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Comparison Ghrehlin at Obesity Without Metabolic Sydrome With Obesity with Metabolic Syndrome

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Abstract

Obesity is principal causative factor in the development of metabolic syndrome and Ghrelin as human natural hormones is involved in fundamental regulatory processof eating and energy balance. Obesity, which has become a global public health problem, is one of the major risk factors for development metabolic syndrome and type 2 diabetes mellitus.This study aimed to analyze the comparison of ghrelin hormone levels in obese with metabolic syndrome and obese non metabolic syndrome . The sample population is obese adults, then we examined the weight, height, waist size, blood pressure, laboratory tests such as blood sugar levels and lipid profile of sample population to separate obese with metabolic syndrome and obese non metabolic syndrome. After we determined each group we measured stress oxidative levels in blood in obese with metabolic syndrome and obese non metabolic syndrome by ELISA method.With statistical analysis using T test found that there was significant difference of ghrelin hormone levels between obese with metabolic syndrome and obese without metabolic syndrome ($p<0.005$).

Keyword: obesity,metabolic syndrome, ghrelin hormone

1. INTRODUCTION

The incidence of obesity increase rapidly as a result of inactive lifestyle. The energy thst used for daily activity decrease parallels along with advances in technology. Based on WHO data there are 1.6 billion adultswith overweight and 400 nmillion among them are obese (World Health Organization, 2015). Based on research data Riset Kesehatan Dasar in 2007 (Riskesdas, 2013), obesity prevalence in Indonesia generally in the population aged ≥ 15 years old is 10.3% (men 13.9% and women 23.8%)(Departemen Kesehatan RI, 2009). An individu determined as obese based on Body Mass Index (BMI) it is a simple index of weight–height relationship calculated as weight in (kg) divided by height in (m) squared. One is categorized as obese I when the BMI 25-29,9 and obese II when the BMI BMI >30. Metabolic syndrome is acondition 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 (World Health Organization, 2000; Stern M *et.al*, 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 (Sargowo D *et.al*, 2011; Carr DB *et.al*, 2004; Pusparini, 2007).

Ghrelin is a peptide hormone from stomach with growth hormone releasing activity. It is also able to modify glucose and insulin metabolism, blood pressure levels,abiogenesis, and inflammatory processes in experimental conditions.

Ghrelin is a peptide hormone comparising 28 amino acids from a 94 long amino acid precursor proghrelin. It is an orexigenic hormone. It is produced by x/A cells of oxyntic glands present in the mucosal layer of the fundus region odf stomach. A great deal of evidence suggests that ghrelin is involved in development of metabolic syndrome and type 2 diabetes mellitus. Ghrelin plays also important role in cardiovascular system. The recent literature suggests that in addition to food intake

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and energy balance, ghrelin also controls glucose metabolism.Furthermore, current evidence suggests that ghrelin could contribute to the metabolic syndrome. It has been shown that ghrelin concentrations are reduced in different pathofisiological conditions including obesity, type 2diabetes and other conditions with metabolic disturbances. Low ghrelin concentrations are also associated with higher prevalence of the metabolic syndrome with progressively lower ghrelin levels in relation to the number of components of the metabolic syndrome (O.Ukkola *et.al*, 2009; .S.M.Poykko *et.al*, 2010). It has been shown that ghrelin concentrations are reduced in different pathophysiological conditions including obesity, type 2 diabetes, and other conditions with metabolic disturbances (.R. Barazzoni *et.al*, 2007). Ghrelin regulates homeostatic food intake, hedonic eating, and is a mediator in the stress response. Total plasma ghrelin and its associations with food intake, hedonic eating, and stress are decreased in obesity, providing evidence consistent with the theory that central resistance to ghrelin develops in obesity and ghrelin's function in appetite regulation may have evolved to prevent starvation in food scarcity rather than cope with modern food excess. Furthermore, ghrelin is associated with metabolic and cardiovascular health, and may have anti-aging effects, but these effects may be attenuated in obesity (Buss J *et.al*, 2014). Ghrelin is the only known circulating orexigenic factor, and has been found to be reduced in obese humans (Alvarez-Castro P *et.al*, 2013).

The aim of this study to analyze the comparison ghrelin hormone level at obesity with metabolic syndrome and obesity without metabolic syndrome.

2. MATERIAL AND METHODS

This study involved 40 obesity subjects, all of whom were in good health. All subjects gave informed consent. This research was approved by Health Research Ethical Committee, Medical Faculty of Sumatera Utara/HAM General Hospital by Number 595/TGL/KEPK FK USU-RSUP HAM /2016. The inclusion criteria were the 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 whether the subject of the metabolic syndrome so examination of weight, height, waist size, blood pressure, laboratory tests such as blood sugar levels and lipid profile. Average age samples of obesity with metabolic syndrome 43.9±11.3 years and average age sample of obesity non metabolic syndrome 34.55±10.8 years

Assays

All the samples we examined ghrelin hormone level in the serum by ELISA method. Collect plasm with EDTA-Na_2 as anticoagulant. Centrifuge samples for 15 minutes at 1000xg at 2-8^{0}C within 30 minutes of collection.Collect the supernatant and carry out the assay immediately. Dilute plasm 1:10, dilute 30 ml of concentrated wash buffer into 750 mL of wash Buffer with deionized or distilled water. Put unused solution back at 4^{0}C. If crystals have formed in the concentrate, we can warm it with 40^{0}C water bath.Incubate for 45 minutes at 37^{0}C, aspirate and wash 3 times, add 100 µL SABC (Streptavidin Conjugate) working solution into each well.Incubate 30 minutes at 37^{0}C aspirate and wash 5 times, add 90 µL TMB, incubate 15-20 minute at 37^0 C and then add 50µL stop solution and read at 450 nm immediately and calculation.

Stastical Analysis.

Statisical analysis was done using Microstat Statistical programme on an IBM compatible computer. T-tes was use compare T test found that there was significant difference of ghrelin hormone levels between obese with metabolic syndrome and obese without metabolic syndrome ($p<0.005$).

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3. RESULT AND DISCUSSION

The characteristics of the subjects of this research are shown in Table 3.1. Subjects in this research were not 20 years old. Body Mass Index (BMI) in the samples used in both obesity with metabolic syndrome and obesity non metabolic syndrome is >27, in this research the waist size of the samples at the obesity with metabolic syndrome found from 89- 119 cm and waist size of the obesity non metabolic syndrome found 97- 117 cm. Fasting Blood Gucose (FBG) in the obesity non metabolic syndrome samples were normal but the obesity with metabolic syndrome range from low to the moderately elevated range. Profile lipid like HDL value of the samples of obesity with metabolic syndrome range 34-60 mg/dL and HDL value of the samples of obesity non metabolic syndrome range 46-162 mg/dL. Trigliseride value of the samples of obesity with metabolic syndrome range 91-452 mg/dL and obesity non metabolic syndrome was 46-162mg/dL. Dividing sample group in to obesity with metabolic syndrome and obesity non metabolic syndrome base on 3 criteria from 5 criteria, that are WS >102 cm at male and >88 at female, trigliseride levels ≥ 150mg/dL, HDL < 40mg/dL at male and <50 mg/dL at female, Blood Pressure (BP) ≥130/85 Hg, so can be categorized as obesity with metabolic syndrome or obesity non metabolic syndrome. The result of measuring ghrelin hormone was found the lower value at obesity with metabolic syndrome was 414,56 pg/ml and the highest value at obesity with metabolic syndrome was 709,14 pg/ml and the lower value at obesity non metabolic syndrome was 801,20 pg/ml and the highest was 1335,9 pg/ml.

	Obesity with metabolic syndrome	Obesity non metabolic syndrome
Age	43.9±11.3	34.55±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
Ghrelin hormone	561±314.7	1068±571.3

Table 3.1. Baseline characteristic of the 40 samples

This study aimed to analyze the ghrelin hormone levels in obese with metabolic syndrome and obese non metabolic syndrome,so we used the statistical analysis with T test found that there was significant difference of ghrelin hormone levels between obese with metabolic syndrome and obese without metabolic syndrome ($p<0.005$).This study ghrelin hormone value was highest at obesity without metabolic syndrome and the lower value we found at obesity with metabolic syndrome . Like the preview study that low plasma ghrelin levels are associated with elevated fasting insulin levels and insulin resistance, suggesting both physiological and pathophysiological roles for ghrelin. For this reason, at least theoretically, ghrelin and/or its signalling manipulation could be

useful for the treatment or prevention of diseases of glucose homeostasis such as type 2 diabetes (Sangiao-Alvarellos S *et.al*, 2010).

Current evidence suggests that ghrelin could contribute to the metabolic syndrome (M. Tsch¨op *et.al*, 2001; Tomomi Shiiya *et.al*, 2002). It has been shown that ghrelin concentrations are reduced in different pathophysiological conditions including obesity, type 2 diabetes, and other conditions with metabolic disturbances. Research by Matthias Tschop et al showed that plasma ghrelin concentration has been shown to be lowerin obese Caucasians when compared with lean Caucasians, like research by Tomomi Shiiya et al showed that plasma ghrelin concentration were higher in patients with anorexia nervosa and lower in patients with simple obesity compared with normal –weight control subjects. In my research was not done in lean samples but just at obesity with metabolic syndrome and obesity without metabolic syndrome, and we found that the obesity with metabolic syndrome was lower ghrelin levels than obesity without metabolic syndrome. As we know that Current evidence suggests that ghrelin could contribute to the metabolic syndrome. It has been shown that ghrelin concentrations are reduced in different pathophysiological conditions including obesity, type 2 diabetes, and other conditions with metabolic disturbances. Circulating ghrelin concentrations are also reduced in healthy off spring of type 2 diabetic patients (Ostergard T *et.al*, 2003).

4. CONCLUSION

The result this study shows that there was significant difference of ghrelin hormone levels between obese with metabolic syndrome and obese without metabolic syndrome ($p<0.005$).

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