Dyslipidemia Incidents Between General Obesity and Central Obesity of Employees with Obesity at Universitas Lampung

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ABSTRACT

This study aims to determine the differences in the incidence of dyslipidemia between general obesity and central obesity in adult male employees having obesity at the Universitas Lampung. This research used cross sectional observation method. The study was conducted from August to October 2016. The respondent populations involved in this study were 33 male adult employees for each obesity group. Samples were taken by consecutive sampling technique. The results revealed that the average age of the respondents were 42.9 years, where 23 respondents (34.8 %) of the respondents were suffered from dyslipidemia. The result of unpaired T test showed that there was a significant difference of dyslipidemia incidence between general obesity and central obesity in adult male employees with obesity at Universitas Lampung in 2016 with p value of 0.039. Bivariate analysis showed that central obesity has a role in increasing the incidence of dyslipidemia greater than general obesity.

Keywords: Central obesity, Dyslipidemia, General obesity.

INTRODUCTION

Obesity is an excessive accumulation of body fat or abnormal tissue caused by an imbalance between food intake and food output that can cause health problems.[1]The prevalence of obesity is increasing every year in various countries. Currently it is estimated that more than 100 million people of the world suffered from obesity.[2] Lifestyle changes that have grown in Indonesia make the incidence of obesity increases from year to year despite the fact that Indonesia is a developing country.[3]

The World Health Organization estimates that in the world there are about 1.6 billion adults over 15 years of age overweight and at least as many as

400 million obese adults in 2005,[4] and it is estimated that more than 700 million adults will obese by 2015. The prevalence of overweight in developed countries ranges from 23.3 percent in Japan to 66.3 percent in the United States of America (USA), whereas in developing countries it ranges from 13.4 percent in Indonesia to 35.6 percent in Saudi Arabia.[5,6] Basic Health Research (Riskesdas) data in the year 2013 in Indonesia showed a prevalence of central obesity of 19.7% in adult men aged over 18 years and the prevalence of central obesity of 26.6% in adult men aged over 15 years.[3]

The highest prevalence in 2013 of obesity was found in North Sumatera at 34.7% and prevalence of central obesity was found in the city of DKI Jakarta by at 39.7% percent in men with waist circumference Ã 90 cm. The prevalences of central obesity in Lampung were 20% in men and women.[3] The risk associated with obesity is not just about the amount of fat but distribution that determines the risk associated with cardiovascular risk factors of the Metabolic Syndrome.[1] Abdominal or visceral fat or central obesity is associated with increased of incidence of cardiovascular risk factors. The morbidity includes Type 2 diabetes, impaired glucose tolerance, and hypertension and dyslipidemia.[7-9]Dyslipidemia is the accumulation of one or more lipids in the plasma, as a manifestation of lipid transport metabolism abnormalities in obesity. Clinically, dyslipidemia is expressed as hypertriglyceridemia, an increase in LDL-cholesterol and/or decreased HDL-cholesterol.[10-11]

Research conducted by Zelzer et al. on the association of obesity with dyslipidemia suggested that obesity is associated with dyslipidemia.[12] Seibert et al. reported a correlation of visceral fat measurement with the risk of cardiovascular disease.[13] The disregulation metabolic in dyslipidemia will mobilize free fatty acids. Lipolytic activity that occurs in central obese people contributes more to the occurrence of dyslipidemia than general obesity. The free fatty acids (FFAs) derived from adipocytes especially from viscera or ectopic fat induce the activation of the NF-kB pathway and in the end, contribute to the synthesis and production of inflammatory cytokines such as TNF-á. Cross-talk between adipocytes and macrophage will then promote positive feedback loop and results in amplification of a detrimental metabolic response. The highest CRP level as an inflammation marker was found in individual with obesity visceral. Another inflammatory cytokines were found, IL-6 and macrophage chemo attractant protein-1 (MCP-1), and developing of the inflammation state in obesity and central obesity will contribute to increase the risk of cardiovascular disease in patient.[11, 14-16]

Based on the above description and fact, then formulated the research question is "is there any difference in the incidence of dyslipidemia between general obesity and central obesity in adult male employees with obesity in the environment of the Universitas Lampung in 2016?

MATERIALS AND METHODS

This research uses laboratory analytic method with cross sectional approach. Analytical research aims to determine the difference of incidence of dyslipidemia between general obesity and central obesity in adult male employees with obesity at the Universitas Lampung. The populations used in this study were male adult employees with obesity in the Universitas Lampung. The total numbers of samples of this study were 66 respondents consisting of 33 respondents form each obesity groups with purposive sampling technique.

The inclusion criteria in the study were obese people, male respondents around the Universitas Lampung aged 35-55 years, met the obesity criteria (BMT> 30 kg/m²) and were willing to follow the research procedure and signed the informed consent. While the exclusion criteria include being on a diet program, using a corticosteroid medication or taking cholesterol drugs, having adrenal tumor or thyroid tumor disease, or having mass in the abdominal area and pelvic cavity.

Obesity variable is divided into central and general obesity. Central obesity is seen based on pelvic hip ratio (RLPP) or waist circumference, while general obesity is seen from body mass index (BMI). An abdominal anthropometric measurement was performed by measuring the circumference of the stomach through the middle of the iliac crest with the lower ribs horizontally and the hip circumference measuring through the middle of the

anterior superior iliac spine horizontally. Central obesity is defined when RLPP is greater than 0.90 in males. Body mass index (BMI) is measured using the formula of body weight in kilograms divided by the square of height in meters. General obesity is defined with BMI over 24.9 kg / m². The variables of dyslipidemia are characterized by abnormalities of one or more lipid profiles, increase in LDL cholesterol and triglyceride and decrease of HDL cholesterol. Both variables are then tested statistically using chi square test.

RESULTS

The research was conducted at the Universitas Lampung during August-October 2016. The subject was 30 male respondents for each central and general obesity group. The age of respondents was in the range of 35-55 years with average age of 42.9 years. From each obesity group, it is known that the average age of respondents that suffer from central obesity were 43.3 + 5.4 years; while the respondents suffering from general obesity were 42.8 + 4.8 years (Table 1).

Diagnostic of dyslipidemia is based on two of more abnormalities measurement of elevated of LDL-cholesterol and triglyceride levels and declined of HDL-cholesetrol. From measurement laboratory data were found men there were no significant prevalences of dyslipidemia in men with general obesity but men with central obesity have more tendencies to get dyslipidemia than central obesity.

Table 3 shows that respondents who have dyslipidemia of 66 respondents are 23 respondents or 34.8% in all type of obesity and respondents who do not have dyslipidemia about 43 respondents or 65.2%. Thus most of the male adult employees with obesity central and general at the Universitas Lampung does not suffer from dyslipidemia.

Table 3 also shows that respondents who have central obesity that suffered from dyslipidemia were 16 respondents (48.5%) and those who did not suffer from dyslipidemia were 17 respondents (51.5%),while respondents with general obesity who suffered from dyslipidemia were 7 respondents (21.2%) and who did not suffer dyslipidemia were 26 respondents (78.8%). The result indicated that

Table 1: Characteristics of age-based responders in adult male employees with obesity in the Universitas Lampung in 2016

Age	Mean	Mininum	Maximum
Central Obesity	43.3 years	35 years	55 years
General Obesity	42.8 years	35 years	51 years

Table 2: Characteristics of respondents based on elevated LDL-cholesterol (LDL-chol) and triglyceride levels and decline HD-choleseterol (HDL-chol) in male adult employees with obesity in the environment of the Universitas Lampung in 2016

No	Lipid profile		Obesity n=66	
			Central n= 33 (%)	General n= 33 (%)
1	LDL-Chol	Increase	51.2	46.1
		Normal	48.8	53.9
2	Tryglyseride	Increase	66.5	40.8
		Normal	33.5	59.2
3	HDL-chol	Decrease	57.1	50.6
		Normal	42.9	49.4

Table 3: Characteristics of respondents based on the incidence of central and general obesity

Obesity	Frequency (n=66)		Percentage (%)	
	(+)	(-)	(+)	(-)
Central	16	17	48.5	51.5
General	7	26	21.2	78.8
Total	23	43		

central obesity has a role in increasing the incidence of dyslipidemia greater than general obesity.

The result of chi square test gave p value of 0.039, which means p value is less than á = 0.05, thus it can be concluded that there is a significant difference of incidence of dyslipidemia between general obesity with central obesity in adult male employees with obesity in environment of Universitas Lampung in 2016.

Table 4: Chi square test results differences in incidence of dyslipidemia between general obesity and central obesity

Obesity	Dyslipidemia incident				Total		P-Value
	Yes		No				
	N	%	N	%	N	%	
Central	16	48.5	17	51.5	33	100	0.039
General	7	21.2	26	78.8	33	100	
Total	23	34.8	43	65.2	66	100	

DISCUSSION

Obesity is an overgrowth of triacylglycerol in fat tissue due to excessive energy intake compared to its use.[17] Obesity that persists during a certain period will cause disturbance in fatty acid metabolism which of because of increasing of body fat accumulation especially in visceral cavity that is called dyslipidemia. Dyslipidemia is a condition in which there is a blood lipid profile abnormality characterized by elevated total cholesterol, LDL and triglyceride levels or decreased HDL levels in the blood.[18]

Obesity has an impact on the emergence of various degenerative diseases. The risk of obesity triggers a fat metabolism disorder early in the fourth decade and increases with age.[19] Dyslipidemia occurs at age above 45 years for men.[20] Previous study in Chongqing, China revealed that the prevalence and risk factors associated with dyslipidemia increase at age 41 and getting higher with age increase.[21]

In obese people, there is an increase in total fat in the body. Such body fat deposits can occur in subcutaneous fat (general obesity) and visceral fat (central obesity). Visceral fat is widely present in the abdominal cavity known from the waist circumference. However visceral fats strongly correlate to dyslipidemia compared with subcutaneous fat. There are differences pathophysiology between two kind of adipose tissues, white adipose tissue (WAT) and brown adipose tissue (BAT). Visceral fat in central obesity have more white adipose tissue composition which have greater secretion of cytokines, chemokines and hormone-like proteins. This WAT is also found in the perivascular adipose tissue has a highly active organ secreting inflammatory cytokines such asinterleukin-1, tumor necrosis factor-á, proatherogenic chemokines, and proangiogenic peptide.[8,14]

Central and general obesities lead to greater abnormalities in the lipid profile of the presence of central or general obesity alone. Significant levels

showed higher triglyceride and LDL-C levels, and lower HDL levels in the central obese population with excess BMI. In other words, unfavorable lipid profiles are found along with obesity. This is supported by observations made when comparing the average lipid levels between the four groups classified on the basis of waist circumference criteria and BMI. Groups with normal waist circumference and normal BMI are on the most favorable spectrum of better lipid profile values. In groups with normal waist circumference, BMI increased or the opposite group showed an intermediate lipid profile score between the two extreme groups. Therefore, the presence of both seems to cause more abnormal lipid profiles than the presence of only one of these factors.[22]

The results of this study in accordance with previous studies of adult population in rural and urban areas in Bali found that the waist circumference is a very good predictor of metabolic syndrome in which the waist circumference is strongly associated with other metabolic syndrome components. Waist circumference is much better used as a predictor of metabolic syndrome compared with BMI. Central obesity is strongly associated with plasma adiponectin levels and is responsible for the incidence of dyslipidemia.[23]

Central obesity is also associated with a condition where the fat accumulation is in excess especially at visceral abdominal.[24] Central obesity relates stronger to the health risk compared to the general obesity[25] due to the increase of accumulation composition of excess white adipose tissue (WAT) in visceral fat tissue. Adipocyte cell in WAT produces much of cytokines that are proimflammation and prothrombosis triggering insulin resistance and oxidative stress.[26-28] The type of daily activity affecting the intake and usage energy also relates with the risk of obesity.

CONCLUSIONS

It was concluded that central obesity and general obesity were risk factors for dyslipidemia. Central obesity is associated with a stronger predictor of dyslipidemia compared with general obesity. There is a significant difference of incidence of dyslipidemia between general obesity and central obesity in adult male employees with obesity in environment of Universitas Lampung in 2016.

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