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Fasting Blood Glucose, Lipid Profile And Vo2max Differences Based On Central Obesity in Health Officer Ciracas District Health Center East Jakarta

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Abstract: Central obesity is a problem that occurs in various parts of the world, including Indonesia. Central obesity is often considered not to cause a health hazard, but central obesity is closely related to metabolic syndrome disorders that lead to glucose intolerance and also dyslipidemia, which in turn can increase the risk of non-communicable diseases such as diabetes mellitus, hypertension, and cardiovascular disease. The tendency to increase blood glucose levels, increase lipid profiles and decrease fitness is a problem that was raised in this study so that a difference was carried out in the central obesity and non-central obesity groups. This research method is observational with a cross-sectional design, located in the Ciracas Public Health Center, East Jakarta. Respondents in this study were 42 peoples. The fasting blood sugar and lipid profile variables were taken by fasting for 8-10 hours and then measured using the Omron Blood Glucose Monitoring System and Lipid Pro, while the VO2max fitness measurement was taken by performing the Rockport Walking Test which was then expressed by the VO2Max value. Data processing was analyzed by univariat and bivariate using Mann-Whitney and Independent T-test. The results of statistical tests from the two groups showed that there were differences in fasting blood glucose levels (p-value 0.01), there were differences in total cholesterol levels (p-value 0.000), there were differences in LDL levels (p-value 0.03) and there were differences in triglyceride levels. (p-value 0.002). This study also obtained insignificant results on HDL variables (p-value 0.950) and VO2Max (p-value 0.567).
Key Words: Central Obesity, Fasting Blood Sugar, Lipid Profile, VO2Max

1. INTRODUCTION

Central obesity is a health problem that in many parts of the world, in America, central obesity has increased since 1999. In the year 2009-2012, it is known that 33.7% of men with central obesity and 71.6% of women with central obesity are known. The development of obesity continued to increase until 2015-2016 as many as 38.0% of men were centrally obese and 74.7% of women were centrally obese (Beydoun et al, 2020). Indonesia also experienced an increase in cases of central obesity in 2007 the increase occurred in the

population aged over 15 years by 18.8%, in 2013 it increased again to 26.6% (Riskesdas, 2013), and in 2018 experienced a peak increase to 31.0%. The highest increase in central obesity was in North Sulawesi and Jakarta (Riskesdas, 2013). Central obesity is fat that is in the abdomen due to excess fat for a long time. Accumulation of fat occurs due to subcutaneous tissue can't work due to excess energy in fat in the body, then triggered by a lack of physical activity in daily activities (Tchrnof, Andre, 2013). A person is said to be centrally obese if he has an abdominal circumference of > 90 cm in men and > 80 cm in women (Kemenkes.RI, 2018). Central obesity is associated with metabolic syndrome risk which is often accompanied by insulin resistance and glucose intolerance (Freitang, 2018). Central obesity is also known to correlate with most of the risk factors for cardiovascular disease, especially on lipid profile levels, increased triglycerides, and decreased HDL levels which have an impact on increasing blood pressure (Rocha et al, 2013). Central obesity-related to VO2Max or maximal oxygen consumption, which is the maximum amount of oxygen that can be consumed by tissues when doing the strongest work and describes body efficiency in using oxygen during intense physical activity until finally, fatigue occurs (Nurlim, 2012). VO2 maximizes lung, cardiovascular, and hematological conditions in oxygen delivery, as well as the oxidative mechanism of muscle that performs an activity (Nurlim, 2012). The update in this study was carried out on health workers who work at community health service centers, which during this pandemic have a double workload so that researchers are interested in measuring blood serum related to metabolism and fitness.

2. METHODS

This study used a cross-sectional design with 42 respondents. Characteristics of the data were obtained by direct interviews, fasting blood glucose levels data were taken using the Omron Blood Glucose Monitoring System, lipid profile data were taken using the Lipid Pro Tool by health personnel and VO2Max data was taken by testing using the Rockport Walking test method. Inclusion Criteria: Willing to be Respondent, 18-45 Years Old. Exclusion Criteria: Not currently suffering from diabetes, Not currently suffering from cardiovascular disease, Athletes/Athletes who that undergo special diets.

This research was carried out at the Ciracas District Health Center, East Jakarta, DKI Jakarta. This research was conducted from May 2021 to July 2021. Research instruments are tools or facilities used by researchers in collecting data so it will be easier and the results are better in the sense of being fast, complete, systematic, so easy to process and measuring tools in this study include: Omron Blood Glucose Monitoring System, used to take samples of fasting blood sugar levels. Lipid Pro is used to take samples of lipid profile levels. Rockport Walking Test used to collect data on cardiorespiratory fitness VO2Max.

The sampling technique in this study was the first on blood serum samples for fasting blood sugar and lipid profile (cholesterol total, HDL, LDL and, triglycerides) variables. Respondents fasted 8-10 hours before taking serum. Fitness sample taking is done by doing a brisk walk as far as 1.6 kilometers, then checking the pulse and oxygen saturation.

Analysis, Statistical data analysis used the independent T-test statistical test, if the data were normally distributed, then the Independent T-test statistical test and Mann-Whitney statistical test was used to determine differences in fasting blood glucose levels, lipid profiles, and VO2Max based on obesity central to health officers at Ciracas District Health Center with a significance level of 5%. Statistical decisions were taken with values at a 95%

confidence level. The difference test and the correlation test were declared significant if $p < 0.05$.

3. RESULTS AND DISCUSSION

Univariate Analysis Results

The univariate analysis in this study shows the distribution of frequency and percentage based on gender, age, and central obesity, As accompanying data on the variables studied. The dependent variables in this study are fasting blood glucose, lipid profile, and fitness VO2Max.

General Characteristrics of Respondents

There are three characteristics of respondents observed in this study. The first characteristic is gender, namely male and female, the second characteristic is th age which is divided into three categories, namely 18-29 years, 30-39 years, and 40-45 years. The third characteristic is central obesity and not central obesity. Respondents were selected according to the inclusion of the study as a condition to provide significant results. Respondent Characteristics, based on age described in this study can be seen in table 1.

Table 1. Respondent Characteristics

Variable	n	(%)
Gender		
Male	6	14.3
Female	36	85.7
Age		
18-27 Years	52	100,0
28-37 Years	0	0,0
38-45 Years		
Central Obesity		
Yes	21	50
No	21	50

Distribution of the dependent variable based on central obesity, namely: fasting blood glucose, lipid Profile (cholesterol total. LDL, HDL and, triglysedes). The distribution of data can be seen in table 2.

Table 2. Distribution of Fasting Blood Glucose and Lipid Profiles Based on Central Obesity

Variable	Min	Max	Median±SE
Fasting Blood Glucose			
Not Central Obesity (21)	86	111	98±1.5
Central Obesity (21)	92	193	103±5.3
Cholesterol Total			
Not Central Obesity (21)	100	189	131±6
Central Obesity (21)	110	302	220±10.1

LDL			
Not Central Obesity (21)	39	131	75±4.6
Central Obesity (21)	35	249	133±12.9
HDL			
Not Central Obesity (21)	25	95	37±4
Central Obesity (21)	24	64	38±2.5
Triglycerides			
Not Central Obesity (21)	50	151	82±6.1
Central Obesity (21)	53	424	144±22.8

a. Overview of Fasting Blood Sugar

Based on table 2. above, it can be seen that respondents who are centrally obese tend to have higher fasting blood glucose levels than those who are not centrally obese. This study is in line with research conducted by (Gholamreza Veghari et al, 2014). Respondents who were centrally obese had the highest measurement value of 249 mg/dl compared to those who were not centrally obese had the highest measurement value of 131 mg/dl.

b. Overview of Profil Lipid

Based on table 2. it can be seen that respondents who have central obesity tend to have higher levels of total cholesterol, LDL, HDL and, triglycerides compared to those who do not have central obesity. This study is in line with research conducted by (Winarta, 2017). The measurement results show that respondents who have central obesity have the highest measuring value of total cholesterol of 302 mg/dl, LDL levels of 249 mg/dl, and Triglycerides of 424 mg/dl. Respondents who do not have central obesity have the highest measuring value of 111, LDL levels of 131 mg/dl, and triglyceride levels of 151 mg/dl. The HDL variable, it can be seen that respondents who are centrally obese have lower HDL levels compared to those who are not centrally obese with the highest measuring value of 64 in central obesity and the highest measuring value of 95 not having central obesity.

Distribution of the dependent variable based on central obesity, namely: fitness variable VO2Max, The distribution of data can be seen in table 3.

Table 3. Distribution of Fitness VO2Max Based on Central Obesity

VO2Max	Min	Max	Mean±SD
Not Central Obesity (21)	-11.9	40.9	16.69±12.05
Central Obesity (21)	-4.3	37	18.69±10.38

c. Overview of Fitness VO2Max

Based on table 3. it can be seen that the highest VO2max fitness measurement value tends to be higher in respondents who do not have central obesity. The results of this distribution are in line with research conducted by (Mondal et al, 2017). The distribution of VO2max fitness of respondents with central obesity has the highest measured value of 37 ml/kg/min and the highest measurement value of respondents who are not centrally obese of 40.9 ml/kg/min.

Bivariate Analysis Results

In this study, bivariate analysis was carried out using Mann-Whitney for fasting blood glucose levels and lipid profile levels. The purpose of this statistical test is to determine differences in fasting blood glucose and lipid profile levels based on central obesity. The test results show that there is a difference in fasting blood glucose levels with a p-value of 0.001 ($p<0.05$). The results of the analysis on lipid profiles show that there are differences in levels based on central obesity on total cholesterol with p-value 0.000, LDL levels with p-value 0.037 and triglyceride levels with p-value 0.002. In the bivariate analysis on HDL variable there is no difference in HDL levels based on central obesity with p-value 0.950 ($p<0.05$).

Table 4. Differences in fasting blood glucose levels and lipid profiles based on central obesity

Variable	Central Obesity		Asymp.sig (2-tailed)
Fasting Blood Glucose	No	Yes	0.001*
Cholesterol Total	No	Yes	0.000*
Triglycerides	No	Yes	0.002*
LDL	No	Yes	0.037*
HDL	No	Yes	0.950

*significant

a. Differences in Fasting Blood Glucose Levels Based on Central Obesity

Based on table 4, the total number of respondents who participated had the highest blood glucose level of 111 mg/dL in respondents who obese and 193 mg/dl in respondents who were non centrally obese. The test results show a value of $p=0.01$ ($p<0.05$), so it can be said that there are differences in blood glucose levels based on central obesity in health officers at Ciracas District Health Center. The subjective difference in blood glucose levels in this study is because most respondents who do not have central obesity limit sugar consumption and also carbohydrate consumption in their daily lives, consume low-calorie and low-fat snacks and even only consume boiled food so that it can be seen.

The condition of blood sugar in respondents who are not centrally obese is more stable than those who are centrally obese. Subjectively, it is known that respondents who have central obesity often consume instant noodles, especially at night to block or serve as a dinner menu, then at least 3 times a week consume coffee and also drinks high in sugar and some even consume 3 times a day, because, during this pandemic, many health workers went down in the field, so it was inevitable to consume high-calorie and high-sugar drinks to increase emotional stability and work fatigue in the field.

This study is in line with research conducted by Veghari et al in 2014 on 4471 respondents, measurements were made in the morning after a 12-hour fast and then determined using laboratory equipment (enzymatic method) with spectrophotometric

techniques. abdominal circumference in men and women in Iran (Gholamreza Veghari et al, 2014).

b. Differences in Lipid Profile Levels Based on Central Obesity

Based on Table 4. from the total number of respondents who participated in the highest cholesterol value of 189 mg/dl in respondents who non centrally obese and 302 mg/dl in centrally obese respondents. The results of the bivariate test showed p value=0.000 (p <0.05) for those who did not have central obesity and experienced central obesity. From the test results, it can be found that there are differences in total cholesterol levels based on central health workers at the Ciracas District Health Center based on central obesity. The difference in total cholesterol levels tends to be high in respondents who have central obesity, this is subjectively the result of eating foods that tend to contain high fat and oil, such as the habit of consuming excessive fried foods. Inadequate facilities such as a healthy canteen or a lack of various food vendors around the community health center, the community health center canteen also provide a lot of food such as fried food which is a favorite food for community health center employees. respondents do not have time to prepare more nutritious food from home so that the pattern of eating habits becomes a bit difficult to change. It should be noted that this increase in cholesterol occurs due to the wrong diet and is carried out for a long time, the result of a continuous increase in cholesterol can cause lipid metabolism disorders that lead to dysplisemia, hypertension, and cardiovascular disease.

This study is in accordance with the theory that samples with more body weight have higher cholesterol levels than those with normal weight. Cholesterol is also caused by an increase cholesterol found in very low-density lipoprotein and low-density lipoprotein secondary to a large increase in circulating triglycerides when there is an increase in body fat (Santos, 2005). Cholesterol levels also tend to increase in people who are obese and lack exercise (Beydoun, 2008).

Based on table 4. from the total number of respondents who participated the highest triglyceride levels were 151 mg/dL in respondents who non centrally obese and 434 mg/dl in respondents who were centrally obese. Bivariate test results showed p-value=0.002 (p <0.05), so it can be said that there are differences in triglyceride levels based on central obesity in health officers at Ciracas District Health Center. Differences in triglyceride levels were also seen in respondents who were centrally obese, the data showed that centrally obese respondents had higher triglyceride levels than respondents who did not experience central obesity. Just like cholesterol levels, an increase in triglyceride levels is subjectively influenced by the high consumption of foods that contain high carbohydrates, high in fat and also oil in their daily lives, as a result of busyness and fatigue at work so that the time to prepare food is very limited, supported by a vaccine schedule that allows consuming food becomes more irregular because they are often served in the field with foods high in oil such as fried foods and also boxed rice with fried side dishes.

Increased triglyceride levels are a marker of increased risk of cardiovascular disease, therefore more attention needs to be paid to reduce triglyceride levels by consuming foods that are high in fiber, consuming foods containing unsaturated fats, and doing activities or exercise regularly. This study is in line with research conducted by Herlan in 2014 at Trisakti University on 158 medical students by filling out questionnaires and direct

measurements of BMI, waist, and triglyceride levels (Herlan, 2014). The research on obesity and triglycerides conducted by Catri in 2020 on 35 Andalas University medical students who were obese by measuring BMI to determine the degree of obesity, the results showed that there was no correlation between the degree of obesity and triglyceride levels in Andalas University Medical students (Catri, 2020).

Based on table 4. from the total number of respondents who participated, the highest LDL level was 131 mg/dL in respondents who were not centrally obese and 249 mg/dl in respondents who were centrally obese. The results of the bivariate test showed a value of p=0.037 (p <0.05), so it could be found differences in LDL levels based on central obesity in health Officers at Ciracas District Health Center. Differences in LDL levels were also seen in the two test groups where respondents who were centrally obese had LDL levels that tended to be higher than those who were not centrally obese.

When cholesterol levels increase, LDL levels also increase as well as cholesterol and triglyceride levels. Subjectively, an increase in LDL levels is triggered by excessive consumption of high-fat and oily foods and also continues for a long time. Facilities such as canteens are very helpful in implementing changes in food habits for respondents where if the canteen provides food that contains more complete nutrients or is nutritionally balanced, slowly there will be changes in food consumption. Respondents who have central obesity also tend to rarely consume fruit in their daily lives, which consuming fruit can help reduce cholesterol levels, especially in fruits that contain high fiber and water. The fiber and water in the fruit can bind bile acids, thereby reducing the absorption of fat and cholesterol in the blood. The importance of lowering LDL levels is related to the consequences of this increase, which eats LDL can cause blockage of blood flow to the heart so that it can cause blood vessel disorders and heart problems thereby increasing the risk of cardiovascular disease, cancer, sleep apnea, and hypertension.

This study is similar to the research conducted by Ercho in 2013 at the University of Lampung using a cross-sectional approach with a consecutive sampling technique for 60 respondents of medical students at Lampung University who were divided into 2 categories of obesity and non-obesity. This study was conducted in a physiological laboratory and a clinical laboratory, The test results showed that there were differences in LDL levels in the two categories of medical students at Lampung University (Ercho et al, 2013).

Based on table 4. from respondent total number who participated, the highest HDL level was 95 mg/dL in respondents who were not centrally obese and the value was 64 mg/dl in respondents who were centrally obese. The results of the bivariate test showed a value of p=0.950 or (p>0.05), so it can be found that there was no difference in HDL levels based on central obesity in health officers at Ciracas District Health Center. There was no difference in HDL levels between the two test groups in this study, this subjectively was caused by the lack of consumption of foods containing unsaturated fats and consuming more foods high in saturated fat. In addition to food, the increase in HDL levels is also influenced by physical activity or exercise. During this pandemic, work fatigue has increased many times over in health workers compared to the usual situation, work fatigue results in a lack of regular exercise and more free time spent resting or just lying down in a rest area, this is also a trigger for high blood pressure levels. HDL in the two respondents became no different.

Giving aerobic exercise is known to reduce total cholesterol levels by 19%, LDL 11%, triglycerides 8%, and can also increase HDL levels by 18% (Kelley et al, 2006). Aerobic exercise performed for six weeks with light to moderate intensity can reduce cholesterol by a percentage of 20.46% (Sudibjo, 2004). Low HDL levels can cause disturbances in cardiovascular function where HDL functions as cholesterol that protects the heart due to increased levels of triglyceride cholesterol, LDL, and total cholesterol which causes coronary heart disease, stroke and hypertension.

This research is similar to a study conducted by Ercho in 2013 at Lampung University with a consecutive sampling technique of 60 respondents from medical students at Lampung University who were divided into 2 categories of obese and non-obese. This study was conducted in the physiology laboratory and clinical laboratory, the test results show that there was a difference in mean HDL levels in the two categories of medical students at Lampung University (Ercho et al, 2013). Research conducted by Gifari in 2021 on the effect of high- intensity training (HIT) and pre-meal water consumption on lipid profiles in 27 obese students who were divided into three treatment groups. In the first treatment group, as many as 9 respondents were given pre-meal water consumption. The second group of 9 respondents was given high interval training (HIT) treatment and the third treatment group was given a combination of HIT and pre-meal water consumption. The results showed that the first group showed a significant increase in HDL levels, the second group showed a significant decrease in total cholesterol and in the third group there were significant changes in both total cholesterol, triglycerides, and HDL (Gifari et al, 2021).

Bivariate Analisys Fitness of VO2Max

Bivariate analysis on the fitness variable VO2max using the independent t-test method because the data are normally distributed. The results of the bivariate analysis of VO2Max fitness based on central obesity showed that there was no significant difference in the VO2max fitness variable with a p-value 0.567 (p>0.05).

Table 5. Differences in Fitness Vo2Max based on central obesity

VO2Max	Mean±SD	P-Value
Not Central Obesity	16.69±12.05	0.567
Central Obesity	18.69±10.38	

c. Differences in Fitness VO2Max Base on Central Obesity

Based on table 5. the total number of respondents who participated obtained an average value of 12.4 for those who were not obese and 14.1 for those who had central obesity (p= 0.620) (p>0.05). From bivariate test results, it can be concluded that there is no difference in VO2Max fitness based on central obesity in health Officers at Ciracas District Health Center. In this study, there was no difference in the VO2Max value in the two test groups, just as fitness HDL levels were also strongly influenced by physical activity or exercise routinely carried out by a person. Work fatigue is the main factor in influencing the low fitness of the respondents in this study. The addition of working time and even replacing the office of colleagues makes the time to do sports become uncertain, respondents who are used to going to the gym after work, jogging or cycling after work and during holidays are not done regularly due to time, space and fatigue limitations.

Work that requires respondents to rest more to recharge in the morning. In addition, when checking the fitness of some respondents, they carried out chatting or playing on mobile phones, this made other factors in taking test results so that for further research it was better to use other methods so that the data was obtained as objectively as possible. VO2Max levels will be stable in people who are trained or accustomed to doing sports continuously over a long period as well as trained athletes. The measurement of VO2Max in the study is a description of the fitness of the respondents so that they can be more enthusiastic in carrying out sports in order to improve cardiovascular function and reduce the risk of disorders of cardiovascular function.

This study is in line with research conducted by Mondal in India in 2017 on 133 respondents consisting of 83 men and 50 women. Measurement of VO2Max using a submaximal treadmill, measurement of central obesity using waist circumference and waist circumference ratio based on height, the results obtained a negative correlation between central obesity and Vo2Max in respondents (Mondal et al, 2017). However, research conducted by Amilia et al in South Kalimantan in 2019 regarding the correlation between BMI and waist circumference on VO2Max of 55 respondents using the rockport test media showed that there was a significant correlation between BMI and abdominal circumference on respondents' VO2Max levels (Amilia et al, 2019).

Research conducted by Kuswari 2015 regarding the frequency of moderate-intensity aerobic exercise affects body fat in IPB female students, the respondents were 21 female students who were further grouped into three treatments, the first group was treated twice a week, the second group three times a week and the third group was given treatment four times a week. This study was conducted for 3 months with primary data in the form of body fat (triceps, abdomen, and thigh fat). Statistical test results show that aerobic exercise performed three times a week can reduce the folds of thigh fat and for aerobic exercise with a frequency of twice a week can reduce the folds of skin under the skin, both triceps, abdomen and quadriceps. Giving moderate-intensity aerobic exercise with a frequency of four times a week has the best function to reduce body fat compared to exercise the best to reduce body fat compared to exercise with a frequency of three times and twice a week (Kuswari et al, 2015).

4. CONCLUSION

Test results showed that there was a significant difference in fasting blood glucose levels, total cholesterol levels, triglyceride levels, and higher LDL levels in health officer who were centrally obese, while for HDL and VO2Max levels obtained were not significant or there were no significant differences experiencing central obesity or not in health Officers at Ciracas District Health Centre. The sample is expected to consume a balanced nutritional intake, increase the intake of unsaturated fats such as avocado, olive oil, canola oil, nuts and seeds, lean meat, various foods containing omega-3 and omega-6 such as tuna, salmon, walnuts, and various processed soybeans. Reducing the consumption of high-calorie, high-sugar and high-salt foods, exercise for 150 minutes/week or can be divided into 15-30 minutes/day.

CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest in this study.

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