Comparison Malondialdehyde (MDA) Level between Obesity Non Metabolic Syndrome and Obesity with Metabolic Syndrome Patients

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Abstract: The main factor of metabolic syndrome in the development country is obesity. In normal weight the defences of antioxidant and counterparts are higher than obese patients it is correspond in reverse with central adiposity. The increasement of reactive oxygen or nitrogen species levels is one of the markers of obesity. In Human and mice there is correlation between systemic oxidative stress with fat accumulation. A biomarker that is commonly used to assess the oxidative stress is Malondialdehyde (MDA). This study purposed to analyze the comparison of MDA level between obesity non metabolic and obesity with metabolic syndrome patients in Murni Teguh Hospital, Medan, North Sumatera. Obesity patients with over 40 years old of age were participated in this research. They are examined by the weight, height, waist size and blood pressure. The clinical laboratory tests of fasting blood sugar and lipid profile was measured in Thamrin clinical laboratory, then we divided in to two groups which are obesity non metabolic syndrome and obesity with metabolic syndrome, after that we measured the MDA level. The data were analyzed using T-test and found that there was statistically significant difference between MDA level in obesity non metabolic syndrome and obesity with metabolic syndrome (p<0.005).

1 INTRODUCTION

One of a serious nutritional state is obesity. Because of obesity, the risk of the death that caused from several pathologies, such as hypertension, dyslipidemia, type 2 diabetes, coronary heart disease, stroke, non-alcoholic fatty liver and sleep apnea are increased. Obesity is categorized by Body Mass Index (BMI) that is formulated by dividing the weight (in kilograms) by the square of height (in meters). BMI is categorized by the mortality data of the caucasian, obesity is indexed by ≥ 30 kg/m2, overweight is indexed by > 25 kg/m2 (Buchwald and Oien, 2013). The main factor of metabolic syndrome in the development country is obesity (Montague and O'Rahilly, 2000), (Matsuzawa, 1999), (Spiegelman and Flier, 2001), (Kahn and Flier, 2000). Metabolic syndrome is a condition that characterized by visceralobesity, increasing trygliceride levels and glucose and decreasing *High Density Lipoprotein* (HDL) and hypertension that can cause a greater risk incidence of type 2 DM and cardiovascular deseases (Bassett and WHO, 2000), (Stern, 2004). Prevalences

of metabolic syndrome varies greatly it is caused by uniformity criterias that used to determine, ethnic difference, sex and age. It can be confirmed that metabolic syndrome likely to increase parallels with obesity or central obesity prevalences (Sargowoand Andarini, 2011), (Carr, 2004), (Pusparini, 2007).

Several different studies have shown a relation between changes in redox state and increased metabolic risk (Warolin, 2013), (Tran, 2012), (Krzystek-Korpacka, 2008), (Codoñer-Franch, 2012), (Hermsdorff, 2012), (Karaouzene, 2011). Accumulation of macrophage in adipose tissue is the frequent chronic condition that associates with metabolic dysfunction with oxidative stress state in the worldwide (Grundy, 2009). In obese patients increasing of reactive oxygen species (ROS) level and decreasing of defense mechanism (decreased antioxidant erzymes) will be marked as oxidative stress (Keaney., 2003), (Olusi, 2002). Oxidative stress may occur because the proliferation of apoptosis and endothelial cell, systemic inflammation and the increasement of vasoconstriction which individually or all together leads to endothelial

dysfunction (Huang, 2015). Lipid peroxidation (LPO) is a reaction that occurred between free radicals and *polyunsaturated fatty acid* on cell membrane structure, LPO is the process which free radicals take the unstable molecules from the lipids that will cause successive oxidations and leads to lipid instability, cell damage and the formation of malondialdehyde (MDA) (Olusi, 2002). (Tinahones, 2008). reported a significant decrease in antioxidant capacity in severely obese patients (Tinahones, 2008). The metabolic syndrome pathogenesis and various diseases commonly associated with oxidative stress (Brownlee, 2001). The most common biomarker that used to determine oxidative stress state in various diseases including psychiatry, asthma, chronic obstructive pulmonary disease, cardiovascular and many other diseases is malondialdehyde (MDA). The methods that frequently used to measure the MDA level in the biological fluids is Thiobarbitoric acid (TBA) assay and enzyme-linked immunoabsorbent assay (ELISA) (Zhang, 2002). One of the important indicator of LPO for many diseases that can be used is the monitoring of MDA levels in biological fluids. The endogenous formation of MDA during intracellular oxidative stress and its reaction with DNA forms MDADNA adducts which makes it an important biomarker of endogenous DNA damage. The methods that useful to predict the oxidative stress levels is to determinate the MDA levels in blood

plasma or tissue homogenates (Zhang, 2002). The MDA association with plasma lipoproteins alters the lipid structures via apoprotein or apoprotein lipid associations (Verma, 1985). Therefore this study purposed to analyze the comparison of malondialdehyde levels between obesity non metabolic syndrome and obesity with metabolic syndrome patients.

2 METHODS

This is a descriptive analytic with cross-sectional design study. Included 40 subjects consecutive sampling used to enroll the sample. The approval of this research was obtained from Health Research Ethical Committee, Medical Faculty of Universitas Sumatera Utara/ H. Adam Malik General Hospital by No: 263/TGL/KEPK FK USU-RSUP HAM/2018. The inclusion criteria were aged >40 years old, obesity people without medical history of diabetes or malignant disease. Subjects devided two groups, one group was obesity with metabolic syndrome and

other group was obesity without metabolic syndrome. Each group consisted of 20 subjects. To determine the subject of the metabolic syndrome and non metabolic syndrome we do the examination of the weight, height, waist size, blood pressure, and clinical laboratory tests such as blood sugar levels and lipid profile was done as well. After that we measured the MDA level by using ELISA (enzyme-linked immunoabsorbent assay) method. The data then analyzed using statisical analysis, T-test.

3 RESULT AND DISCUSSION

Table 1. Baseline characteristic of 40 subjects

	Obesity with metabolic syndrome	Obesity non metabolic syndrome	p
Age	53.9±11.3	44.55±10.8	
BMI	33.86±5.0	31.75±4.0	
Waist size	107±10	104±15	
FBG	101.85± 50.8	88.49±7.2	
HDL	63.2±23.85	46.05 ±6.99	
Trig	193.15±88.59	91.9±32.81	
Sistole	139.85 ± 16.3	123 ± 155	
Diastole	87± 8.4	81.3 ±9.1	
MDA	22.29±7.22	20.11±17.16	<0.005

The characteristic of the obesity subjects in this research are shown in the Table above. In this research the average age of the samples in group of obesity non metabolic syndrome is 44.55 years old and in group of obesity with metabolic syndrome is 53.9 years old, the average BMI of the samples in group of obesity non metabolic syndrome is $31.75 kg/m^2$ and in group of obesity with metabolic syndrome is 33.86 kg/m^2, the average waist size of the samples in group of obesity non metabolic syndrome is 104 cm and in group of obesity with metabolic syndrome is 107cm, the average FBS of the samples in group of obesity non metabolic syndrome is 88.9mg/dl and in group of obesity with metabolic syndrome is 101.85mg/dl, the average systole of the samples the samples in group of obesity non metabolic syndrome is 123mmHg and in group of obesity with metabolic syndrome is 139.85mmHg, the average diastole of the samples in group of obesity

non metabolic syndrome is 81.3mmHg and in group of obesity with metabolic syndrome is 87mmHg and the average MDA level of the samples in group of obesity non metabolic syndrome is 20.11 nmol/ml and in group of obesity with metabolic syndrome is 22.2 nmol/ml. This study purposed to analyze the comparison of malondialdehyde levels between obesity non metabolic syndrome and obesity with metabolic syndrome patients. The most common biomarker that used to determine oxidative stress state in various diseases including psychiatry, asthma, chronic obstructive pulmonary disease, cardiovascular and many other diseases is malondialdehyde (MDA). The imbalance between oxidants derivatives production and antioxidants defences will cause systemic oxidative stress. In this study we compared the oxidative stress parameters which is malondyaldehide in obesity non syndrome metabolic and obesity with syndrome metabolic (Lay, 2014). In present study, MDA level was increased as the grade of obesity increased which means higher in the obesity with metabolic syndrome group. Performed a similar study and reported that the concentration of MDA increased with increasing BMI, which MDA levels was found significantly higher in overweight subjects and obese subjects compared to normal-weight subjects (Sankhla, 2012). The presence of factors that accelerates free-radical production and loss or failure in neutralizing damaging processes (antioxidants) characterizes oxidative stress might be the cause. (Tinahones, 2008) reported a significant decrease in antioxidant capacity in severely obese patients (Tinahones, 2008). The metabolic syndrome pathogenesis and various diseases commonly associated with oxidative stress (Brownlee, 2001).

4 CONCLUSION

In our study we found there was significant difference between malondialdehyde levels in obesity non metabolic syndrome and obesity with metabolic syndrome (p<0.005).

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