

CORRELATION BETWEEN OBESITY AND TYPE 2 DIABETES MELLITUS USING PPAR γ 2 GENE VARIAN

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ABSTRACT : Obesity is caused by dietary, environmental and genetic factors, with various complications capable of causing inflammation, insulin resistance, hypertension and type 2 diabetes mellitus (type 2 DM). However, peroxisome proliferator activator receptor γ (PPAR γ) are genetic variations that influence type 2 DM. Therefore, this study aimed at determining the genetic variation of PPAR γ 2 gene in DM and non-DM obsessed patients using the analytic observation and cross sectional approaches. A total of 88 patients consisting of 44 type-2DM patients and non-DM patients were used to conduct this research. Microtoise and weight scales were the instruments used to measure the body mass index, while PPAR γ 2 gene examination used DNA isolation method with PCR. Furthermore, the electrophoresis and results of all samples in sequencing were used to determine the effect of PPAR γ 2 genes and statistical tests using Chi-Square analysis. The results of statistical tests on the PPAR γ 2 polymorphism genotype in the DM group were found to be 100% Pro12pro, while the ala12ala and pro12ala contained no genotype. The control group found 84.1% pro12pro wild type genotype, 13.6% pro12ala and 2.3% ala12ala. BMI statistical test results obtained $p = 0,000$, $\alpha = 5\%$, therefore, there is a significant relationship between BMI in type 2 DM patients with the control group. Based on the results of the study it is concluded that the variation of PPAR γ 2 Pro12pro gene and body mass index obesity have a significant relationship with people living with type 2 diabetes.

Key words : Body mass index, diabetes mellitus type-2, insulin resistance.

INTRODUCTION

Obesity is a multifactorial health problem caused by diet, environmental and genetic or hereditary factors (Albuquerque, 2015). Its prevalence throughout the world raises various complications such as inflammation, insulin resistance, atherosclerosis, cardiovascular disorders, hypertension and diabetes mellitus (ADA, 2017). In addition to environmental and genetic factors, the genetic variation which has shown to affect type 2 DM is the Peroxisome Proliferator Activator Receptor γ (PPAR γ) gene (Costa, 2010). This gene regulates transcription factors, which consists of 3 isoforms, namely γ 1, γ 2, γ 3, and functions as a transcription factor which activates fat as well as adipocyte. There is a strong relationship between the PPAR γ gene and obesity (Tehernof, 2013)

METHODS

This is a cross-sectional comparative study with an analytic observation design. The variables examined were measured with the presence or absence of a relationship. Furthermore, sampling was carried out at the family

doctor's clinic in Lampung, using the Notoadmodjo method (Notoatmodjo, 2010). The subjects in this study were 44 obsessed patients of type-2 DM and 44 non-DM patients, using the body mass index (BMI). A blood sample of 5 cc was extracted from each group using PCR SNP rs1901282. In the next step the entire sample was sequenced at the Unand FK Biomedical Laboratory with data analyzed.

RESULTS

The results of statistical analysis using BMI on type-2 DM patients in the control group of the research subjects are presented in Table 1.

The statistical analysis results of PPAR γ 2 polymorphism genotype variation in Type -2 DM and Control are given in Table 2.

Based on Table 1, the average BMI data in patients living with type-2 DM is 25.77 with a standard deviation of 2.20, while in the control group it is 21.70 and 1.34, respectively. The results of the statistical test obtained a value of $p = 0.001$, $\alpha = 5\%$, with a significant relationship

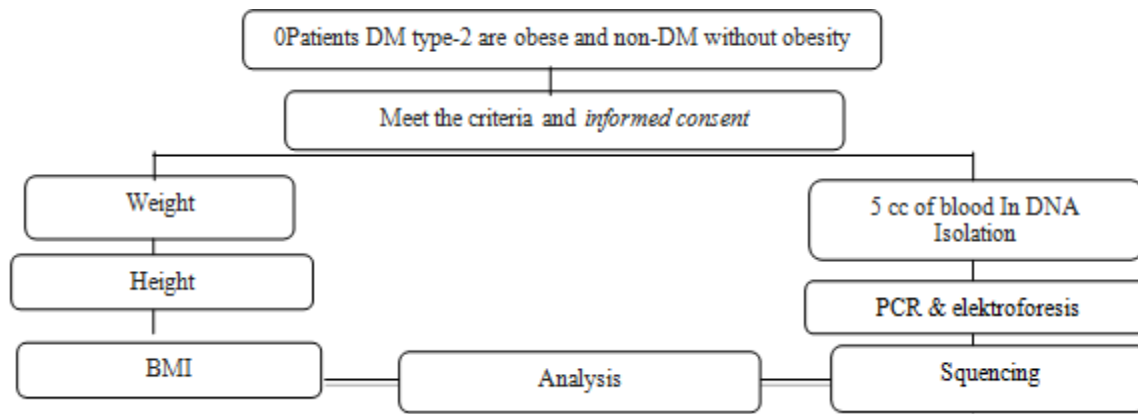


Fig. 1 : Research flow.

Table 1 : 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	

Table 2 : Different average of PPARα2 polymorphism genotype variation in Type -2 DM and Control

Group	Genotype variant (%)		
	Pro12pro	Pro12ala	Ala12ala
Obsessed + type 2 DM	100	0	0
Non obsessed with type-2 DM	84,1	13,6	2.3

between BMI living with type-2 DM and the control group. In Table 2, patients living with type-2 DM had 100% Pro12pro while Pro12ala and Ala12ala were not found. In the control group, 84.1% of the wild type were found, with 13.6% pro12ala and 2.3% Ala12ala genotypes found.

DISCUSSION

In this study, all samples of type 2 DM accompanied by obesity had variations in the pro12pro genotype, which showed that 100% of the sample had a pro12pro genotype variant. This proves it occurs in decreasing fatty acids which disrupts insulin receptor, thereby, leading to resistance in blood glucose and type 2 DM. While genotype variations in the control group varied with the dominating number of wild type C or pro12pro, leaving the rest as a variant of pro12ala and ala12ala. In the control group pro12pro were 84.1%, pro12ala 13.6% and ala12ala, 2.3% genotype. The genotype with the highest value is pro12pro, which is in accordance with research conducted by Yates *et al* (2015). Furthermore, the genotype results of pro12pro 82%, pro12ala 17% and ala12ala 1% was in line with studies carried out by Bonora *et al* (2000) in Turkey on PPARα2 gene using 3 variants namely wild type, heterozygous and homozygous.

In this study, pro12pro is a variation found in all obese

patients with type 2 diabetes. Furthermore, in line with the research conducted by Vergotine *et al* (2010), pro12pro is the genotype commonly found in type 2 DM patients, with those obsessed with 3 possibilities PPARα2 gene genotype, namely Pro12pro, Pro12ala and Ala12ala. The pro12pro genotype triggers the occurrence of type 2 DM, while pro12ala and Ala12ala genotypes protect the body against its occurrence. This study found variations in pro12ala and ala12ala genotypes, which are protective factors for type 2 DM patients.

Obesity is excess body fat which causes weight gain, and associated with the occurrence of type 2 diabetes. In this study, the relationship between type-2 DM with body mass index and weight were in accordance with the results of the study conducted by Lipoto *et al* (2007). Furthermore, there was a close relationship between obesity and type 2 DM, which Al-Naemi defined as a risk factor. Alanine alleles increase free fatty acids in the blood with rise in insulin sensitivity. The mechanism increases insulin sensitivity by raising the regulation of metabolic pathways which increases the uptake of adipocytes in the circulation of fatty acids as well as the stimulation of adipogenesis and body weight. According to research conducted by Trisnawatiin (2012), family history, physical activities, age, stress, blood pressure and cholesterol are associated with the occurrence of type 2 diabetes and obsessed people with a risk of 7.14.

Limitations

This research achieved the expected goals, however, the short timeframe and the difficulty in locating patients suffering from type 2DM were the limitations experienced.

CONCLUSION

Type-2 DM is association with obesity through the PPARα2 gene pro12pro variant

Recommendation

From the results of the study, it was shown that obesity and PPAR α 2 genes are factors of Type-2 DM.

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