Relationship of Body Mass Index (BMI) and Insulin Resistance on Patients Diabetes Mellitus Type-2 in Lampung

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1. Introduction

It is estimated that in 2035 there will be 592 million people in the world [l]. Indonesia is the 4th country in the world after the United States, India and China whose population suffers from diabetes [2].

Diabetes Mellitus type-2 is the most in Indonesia. Diabetes Mellitus is a disease caused by a disorder that occurs in the pancreas organ which is characterized by an increase in blood sugar levels or often referred to as the condition of hyperglycemia caused by insulin resistance or insulin [3].

Two of the several risk factors for DM type-2 are insulin resistance and BMI. Insulin resistance occurs due to a decrease in the ability of the hormone insulin to work effectively on peripheral target tissues (especially in the muscles and liver). Weight gain can also cause insulin resistance.

A study showed that in a non-DM, there was also a decrease in insulin receptor sensitivity when his Body Mass Index (BMI) increased from 18 kg/m2 to 38 kg / 1112.

This increase in insulin resistance seems to be closely related to the amount of fat tissue in the body cavity. The BMI results of >25 that fall into the excess weight category need to be watched out. excess body weight is a risk factor that plays an important role in DM type-2 disease [4].

Based on a study using Garcinia atroviridis is not enough to reduce NIDA levels despite a decrease in BMI, therefore obesity is still a factor in the influence that affects DM Type 2 [5].

2. Method

This study used a cross-sectional comparative study analytic observation design.

The variables to be examined are only measured on one measurement, then the presence or absence of a relationship between variables with one another. Sampling was carried out at the family doctor's clinic in Lampung, to use Notoadmodjo methode [6].

The subjects in this study amounted to 44 patients DM type-2 with obesity and 44 non-DM and non-obese patients, taking samples with research variables namely body mass index (BMI) and insulin resistance (HOMA IR).

For BMI data by measuring height and weight in patients, according to the formula weight (kg) divided by height squared (in meters). While insulin resistance data (HOMA IR) was carried out as much as 3 ml of blood in patients DM type-2 and non DM for blood glucose and fasting insulin examination.

Furthermore, fasting insulin examination was carried out using the enzyme-linked immunosorbent assay (ELISA) method. Examination of insulin resistance (HOMA IR) was calculated using the fasting insulin formula (g ul / ml) x fasting glucose (mmol / l) divided by 22.5. Then continued with statistical analysis using T-test.

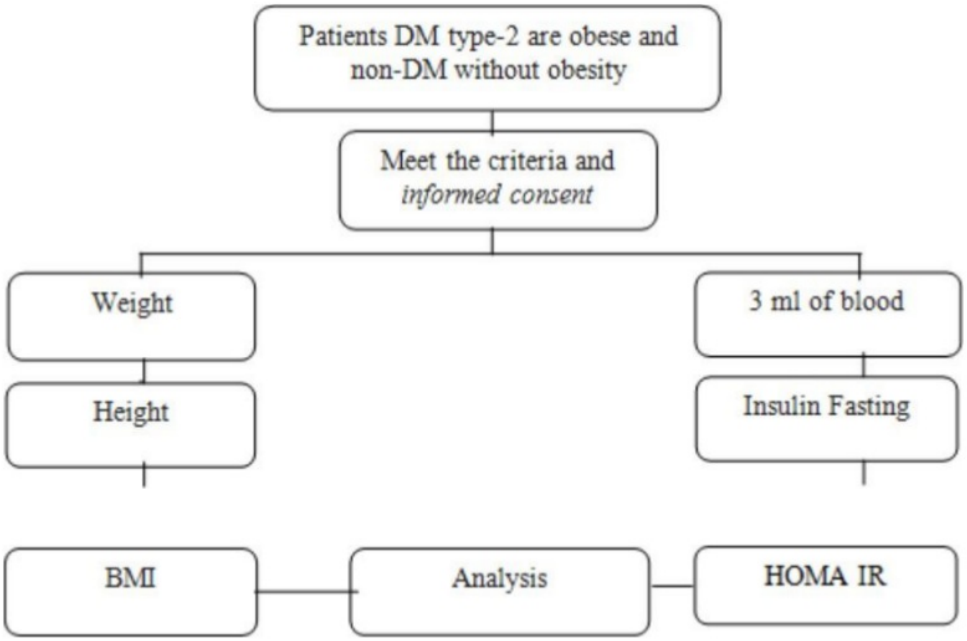

Figure 1: Research Flow

3. Result

The results of the HOMA IR analysis in patients DM type-2 with control patients in the study subjects are presented in table I.

Table 1: Different average HOLMA IR results between patients DM type-2 with controls

HOMA IR	N	Mean	SD	P
DIM tipe-2	44	5,48	5.36	0.00
Control	44	3,58	1,89	

The results of statistical analysis of BMI in patients DM type-2 with a control group of research subjects are presented in table 2.

Table 2: Different average BMI results between type-2 DM with controls

BMI	N	Mean	SD	P
DM tipe-2	44	25.77	2.20	0.001
Control	44	21.70	1.34	

Based on the table it can be seen that the average BMI data in patients DM type-2 is 25.77 with a standard deviation of 2.20, whereas in the control group the BMI data is 21.70 with a standard deviation of 1.34. The results of the statistical test obtained a value of p = 0.001, a = 5%, so there was a significant relationship between BMI in patients DM type-2 and the control group.

4. Discussion

In this study the results showed that there was a significant relationship between DM type-2 with HOMA IR. In accordance with Bonora E [7] study that insulin resistance in DM type-2 was identified using HOMA IR. The HOMA-IR formula is a validated method of assessing insulin resistance in patients with diabetes mellitus. The relationship between insulin resistance and HOMA IR is very strong. Yates T [8] study that HOMA IR affects DM type-2.

In this study, it was found that there was a significant relationship between DM type 2 and BMI. In line with [9] study that more weight (BMI) was associated with DM type-2, then according to Al-Naemi AH [10] in Iraq that BMI is a risk factor that affects DM type-2. The results of this study are in line with the research conducted by Jelantik IGM [Il] In which stated that there was a relationship between body mass index and the incidence of type 2. DM type-2 research by Bays HE [12], stating that there was an association between body mass index which increased with prevalence DM type-2, most commonly in individuals with BMI>40.4 Research conducted by Ninh T. Nguyen, Xuan-Mai T Nguyen, John Lane, and Ping Wang in Relationship Between Obesity and Diabetes in US Adult Population shows the presence significant relationship between obesity and the occurrence of DM type-2.

According to research [14] that a history of obese people has a risk of 7.14 times being exposed to DM type 2 compared to those who do not have obesity according to the results of the study date [15] shows that almost half of respondents have mild BMI overweight and most of the respondents had more than average blood sugar levels. In obese adults causes insulin receptors in target cells in the whole body to be less sensitive. Health workers must regularly check blood sugar for diabetics, provide counseling about a balanced nutrition diet, and other efforts that can stabilize blood sugar. So the incidence of DM type 2 is related to body mass index in each patient, whose average high blood sugar level occurs in patients who have more weight.

5. Limitations

I am grateful that this research has achieved the expected goals but there are some limitations that I have experienced that are short time and the difficulty of finding patients suffering from DM type 2 who are still obese.

6. Conclusion

Based on the results of research conducted in Lampung it can be concluded that insulin resistance and BMI have a significant relationship with patients DM type-2.

6. Recommendation

From the results, it was shown that HOMA IR and BMI could be used for diagnostic diabetes mellitus type 2, HOMA IR and BMI are factors for the occurrence of DM Type 2.

Acknowledment

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