siska and Himawan, 2021), there is a relationship between Body Mass Index and the incidence of hypertension in the elderly, and the elderly who have a BMI are at risk of experiencing hypertension. There is also research that has been conducted by (Herdiani, 2019) stating that there is a significant relationship between BMI and hypertension in the elderly where they have a higher chance of experiencing hypertension.

METHOD

This research was a type of quantitative research using an analytic observational design with a Cross Section Study approach. It took measurements simultaneously with only one follow-up. The population was all hypertension respondents in Ngablak Hamlet for public health services of 59 respondents. The inclusion criteria were age over 30 years, Systolic Blood Pressure ≥140, and/or Diastolic Blood Pressure (DBP) ≥90. Exclusion criteria were respondents' refusal to be included in this research, pregnant respondents, and respondents who were active smokers or consumed alcohol. The sampling technique in this research was Accidental Sampling, namely accidental sampling by taking cases or respondents who occurred to be available somewhere that met the inclusion and exclusion criteria (Sugiyono and Mitha Erlisya Puspandhani, 2020). The number of samples in this research that met the inclusion and exclusion criteria was 30 respondents. This research was conducted on June 18 2022 at the participants of the Posyandu in Ngablak Hamlet, Sitimulyo Village, Piyungan, Bantul, Yogyakarta.

The tools used in this research were the ABN sphygmomanometer and ABN stethoscope to measure blood pressure, 120 kg GEA body scales to measure body weight, and the Onemed meter with a length range of 0-200 cm to measure height. Data analysis was performed using the Spearman correlation test with an error rate <0.05 and using an ordinal scale (interpretation). Statistical analysis of data was carried out using the Statistical Package for Social Sciences (SPSS).

RESULTS

A. Characteristic of Respondent

Table 1. Basic Characteristics Based on Age, Gender, and Occupation

No	Variable		N	%
1.	Age	30-44 years old	6	20,0
		45-54 years old	3	10,0
		55-65 years old	5	16,7
		66-74 years old	12	40,0
		75-90 years old	4	13,3
		Total	**30**	**100**
2	Gender	Man	4	13.3
		Woman	26	86.7
		Total	**30**	**100**
3	Occupation	Farmer	4	13.3
		Housewife	11	36.7
		Seller	9	30.0
		Labor	6	20.0
		Total	**30**	**100**

Source: Primary Data 2022

Table 1 shows that most respondents were 66-74 years old with a total of 12 (40.0%) respondents. The most gender women of 26 (86.7%) respondents and 4 (13.3%). %) men of respondents and the majority occupation were housewives (IRT) of 11 (36.7%) respondents.

Table 2. Frequency Distribution of Body Mass Index in Hypertension Respondents

BMI	Frequency (n)	Percentage (%)
Underweight	2	6.7
Normal	11	36.7
Overweight	13	43.3
Obesity class 1	4	13.3
Obesity class 2	0	0
Obesity class 3	0	0
Total	**30**	**100**

Source: Primary Data 2022

Based on Table 2, it is known that the highest BMI frequency was overweight of 13 respondents (43.3%) and the lowest was underweight of 2 (6.7%) respondents.

Table 3. Frequency Distribution of Respondents' Hypertension in Ngablak Hamlet

Hypertension	Frequency (n)	Percentage (%)
Hypertension 1	19	63.3
Hypertension 2	7	23.3
Hypertension 3	4	13.3
Total	**30**	**100.0**

Source: Primary Data 2022

Based on the data in Table 3, it can be concluded that the results of the examination mostly suffered from hypertension 1 of 19 (63.3%) respondents and the lowest was hypertension 3 of 4 (13.3%) respondents.

Table 4. Cross tabulation between Body Mass Index and Hypertension

	HT1	HT2	HT 3	N	%
Underweight	0	1	1	**2**	**6.7**
Normal	7	1	3	**11**	**36.7**
Overweight	8	5	0	**13**	**43,3**
Obesity class 1	4	0	0	**4**	**13,3**
N	**19**	**7**	**4**	**30**	**100**
Total (%)	**63,3**	**23.3**	**13.3**	**30**	**100**

Source: Primary Data 2022

Based on Table 4, the respondents with the highest BMI, namely overweight, were 13 (43.3%) respondents and the most hypertension, namely hypertension 1, were 19 (63.3%) respondents. The highest number of hypertension 1 was overweight of 8 (26.7%) respondents, and hypertension 2 was the most overweight

of 5 (16.7%) respondents while the most hypertension 3 was 3 (10.0%) respondents.

Table 5. Correlation Analysis of Blood Pressure with Body Mass Index

	R	*ρ* value	n
Body Mass Index Blood Pressure	-.370*	0,04	30

Source: Primary Data 2022

Based on the Spearman rank correlation test in Table 5, it is known that there was a significant (mean) relationship between BMI and hypertension, namely sig. (2-tailed) of ρ = 0.04 (ρ <0.05) and the level of strength of the relationship was -0.370 or sufficient with the number of correlation coefficients was negative or the relationship between variables was not unidirectional.

DISCUSSION

Based on the data that has been obtained, it is concluded that the majority of the age range of the respondents was 66-74 of 12 (40.0%) respondents. This research was supported by research conducted by Yulnefia, (2020) in Pekanbaru City. It showed that most respondents with hypertension based on age were 60-74 years of 25 (40.9%) patients. The older a person is, the risk of developing hypertension will increase. This happens because of natural conditions in the body that affect the heart, blood vessels, and hormones. The function of the organs also decreases with age. As people get older, the risk of developing hypertension is greater. Hence, the prevalence among the elderly is quite high. Arteries lose elasticity or flexibility and blood pressure increases with age (Ekarini, Wahyuni and Sulistyowati, 2020).

The results of this research showed that the majority were women, with 26 (86.7%) respondents compared to men. This research was following research by (Abineno and Malinti, 2022) in Ponain Village which showed that the majority of hypertension respondents were women with a total of 61 (55.5%) respondents. Lower estrogen levels after menopause may partly explain lower arterial compliance and increased risk of hypertension in older women (Abramson *et al.*, 2018).

The results of the field data for the majority of the sample were housewives (IRT) 36.7%, who had less physical activity. This research was following research by (Marleni, 2020) in Palembang which showed that there were more respondents with light physical activity with a result of 51 (58.0%) respondents. Physical activity greatly affects the stability of blood pressure. People who are not physically active tend to have a higher heart rate. This causes the heart muscle to work harder with each contraction. The harder the heart muscle tries to pump blood, the greater the pressure that is imposed on the arterial walls, thereby increasing peripheral resistance which causes an increase in blood pressure. Lack of physical activity can also increase the risk of being overweight which will cause the risk of hypertension to increase (Herawati, Indragiri and Melati, 2020).

The results showed that the highest BMI frequency characteristic was overweight of 13 (43.3%) respondents. The same results were also found by Kurniawan et al., (2021) in East Java regarding BMI showing that more patients were overweight (42.3% of respondents). BMI above normal (overweight or obesity) increases the risk of developing hypertension because the greater the body mass, the more blood supply is needed to supply oxygen and nutrients to the body's tissues. This results in the volume of blood circulating through the blood vessels increasing. Thus, the

pressure on the artery walls becomes greater. Being overweight also increases heart rate and insulin levels in the blood. Increased insulin levels cause the body to retain sodium and water (Tiara, 2020).

According to WHO (2022), an increase in BMI is a major risk factor for non-communicable diseases such as hypertension because the greater the body mass, the more blood supply is needed to supply oxygen and nutrients to body tissues. This results in the volume of blood circulating through the blood vessels increasing. Hence, the pressure on the artery walls becomes greater (Tiara, 2020).

CONCLUSIONS

There is a significant relationship between BMI and the incidence of hypertension, namely $\rho = 0.04$ ($\rho < 0.05$). BMI above normal increases the risk of hypertension because the greater the body mass, the more blood supply is needed to supply oxygen and nutrients to the body's tissues. This results in the volume of blood circulating through the blood vessels increasing. Therefore, the pressure on the artery walls becomes greater.

REFERENCES

Abineno, A. P. and Malinti, E. (2022) 'Hubungan Indeks Massa Tubuh dengan Tekanan Darah pada Orang Dewasa', *Indonesian Journal of Nursing and Health Sciences*, 3(1), pp. 35–40. Available at: http://jurnal.globalhealthsciencegroup.com/index.php/IJNHS/article/view/973.

Abramson, B. L. *et al.* (2018) 'Women and Hypertension: Beyond the 2017 Guideline for Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults', *American College of Cardiology*. Available at: https://www.acc.org/latest-in-cardiology/articles/2018/07/27/09/02/women-and-hypertension.

Cardoso, F. *et al.* (2019) 'KEYNOTE-756: Randomized, double-blind, phase 3 study of pembrolizumab vs placebo combined with neoadjuvant chemotherapy and adjuvant endocrine therapy for high-risk, early-stage estrogen receptor–positive, human epidermal growth factor receptor 2–negative', *Journal of Clinical Oncolog*, 37(15). Available at: https://ascopubs.org/doi/abs/10.1200/JCO.2019.37.15_suppl.TPS601.

CDC (2022) 'Overweight & Obesity', *Centers for Disease Control*. Available at: https://www.cdc.gov/obesity/basics/consequences.html.

Dinkes Kota Yogyakarta (2020) 'Profil Dinas Kesehatan Kota Yogyakarta tahun 2020', *Profil Dinas Kesehatan Kota Yogyakarta tahun 2019*, pp. 1–234.

Ekarini, N. L. P., Wahyuni, J. D. and Sulistyowati, D. (2020) 'Faktor - Faktor Yang Berhubungan Dengan Hipertensi Pada Usia Dewasa', *Jkep*, 5(1), pp. 61–73. doi: 10.32668/jkep.v5i1.357.

Herawati, C., Indragiri, S. and Melati, P. (2020) 'Aktivitas Fisik Dan Stres Sebagai Faktor Risiko Terjadinya Hipertensi Pada Usia 45 Tahun Keatas', *Jurnal Kesehatan Masyarakat STIKES Cendekia Utama Kudus*, 7(2), pp. 66–80.

Herdiani, N. (2019) 'Hubungan Imt Dengan Hipertensi Pada Lansia Di Kelurahan Gayungan Surabaya', *Medical Technology and Public Health Journal*, 3(2), pp. 183–189. doi: 10.33086/mtphj.v3i2.1179.

Kurniawan, A. H. *et al.* (2021) 'Correlation between Body Mass Index to Hypertension in A Rural Area in East Java', *Mutiara Medika: Jurnal Kedokteran dan Kesehatan*, 21(1), pp. 26–31. doi: 10.18196/mmjkk.v21i1.7385.

Marleni, L. (2020) 'Aktivitas Fisik Dengan Tingkat Hipertensi Di Puskesmas Kota Palembang', *JPP (Jurnal Kesehatan Poltekkes Palembang)*, 15(1), pp. 66–72. doi: 10.36086/jpp.v15i1.464.

Sugiyono and Mitha Erlisya Puspandhani

(2020) *Metode Penelitian Kesehatan*. 1st edn. Bandung: CV. Alfabeta.

Tiara, U. I. (2020) 'Hubungan Obesitas Dengan Kejadian Hipertensi', *Journal of Health Science and Physiotherapy*, 2(2), pp. 167–171. doi: 10.35893/jhsp.v2i2.51.

Yulia, R., Siska, D. and Himawan, D. (2021) 'Hubungan Indeks Massa Tubuh Dengan Kejadian Hipertensi Pada Lansia di Puskesmas Sei Langkai kota Batam Tahun 2021', *Journal Of Health And Medical Research*, 1(1), pp. 18–24.

Yulnefia, Y. (2020). the Relationship of the Body Mass Index With the Event of Hipertension in Poli Usila Puskesmas Rawat Inap Simpang Tiga Kota Pekanbaru. *Collaborative Medical Journal (CMJ)*, *3*(2), 69–75.https://doi.org/10.36341/cmj.v3i2.1393

WHO. (n.d.). *Obesity and overweight*. Retrieved February 20, 2022, from https://www.who.int/en/news-room/fact-sheets/detail/obesity-and-overweight