STRADA Jurnal Ilmiah Kesehatan
DOI: 10.30994/sjik.v10i1.545
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 749-755

Abdominal Circumference, Blood Pressure, and Blood Sugar Rate in Adult Men

Wa Ode Sri Asnaniar, Nur Wahyuni Munir
Universitas Muslim Indonesia, Indonesia
** Correspondent Author: waode.sriasnaniar@umi.ac.id*

ABSTRACT
General obesity and central obesity are also major public health problems in Indonesia. Measuring abdominal circumference is useful for measuring excess abdominal fat. This study aims to determine the relationship of abdominal circumference to blood pressure and blood sugar levels of adult men at the Faculty of Public Health, Universitas Muslim Indonesia Makassar.
This research design was a quantitative study with a cross-sectional study design. The population in this study were adult males at the Faculty of Public Health, Universitas Muslim Indonesia. Samples were taken by total sampling method with a total of 33 samples. Data obtained through direct measurement of abdominal circumference, blood pressure and blood sugar levels. The data analysis used was the Pearson test correlative analysis to determine the correlation between abdominal circumference and blood pressure and blood sugar levels. The results showed a significant positive relationship between systolic blood pressure and abdominal circumference (r = 0.523; p = 0.002), while diastolic blood pressure had a negative and insignificant relationship (r = -0.038; p = 0.832). There was a positive and insignificant relationship between stomach circumference and blood sugar levels (r = 0.224; p = 0.211).
The conclusion of this study is that a large abdominal circumference is in line with an increase in systolic blood pressure so that it can be used as a screening for increased blood pressure.

Keywords: Abdominal Circles, Blood Pressure, Blood Sugar Levels

Received March 17, 2021; Revised April 7, 2021; Accepted April 21, 2021

STRADA Jurnal Ilmiah Kesehatan
DOI: 10.30994/sjik.v10i1.545
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 749-755

BACKGROUND

Overweight or obesity is a condition of abnormal or excessive fat accumulation that can interfere with health (1). General obesity and central obesity are also major public health problems in Indonesia (2) . According to the 2018 Basic Health Research, central obesity or abdominal obesity is a collection of excessive abdominal fat in the abdominal or abdominal area, where this central obesity measurement can be determined by measuring the circumference of the abdomen (3). The World Health Organization in 2018 there are more than 1.9 billion adults in the world who are overweight or overweight and 650 million adults are obese, or as a whole, 11% of the world's adult population are men and 15% of women are obesity (1). Based on the results of Basic Health Research in 2018, the prevalence of central obesity in Indonesia has increased every year to date for people aged ≥15 years, namely 31.0% (4).

World Health Organization, the impact of obesity on the cardiovascular system, which can cause hypertension, heart disease and stroke, The results of Riskesdas (2018) show that the prevalence of stroke incidence in men is higher (11%) compared to women (4). The musculoceletal system can cause osteoarthritis and other degenerative diseases of the joints and bones as well as increased insulin resistance (1). the impact of obesity that occurs is not only on health problems, but also on psychosocial problems, namely negative body image, low self-esteem, and bullying (5). Based on the results of research by Rohkuswara and Syarif (2017), it is shown that the proportion of grade 1 hypertension is 41.7% and obesity is 54.9%. are obesity (6). and based on the results of research from Rahmi et al. 2015 that there is a significant relationship between body mass index, hip waist circumference ratio and diabetes mellitus, which is related to the occurrence of insulin resistance due to obesity (7).

The prevalence of obesity in adulthood is higher because modernization and industrialization have led to sedentary lifestyles, inadequate physical activity, and unhealthy eating patterns (8).

Research Bidari the percentage of male respondents who have a risky abdominal circumference (≥90 cm) is 17 people (22.7%). The average stomach circumference of male respondents was greater than that of female respondents. Abdominal circumference measurement is performed to determine the presence or absence of abdominal / central obesity. This type of obesity is very influential on the incidence of cardiovascular disease and diabetes mellitus, which recently is also closely related to the incidence of metabolic syndrome (9).

Most of those who work in offices all day just sit and spend less energy. As for adults who do not work in offices, it is influenced by lifestyle transitions due to technological developments and the high accessibility of fast food. It is inevitable that the academic community of the Faculty of Public Health, Universitas Muslim Indonesia also has the potential to be obese. The results of the observation study of abdominal circumference of 7 adult males at the UMI FKM, found that 5 people had central obesity (abdominal circumference> 90 cm). From this phenomenon, the authors are interested in conducting research related to the relationship of abdominal circumference to blood pressure and blood sugar levels in adult males in the academic community of the Faculty of Public Health, Muslim University of Indonesia.

METHODS

The research design used was analytical survey research with a cross sectional design approach. This research was conducted at the Faculty of Public Health, Indonesian Muslim University Makassar for 6 months (January - July 2020). The population in this study was

DOI: 10.30994/sjik.v10i1.545
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 749-755

the academic community, namely male lecturers and employees at the Faculty of Public Health, UMI Makassar. The sampling method in this study is to use total sampling. The sample in this study amounted to 33 people. The instruments in this study were a metline / measuring tape to measure abdominal circumference, a tensimeter and a stethoscope to measure blood pressure, and a measuring device for measuring blood sugar levels (GDS). The normality test was carried out first using Shapiro-Wilk because the sample was ≤ 50 and normal data were obtained (p> 0.05). The bivariate analysis used was the Pearson test correlative analysis to determine the correlation of abdominal circumference to blood pressure and blood sugar levels.

RESULTS

Table 1 Distribution of Respondents based on Characteristics of Respondents at the Faculty of Public Health, UMI (n = 33)

	Frequency (n)	Persentase (%)	Mean (SD)	Minimum-Maksimum
Age			36 (8,6)	27 – 54
Smoking History				
No Smoking	21	64		
Smoking	12	36		
Sports				
Routine	1	3		
No Routine	32	97		
Married status				
Married	27	82		
No Married	6	18		

Table 1 describes the characteristics of adult males in the FKM UMI community, namely from 33 adult males, the average age was 36 years (SD = 8.6). Most of the adult males who do not have a smoking history are 21 (64%), 32 people do not regularly exercise (97%), and 27 are married (82%).

Table 2 Frequency Distribution based on Abdominal Circumference, Blood Pressure, and Current Blood Sugar Levels

Variable	Amount	
	N	%
Abdominal Circumference		
Normal	13	39
Obesity	20	60
blood pressure		
Normal	9	27
Pre Hypertension	15	46
Hipertension	9	27
c		
Normal	30	91
No Normal	3	9
Total	33	100

DOI: 10.30994/sjik.v10i1.545
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 749-755

Table 2 shows that of the 33 adult males of the UMI FKM community, it is known from the measurement of the abdominal circumference that the risk of obesity (60%) is more than those who have normal abdominal circumference (39%). If the measurement of blood pressure, adult males with pre-hypertension status (46%) are more than those with normal status (27%), and hypertension status (27%). Meanwhile, if the measurement of blood sugar levels at any time, it can be seen that adult males with normal levels (91%) are more than abnormal levels (9%).

Table 3
The Relationship of Abdominal Circumference with Blood Pressure and Blood Sugar Levels of Adult Men in the Academic Community at the Faculty of Public Health, UMI

Variable	Abdominal Circumference	
	R	p-*value*
Blood Pressure		
Sistolic	0,523	0,002
Diastolic	-0,038	0,832
Abdominal Circumference	0,224	0,211

Table 3 based on the results of the Pearson correlation test shows that adult males in the academic community at the UMI Faculty of Public Health who have systolic blood pressure have a significant positive relationship with abdominal circumference, namely r = 0.523; p-value (0.002), whereas at diastolic blood pressure, abdominal circumference had a negative and insignificant relationship, namely r = -0.038; p-value (0.832). The blood sugar level and abdominal circumference also had a positive and insignificant relationship, namely r = 0.224; p-value (0.211). These results indicate that a significant relationship is only obtained from systolic blood pressure to blood pressure of adult males in the academic community at the Faculty of Public Health, UMI.

DISCUSSION

The Relationship between Abdominal Circumference and Blood Sugar Levels

In this study most of the adult males of the academic community at the Faculty of Public Health UMI had blood pressure that showed pre-hypertension (46%) and hypertension (27%), compared with those who had normal blood pressure (27%). Based on the results of the statistical test of the correlation between abdominal circumference and systolic blood pressure, it was found that the value of r = 0.523 and (p = 0.002), which means that it has a significant positive relationship, but in the statistical test the correlation between abdominal circumference and diastolic blood pressure has a positive and insignificant relationship with the r value. = -0.038 (p = 0.832).

Significant relationship between abdominal circumference and systolic blood pressure since research by Khairana Sari, et al about 'The Relationship of Abdomen's Circumference with Blood Pressure (10). The results of this study are also in line with research by Arifin et al found that there was a relationship between abdominal circumference and systolic blood pressure (p <0.001). The insignificant relationship in this study is not comparable to that of Arifin et al. (2013) who found a significant relationship between abdominal circumference and diastolic blood pressure (11).

DOI: 10.30994/sjik.v10i1.545
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 749-755

The abdominal circumference is a clinical parameter for assessing the risk of developing metabolic syndrome. Abdominal circumference measurement is performed to determine whether there is abdominal obesity or central obesity. Abdominal obesity greatly affects the incidence of cardiovascular disease and diabetes mellitus, as well as the incidence of metabolic syndrome. Abdominal circumference can describe the presence of fat deposits in the abdominal cavity. The longer the abdominal circumference indicates the presence of excess fat deposits in the abdominal cavity (11).

This research was conducted in Makassar, which is an urban / urban area that has a growing social and economic status. As in research (12). shows that the consumption pattern is one of the risk factors that causes the proportion of obesity in urban areas to be higher than in rural areas.

The majority of respondents in this study did not exercise regularly. One of the factors that influence the incidence of hypertension is exercise. Research results by Jannah and Ernawaty found a significant relationship between exercise and the incidence of hypertension. An unhealthy lifestyle in the form of lack of exercise increases the incidence of hypertension. A person who does not exercise will tend to have an increased heart rate, so the heart muscle has to work harder with each contraction (13). The harder and more often the heart muscle pumps blood, the greater the pressure placed on the arteries. By exercising regularly, it can make the heart healthier so that it can avoid hypertension, because hypertension is a disease caused by an increase in blood pressure which gives continuous symptoms to target organ functions, such as stroke for the brain, coronary heart disease for the heart blood vessels and heart muscle. Exercise will provide good benefits for the function and work of the heart, lungs and blood vessels, which is indicated by a decreased resting pulse Exercise will provide good benefits for the function and work of the heart, lungs and blood vessels, which is characterized by a decreased resting pulse rate, reduced lactic acid buildup, increased cholesterol HDL, and reduced atherosclerosis (14). Apart from not exercising regularly, some of the respondents also had a history of smoking, Research by Setyanda a found a significant relationship between smoking behavior and the incidence of hypertension in men aged 35-65 years in the city of Padang. The nicotine in cigarettes can affect a person's blood pressure, either through the formation of atherosclerosis plaques, the direct effect of nicotine on the release of the hormones epinephrine and norepinephrine, or through the effect of CO in increasing red blood cells (15).

The Relationship between Stomach Circumference and Blood Sugar Levels

This study showed a positive correlation between abdominal circumference and blood sugar levels at time (r = 0.224) but it was not statistically significant (p = 0.211). This is supported by research Wijaya, Wande, & Wirawati on Udayana University Faculty of Medicine students which showed a negative correlation between abdominal circumference and fasting blood sugar levels and was not statistically significant. In that study, there are many factors that influence the incidence of Diabetes Mellitus. The results show that the correlation between abdominal circumference and blood sugar levels is very weak, so that abdominal circumference cannot be a risk factor for Diabetes Mellitus. The number of samples in the study as well as qualitative factors such as stress levels, self-efficacy, sample self-management, and social support were the things that influenced the results of the study (16).

This study is not in line with research Septyaningrum & Martini which found that abdominal circumference had a significant positive relationship with blood sugar levels (p = 0.002; r =

DOI: 10.30994/sjik.v10i1.545
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 749-755

0.392), which means that the larger the circumference of the stomach, the higher the blood sugar levels (17).

This research also has a positive correlation but its strength is very weak. FKM adult males who have large stomach circumference, have high blood sugar levels. Obesity causes the beta cells of the islets of Langerhans to become less sensitive to stimuli or as a result of increased blood glucose levels which causes the secretion of insulin after meals to cause no significant function. Obesity also causes the number of insulin receptors on target cells throughout the body to be suppressed so that the amount of available insulin is less effective in increasing its normal metabolic effects. The increased need for insulin cannot be met, resulting in high blood glucose concentrations (18).

The assumption of the researchers was that the positive but not significant correlation between abdominal circumference and blood pressure was due to the average age of the sample in the study of 36 years with a minimum age of 27 years and a maximum of 54 years, It is in accordance with research that the age of more than 40 years has a 6 times greater risk of developing type 2 diabetes (19). There are only 3 adult male respondents who have over 40 years of age and suffer from diabetes mellitus.

The results of measuring blood glucose levels as adult males at the fkm umi found that most (91%) had normal blood sugar levels and only 9% suffered from Diabetes Mellitus which illustrates that the population is not a Diabetes Mellitus population. Research Mildawati et al shows that female sex is more at risk of developing Diabetes Mellitus than men. And the older a person is, the more risk he has for developing Diabetes Mellitus (19).

Diabetes mellitus is a metabolic disease that is influenced by many factors. Obesity is only one of the risk factors for diabetes mellitus. Other factors such as hereditary history of type 2 diabetes, unhealthy lifestyle, and black race according (20).

CONCLUSION

Increasing the abdominal circumference of an adult male will increase his systolic blood pressure but not his diastolic blood pressure. Correlation: Abdominal circumference of adult males does not have a significant effect on blood sugar levels, but it shows that high abdominal circumference has high blood sugar levels.

ACKNOWLEDGMENTS

The author would like to thank the Institute for Research and Resource Development (LP2S) of the Indonesian Muslim University and the Faculty of Public Health at the Muslim University of Indonesia who have assisted in the research and writing of this scientific article

REFERENCES

1. WHO. Obesity and overweight [Internet]. World Health Organization. 2020. Available from: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight#:~:text=%2Fm2).-,Adults,than or equal to 30.
2. Harbuwono DS, Prawono, Yunir, Subekti I. Obesity and Central Obesity in Indonesia: Evidence From a National Health Survey. Med J Indones [Internet]. 2018;27(2):114. Available from: https://doi.org/10.13181/mji.v27i2.1512
3. Arini FA. Pengukuran antropometri dan hubungannya dengan"golden standard"persen lemak tubuh, bioelectrical impedance analysis: studi validasi pada anak sekolah dasar tahun 2010. Fkm Ui. 2010;1–101.

DOI: 10.30994/sjik.v10i1.545
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 749-755

4. Kemenkes. Laporan Hasil Riset Kesehatan Dasar (Riskesdas) [Internet]. Badan Litbangkes Kementrian Kesehatan Republik Indonesia. 2018. Available from: https://www.litbang.kemkes.go.id/laporan-riset-kesehatan-dasar-riskesdas/
5. Utami AP, Probosari E, Panunggal B. Faktor Risiko Status Obesitas terhadap Kejadian Gangguan Psikososial pada Remaja Putri di Semarang. Media Penelit Dan Pengemb Kesehat [Internet]. 2018;28(1):57–66. Available from: https://doi.org/10.22435/mpk.v28i1.7941.57-66
6. Rohkuswara TD, Syarif S. Hubungan Obesitas dengan Kejadian Hipertensi Derajat 1 di Pos Pembinaan Terpadu Penyakit Tidak Menular (Posbindu PTM) Kantor Kesehatan Pelabuhan Bandung Tahun 2016. J Epidemiol Kesehat Indones. 2017;1(2):13–8.
7. Auliya Rahmy H, Triyanti T, Ayu Dewi Sartika R. Hubungan Imt, Rlpp Dan Riwayat Diabetes Pada Keluarga Dengan Kadar Gula Darah Sewaktu Pada Pns. J Kesehat Masy Andalas. 2015;9(1):17.
8. Nair, Napolean, Reny, Stephen J. Prevalence of Overweight and Obesity Among Students of a Medical College in South India: A Pilot Study. Indian J Clin Pract. 2014;25(4):333–337.
9. Bidari, Asroruddin, Armyanti. No Title. FK Untan. 2016. p. 371–84.
10. Sari MK, Lipoeto NI, Herman RB. Artikel Penelitian Hubungan Lingkar Abdomen (Lingkar Perut) dengan Tekanan Darah. J Kesehat Andalas. 2016;5(2):456–61.
11. Arifin Z, Antari GY, Albayani MI. Hubungan Lingkar Perut dan Tekanan Darah Karyawan STIKES Yarsi Mataram. J Kesehat Qamarul Huda. 2019;7(1):13–7.
12. Endang E, Ratu A, Dewi A. Faktor Risiko Obesitas pada Orang Dewasa Urban dan Rural Obesity Risk Factors in Urban and Rural Adults. J Kesehat Masy Nasional, [Internet]. 2010;5:29–34. Available from: http://jurnalkesmas.ui.ac.id/index.php/kesmas/article/download/159/160
13. Jannah L, Ernawaty L. The Relationship of Lifestyle with Hypertension in Bumiayu Kabupaten Bojonegoro. J Berk Epidemiol. 2018;6(2).
14. Sriani KI, Fakhriadi R, Rosadi D. Hubungan antara perilaku merokok dan kebiasaan olahraga dengan kejadian hipertensi pada laki-laki usia 18-44 tahun. J Kesehat Masy Indones [Internet]. 2016;3(1):1–6. Available from: https://www.e-jurnal.com/2018/06/hubungan-antara-perilaku-merokok-dan.html
15. Setyanda, Sulastri D, Lestari Y. Hubungan Merokok dengan Kejadian Hipertensi pada Laki-Laki Usia 35-65 Tahun di Kota Padang. J Kesehat Andalas [Internet]. 2015;4(2):434-44-. Available from: https://doi.org/10.25077/jka.v4i2.268
16. Wijaya A, Wande N, Wirawati IAP. Hubungan lingkar perut dengan kadar gula darah puasa pada mahasiswa Fakultas Kedokteran Universitas Udayana angkatan 2014. Intisari Sains Medis. 2019;10(2):279–83.
17. Septyaningrum N, Martini S. Lingkar perut mempunyai hubungan paling kuat dengan kadar gula darah. J Berk Epidemiol [Internet]. :50–1. Available from: https://doi.org/10.1049/oap-cired.2017.1227
18. Sherwood L. Fisiologi Manusia (Dari sel ke sistem) (6 ed.). jakarta: EGC; 2009.
19. Mildawati, Diani N, Wahid A. Hubungan Usia, Jenis Kelamin dan Lama Menderita Diabetes dengan Kejadian Neuropati Perifer Diabateik. Caring Nurs J. 2019;3(2):31–7.
20. Kistianita AN, Gayatri RW. Analisis Faktor Risiko Diabetes Mellitus Tipe 2 Pada Usia Produktif Dengan Pendekatan Who Stepwise Step 1 (Core / Inti) Di Puskesmas. 2015;1.