



Association between Central Obesity and Waist/Hip Circumference (WHCR) to Dyslipidemia among Adult Patients in Aceh, Indonesia

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Abstract

Introduction: Dyslipidemia is a lipid metabolic disorder marked by high level of total cholesterol, LDL cholesterol and triglyceride, and low level of HDL cholesterol. Dyslipidemia is a risk factor of coronary heart disease, atherosclerosis, acute myocardial infarction, type-2 diabetes, hypertension, and chronic kidney disease. The aim of this study was to evaluate the association between central obesity and waist/hip circumference ratio (WHCR) status to the dislipidemic status in internal medicine clinic patients at Meuraxa Hospital, Aceh, Indonesia.

Methods: The design of the study was analytic observational with cross sectional approach. Purposive sampling was conducted to 64 subjects. Central obesity and WHCR status were determined by measurements while dislipidemic status were collected from patients' medical records.

Results: Based on age, the biggest proportion of dyslipidemia was more than 45 years old (78.1%), and women gender (70.3%). High central obesity status was 76.6%, and high WHCR was 85.5%. High cholesterol was found in 56.3%, with high LDL 78.1%, high triglyceride 59.4% and low HDL 62.5%. There were significant associations between central obesity and dyslipidemic status ($p < 0.05$), and between WHCR status and dislipidemic status ($p < 0.05$).

Conclusion: We concluded that there were associations between central obesity and WHCR status to dyslipidemic status.

Keywords Central Obesity Dyslipidemia, Waist/Hip Circumference Ratio

Introduction

Dyslipidemia is a lipid metabolic disorder which is marked by high level of total cholesterol, triglycerida, and LDL but low level of HDL cholesterol.¹ Indonesian Basic Health survey data or *Riset Kesehatan Dasar* (RISKESDAS) showed

the prevalence of dyslipidemia in Indonesia was 14% in 2007 and had increased to 25–28% in 2013.²

Household Survey data obtained the prevalence of dyslipidemia was 44.6% and at the age 25–34 years old was 10%, in which women was 15% higher compared to men, and people above 60 years old had more prevalence of dyslipidemia (56.2%).³ The increasing cholesterol in blood could cause atherosclerosis. The study conducted by Monica⁴ stated that total cholesterol in women averaged 206.6 mg/dl and men 199.8 mg/dl in which tends to develop to high LDL-

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cholesterol, low HDL-cholesterol, high triglycerida, and high blood glucose.

Central obesity is defined by the accumulation subcutaneous and visceral adipose tissues in abdominal wall, which metabolically active in secreting inflammatory mediators. It is well known that adipose tissue in the abdominal visceral wall had more risk for morbidity compared to subcutaneous adipose tissue. The reduction of waist circumference and waist to hip circumference ratio (WHCR) can reduce the risk of central obesity which has a role in metabolic and vascular aspects.^{5,6}

The increasing of abdominal fat marked by waist circumference and WHCR are indicators of the increasing free fatty acid production in blood which then become risk factors of atherosclerosis and obesity. Thus, the accumulation of fat in abdominal cavity (central obesity) is associated with metabolic risk causes.⁶ Fat is easily accumulated and dissolved in the peritoneum, which in turn is accumulated in blood. Central obesity can be measured with abdominal circumference, which is normally <90 cm in men and <80 cm in women, in which is associated with abdominal sagittal diameter which correlated with dislipidemia.^{6,7}

Methods :

Subject and Study Design

This study used observational analytic design with cross sectional approach. The study was conducted in Internal Medicine clinic at Meuraxa Hospital Aceh Indonesia from November 23 to November 30, 2016. Nonprobability sampling with consecutive sampling was used to obtain samples who fulfilled the study criteria, i.e. age 18–60 years old, and had blood lipid data from the medical record. Data was analyzed descriptively and association between WHCR and dyslipidemia status was determined using chi-square test.

Results

A total of 64 samples were obtained. Table 1 shows the characteristics based on age, sex, education,

Table 1 Characteristics of the subjects (n=64)

Characteristic	Frequency (n)	Percentage (%)
Age, y		
<30	-	-
30–45	14	21.9
45	50	78.1
Gender		
Male	20	31.3
Female	44	68.7
Education status		
Low	20	31.3
Middle	24	37.5
High	20	31.2
Occupation		
Stay-at-home	24	37.5
Employee	20	31.3
Others	20	31.2
Economic Status		
Low	14	21.9
Medium	20	31.3
High	30	46.8

occupation, economic status. The results showed that age above 45 years old are more dominant (78.1%), more female (68.7%) with middle education status (37.5%), stay-at-home job (37.5%) and high economic status (46.8%).

Table 2 Distribution of the subjects based on central obesity, WHCR, and lipid profiles (n=64)

Variables	Frequency (n)	Percentage (%)
Central obesity	46	71.9
High WHCR	55	85.9
High total cholesterol	36	56.3
High LDL-cholesterol	50	62.5
Low HDL-cholesterol	40	62.5
High tryglyceride	38	59.4

As shown in Table 2, there were high prevalence of central obesity, high WHCR and dyslipidemia among the subjects.

Table 3a Association between central obesity and WHCR to total cholesterol (n=64)

	Total cholesterol (n, %)		p
	High	Normal	
Central obesity			
Yes	28 (60.9)	18 (39.1)	0.043
No	8 (44.4)	10 (55.6)	
WHCR			
High	32 (58.2)	23 (41.8)	0.020
Normal	4 (44.4)	5 (55.6)	

Based on Table 3a, the results that 60.9% subjects with central obesity and 58.2% patients with WHCR had high total cholesterol level. Based on chi-square test, there was a significant association between central obesity with total cholesterol (p=0.043), and also between WHCR with total cholesterol (p=0.020).

Table 3b Association between central obesity and WHCR to LDL-cholesterol

	LDL-cholesterol (n, %)		p
	High	Normal	
Central obesity			
Yes	40 (86.9)	6 (13.1)	0.025
No	10 (55.6)	8 (44.4)	
WHCR			
High	45 (81.8)	10 (18.2)	0.028
Normal	5 (55.6)	4 (44.4)	

Based on the results shown in Table 3b, 86.9% patients with central obesity and 81.8% patients with high WHCR had high LDL cholesterol levels. Chi-square test results found a significant relationship between central obesity and LDL-Cholesterol (p=0.025), and also WHCR with LDL-cholesterol profile (p=0.028).

Table 3c Association between central obesity and WHCR to HDL-cholesterol (n=64)

	HDL- cholesterol (n, %)		p value
	Low	Normal	
Central obesity			
Yes	32 (69.6)	14 (30.4)	0.049
No	8 (44.4)	10 (55.6)	
WHCR			
High	38 (69.1)	17 (30.9)	0.041
Normal	2 (22.2)	7 (77.8)	

Result of data analysis in Table 3c showed that 69.6% central obesity patients and 69.1% high WHCR patients had low HDL levels. There was a significant relationship between central obesity with HDL-cholesterol level (p=0.049), and also between WHCR and HDL-cholesterol level (p=0.041).

Table 3d Association between central obesity and WHCR to triglyceride (n=64)

	Triglyceride (n, %)		p
	High	Normal	
Central obesity			
Yes	30 (65.2)	16 (34.8)	0.037
No	8 (44.4)	10 (55.6)	
WHCR			
High	35 (63.6)	20 (36.4)	0.010
Normal	3 (33.3)	6 (66.7)	

Based on Table 3d, 65.2% central obesity patients and 63.6% patients with high WHCR had high triglyceride levels. Chi-square test results showed there were significant relationships between central obesity and triglyceride levels (p=0.037), and also between WHCR and triglyceride levels (p=0.010).

Discussion

The result of this study had similar findings to Hafnizar et al.⁹ study which stated that WHCR is associated to cardiovascular diseases and dyslipidemia. The study by Abete et al.¹⁰ stated that WHCR and central obesity can be used as indicator of dyslipidemia and metabolic syndrome risk factors. The study of Lee et al.¹¹ shows that waist – to –hip ratio (WHR) has the best potential for predicting subclinical atherosclerosis compared to Body Mass Index (BMI) and waist circumference (WC) in post menopausal women. Central obesity is one of the risk factors for metabolic syndrome and dyslipidemia. Yekdes study has a central obesity relationship with coronary heart disease, WHCR and central obesity and dyslipidemia are parameters of pathogenesis of coronary heart disease.¹³ Affanti Study has a central obesity relationship with HDL and LDL levels. Central obesity or excessive accumulation of fat causes increased levels of fat in the blood resulting in elevated cholesterol levels.¹⁴ Medika Research has a relationship of central obesity and WHCR with HDL and LDL cholesterol. A person with central

obesity and a high WHCR has a 3 times chance of having higher LDL cholesterol and lower HDL in comparison to a non-central obesity person. Central obesity and excessive WHCR are risk factors for diabetes mellitus type 2, hypertension, coronary heart disease and dyslipidemia. So it makes increased cholesterol production by acetyl-coA in the liver by 15% to 25% if a person is high in saturated fat.¹⁵ Rasdini Study has a central obesity relationship with total cholesterol levels this is due to visceral fat is more associated with dyslipidemia and metabolic syndrome than total body fat.¹⁶ Ma, rufi et al.¹⁷ study state that women with excess abdominal circumference and high WHCR risk 1.5 times increased cholesterol LDL and at risk for dyslipidemia and cardiovascular disease.

Conclusion

This study found association between central obesity and WHCR status to dislipidemia among subjects in internal medicine clinic at Meuraxa Hospital Aceh Indonesia. It is then suggested to do screening periodically by using waist abdominal and hip circumference measures as prevention efforts toward dyslipidemia and risk of cardiovascular diseases.

Conflict of Interest

The authors of this paper declare there is no conflict of interest regarding this research.

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