Jurnal Analis Medika Biosains (JAMBS)
Vol.12, No.01, March 2025, pp. 27-32 http://jambs.poltekkes-mataram.ac.id/index.php/home
E-ISSN: 2656-2456 DOI: https://doi.org/10.32807/jambs.v12i1.369

Differences In Lipid Profiles In Diabetes Mellitus Patients Based On Cigarette Consumption

Fihiruddin[1], Ananda Kinanti Putri[2], Siti Zaetun[3], Maruni Wiwin Diarti[4]
[1-4] Department of Medical Laboratory Technology, Poltekkes Kemenkes Mataram, Indonesia
*Email: fihir.analis79@gmail.com

Article Info

Article history :

Received June 10th 2024
Revised March 13th 2025
Accepted March 17th 2025

Keyword :

Diabetes Mellitus
Lipid Profile
Cigarettes

ABSTRACT

Diabetes mellitus (DM) is a metabolic condition characterized by hyperglycemia and abnormalities in protein, lipid and carbohydrate metabolism. Smoking is one thing that can cause DM. Smoking as a risk factor for insulin resistance. An increase in lipid profile is directly related to insulin resistance, which increases blood sugar levels by increasing lipolysis and decreasing lipogenesis in fat cells. To determine differences in lipid profiles (total cholesterol, HDL, LDL, triglycerides) in diabetes mellitus sufferers based on cigarette consumption. This research is Analytical Observational using secondary data with an approach Cross Sectional. The sampling method used in this research was purposive sampling. Data was collected using medical record data on the lipid profile of 48 samples of diabetes mellitus sufferers who consumed cigarettes and analyzed using statistical tests Paired Sample t-test. Were that the mean levels of total cholesterol, HDL, LDL and triglycerides in diabetes mellitus patients who consumed less than 20 cigarettes per day were 228.8 mg/dL, 49 mg/dL, 127.4 mg/dL and 144.4 mg/dL. The mean levels of total cholesterol, HDL, LDL and triglycerides in diabetes mellitus sufferers who consumed more than 20 cigarettes per day were 185.3 mg/dL, 32.7 mg/dL, 116.7 mg/dL and 148 mg/dL. There is a significant difference between the HDL lipid profile in diabetes mellitus patients who consume less than 20 cigarettes per day and more than 20 cigarettes per day.

INTRODUCTION

Diabetes is a non-communicable degenerative disease whose prevalence continues to increase every year. According to data International Diabetes Federation (2015), 415 million people worldwide are estimated to suffer from diabetes mellitus. In 2040, it is estimated that there will be around 642 million people suffering from diabetes mellitus (Harahap, 2021). According to predictions World Health Organization (WHO), the incidence of diabetes in Indonesia could increase significantly from 8.4 million cases in 2000 to 21.3 million cases in 2030 (Pinakesty & Azizah, 2020). Based on the results of the 2018 NTB Basic Health Research (RISKESDAS), the prevalence of diabetes mellitus in NTB province in 10 city districts was 1.16% and East Lombok district was 1.08% (Riskesdas NTB, 2018).

Diabetes mellitus (DM) is a metabolic condition characterized by hyperglycemia and abnormalities in protein, lipid and carbohydrate metabolism. If diabetes sufferers are not treated properly, it will cause damage to various body organs and affect small blood vessels (kidneys) and large blood arteries (heart, brain and feet). This condition may increase the risk of coronary artery disease (Firdayanti et al., 2017).

How to cite: Fihiruddin, F., Putri, A., Zaetun, S., & Diarti, M. (2025). Differences In Lipid Profiles In Diabetes Mellitus Patients Based On Cigarette Consumption. *Jurnal Analis Medika Biosains (JAMBS), 12*(1). doi:https://doi.org/10.32807/jambs.v12i1.369

One of the causes of cardiovascular disease is a person's smoking habit, more than 4000 chemicals and 43 carcinogenic substances are found in cigarettes. These ingredients cause the release of hormones involved in fat metabolism, increasing lipolysis processes and the production of free fatty acids in the blood. The liver then produces large amounts of lipoproteins to transport these free fatty acids (Qoridisa et al., 2018).

According to data from the Central Statistics Agency, the percentage of smoking aged ≥ 15 years in West Nusa Tenggara province continues to increase from 2020 to 2022. In 2020 it was 30.58%, then increased to 32.71% in 2021 and in 2022 will increase again by 33.20% (8). Meanwhile, according to the 2018 NTB Basic Health Research Results (RISKESDAS), the prevalence of smoking among residents ≥ 10 years old in East Lombok is 25.79% (Riskesdas NTB, 2018).

Smoking is one of the bad habits of society that can cause DM. Smoking can affect the way the body processes glucose, which can cause DM. Smoking is a risk factor for insulin resistance (Seifu, 2015). An increase in lipid profile is directly related to insulin resistance, which increases blood sugar levels by increasing lipolysis and decreasing lipogenesis in fat cells (Suyatno et al., 2021). According to several studies, smoking can reduce anti-atherogenic HDL cholesterol and increase levels of triglycerides, LDL and total cholesterol in blood serum. This is because nicotine, the main ingredient in cigarettes, has the ability to increase catecholamine secretion thereby increasing lipolysis. As a result, triglyceride, cholesterol and VLDL levels increase, while HDL levels decrease (Raditya et al., 2019).

Based on Samudra's et al., 2021 research shows that the HDL cholesterol levels of diabetes mellitus sufferers in active smokers are lower than those of passive smokers and the total cholesterol levels of diabetes mellitus sufferers of active smokers are higher than those of passive smokers, however in this study a complete lipid profile examination was not carried out, so research is needed further to find out whether there are differences in lipid profiles in the form of total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides in diabetes mellitus sufferers based on the number of cigarettes consumed per day.

MATERIALS/METHOD

The research carried out was research with a cross sectional research design. The research was carried out at RSUD Lombok Timur, from October to March 2024. The population in this study was all medical record data of diabetes mellitus patients at RSUD Lombok Timur who had a lipid profile examination, totaling 48 people. The sample in this study was all lipid profile data for diabetes mellitus sufferers who consumed cigarettes at RSUD Lombok Timur, totaling 48 samples. The independent variable in this study is cigarette consumption. The dependent variable in this study is the lipid profile in diabetes mellitus sufferers. The results of examining lipid profiles in diabetes mellitus sufferers based on cigarette consumption are presented in tabular form and then the data obtained is analyzed statistically using the paired sample t-test.

RESULTS AND DISCUSSION

The results of examining lipid profile levels in diabetes mellitus sufferers who consume less than 20 cigarettes per day and more than 20 cigarettes per day can be seen in tables 1 and 2 below.

Table 1. Results lipid profile examination based on cigarette consumption less than 20 cigarettes per day

No.	Kode Sampel	Pemeriksaan profil lipid pada penderita DM yang mengkonsumsi rokok <20 batang perhari dalam satuan mg/dL			
		Chol-total (mg/dL)	HDL (mg/dL)	LDL (mg/dL)	TG (mg/dL)
1.	AH	209.3	36	120	62
2.	AQ	142.7	30	82	155
3.	N	275.9	87	165	121
4.	H	329.2	67	70	62
5.	S	183.4	58	51	172
6.	DA	199	55	130	72
7.	F	320.6	51	208	309

No.	Kode Sampel	Pemeriksaan profil lipid pada penderita DM yang mengkonsumsi rokok <20 batang perhari dalam satuan mg/dL			
		Chol-total (mg/dL)	HDL (mg/dL)	LDL (mg/dL)	TG (mg/dL)
8.	AS	193.1	59	117.1	85
9.	S	309.2	76	186.6	233.3
10.	J	246.2	50	54	130
11.	HS	193.4	58	51	121
12.	M	212.8	69	95	242
13.	MAF	190	40	120	65
14.	B	214.5	43	151	105
15.	R	184.4	49	118	88
16.	J	303.7	36	240	137
17.	LM	140.3	32	121	114
18.	S	169.9	46	144	64
19.	ZA	399.8	33	225	150
20.	MO	179.3	37	113	149
21.	S	264.9	43	98	274
22.	M	205.8	43	140.4	112
23.	ZI	269.3	41	171	285
24.	RM	156.5	38	87	159
Rerata		228.8	49	127.4	144.4

Table 2. Results lipid profile examination based on cigarette consumption more than 20 cigarettes per day

No.	Kode Sampel	Pemeriksaan profil lipid pada penderita DM yang mengkonsumsi rokok >20 batang/hari dalam satuan mg/dL			
		Chol-total (mg/dL)	HDL (mg/dL)	LDL (mg/dL)	TG (mg/dL)
1.	RM	176	42	127	38
2.	A	250.5	35	203	65
3.	T	187.2	27	150	49
4.	A	130.1	25	87	90
5.	H	215.6	39	170	34
6.	B	170	36	124	50
7.	AQ	146.7	30	82	155
8.	J	294	23	221	253
9.	MN	122.3	25	78.5	94
10.	MS	165.7	20	93	264
11.	M	133	30	83	99
12.	M	138.2	17	71	253
13.	R	196.3	37	108	258
14.	SA	233.1	39	143	254
15.	S	142	32	90	99
16.	R	149.2	23	94	162
17.	S	174.6	38	36	150
18.	MH	233.1	39	143	254
19.	S	212.4	34	152	132
20.	S	188.7	35	140	120
21.	AQ	130.2	35	51	222
22.	M	223.5	41	151	135
23.	R	243.2	45	156	212
24.	ZI	192.5	40	48	112
Rerata		185.3	32.7	116.7	148

Based on the results of lipid profile examinations (total cholesterol, HDL, LDL, triglycerides), diabetes mellitus sufferers who consume less than 20 cigarettes per day have a higher mean

difference in total cholesterol levels, namely 19%, HDL, namely 33%, and LDL, namely 8%. Meanwhile, for cigarette consumption of more than 20 cigarettes per day, a higher mean difference in TG levels was found, namely 2%.

The results of examining lipid profile levels in diabetes mellitus sufferers based on cigarette consumption were analyzed using statistical tests, where the first test carried out was the normality test method. Shapiro-Wilk.

Table 3. Test Statistics Paired Sample t-test total cholesterol lipid profile

Paired Differences									
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2 tailed)
Pair 1	Chol-total <20 batang/hari - Chol-total >20 batang/hari	43.5083	91.9685	18.7730	4.6734	82.3432	2.318	23	0.30

Based on the results of table 3 statistical tests Paired Sample t-test The above total cholesterol lipid profile results were obtained p-value (0.30) > 0.05, then Ho is accepted and Ha is rejected, meaning that it can be said that there is no difference in the total cholesterol lipid profile in diabetes mellitus sufferers based on cigarette consumption.

Table 4. Statistical Test Paired Sample t-test HDL lipid profile

Paired Differences									
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2 tailed)
Pair 1	HDL<20 batang/hari - HDL >20 batang/hari	16.250	19.996	4.082	7.806	24.694	3.981	23	0.001

Based on the results of table 4 statistical tests Paired Sample t-test for the HDL lipid profile above, the p-value (0.001) < 0.05, then Ho is rejected and Ha is accepted, meaning that it can be said that there is a difference in the HDL lipid profile in diabetes mellitus sufferers based on cigarette consumption.

Table 5. Statistical Test Paired Sample t-test LDL lipid profile

Paired Differences									
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2 tailed)
Pair 1	LDL<20 batang/hari - LDL >20 batang/hari	10.6917	68.4597	13.9743	-18.2163	39.5996	.765	23	0.452

Based on the results of table 5 statistical tests Paired Sample t-test LDL lipid profile above, the p-value (0.452) < 0.05, then Ho is accepted and Ha is rejected, meaning that it can be said that there is no difference in the LDL lipid profile in diabetes mellitus sufferers based on consumption. cigarette.

Table 6. Statistical Test Paired Sample t-test triglyceride lipid profile

Paired Differences									
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2 tailed)
Pair 1	TG <20 batang/hari - TG >20 batang/hari	-3.6542	100.7116	20.5577	-45.1809	38.8726	-178	23	0.860

Based on the results of table 6 statistical tests Paired Sample t-test for the TG lipid profile above, the p-value (0.860) < 0.05, then Ho is accepted and Ha is rejected, meaning that it can be said that there is no difference in the TG lipid profile in diabetes mellitus sufferers based on consumption. cigarette.

Based on the statistical tests carried out, the results were obtained of this study showed that there were no significant differences in the lipid profile levels of total cholesterol, LDL and triglycerides in diabetes mellitus sufferers based on their daily cigarette consumption. Meanwhile, there are significant differences in the HDL lipid profile levels of diabetes mellitus sufferers based on their daily cigarette consumption.

According to several studies, smoking can reduce anti-atherogenic HDL cholesterol and increase levels of triglycerides, LDL and total cholesterol in blood serum. This is because nicotine, the main ingredient in cigarettes, has the ability to increase catecholamine secretion thereby increasing lipolysis. As a result, triglyceride, cholesterol and VLDL levels increase, while HDL levels decrease (Raditya et al., 2019). In the results of research that has been carried out, namely for total cholesterol, LDL and triglyceride levels, the results showed that there were no significant differences based on daily cigarette consumption, in accordance with previous research, showing that the differences in HDL and LDL levels were not significant between smokers and non-smokers. It can be caused by several factors, namely age, diet, physical activity, body weight, waist and hip ratio, psychological disorders, and genetic diversity (Al-Jaf & Al-Jaf, 2020). The lipid profile levels of diabetes mellitus sufferers are also often abnormal, causing the effect of smoking to be less significant on the lipid profile levels of diabetes mellitus sufferers, because they already have abnormal lipid metabolism before (Pratiwi, 2022).

According to Arum Pravitasari, 2021 an increase in the number of cigarettes consumed every day can increase the levels of nicotine and free radicals absorbed by the body which can worsen the serum lipid profile of smokers. Where this opinion is in line with the results of research that has been carried out on differences in lipid profiles in diabetes mellitus sufferers based on cigarette consumption on HDL lipid profile levels, where significant differences were found in HDL lipid profile levels in diabetes mellitus patients who consumed less than 20 cigarettes per day and those who consumed less than 20 cigarettes per day. HDL lipid profile levels in diabetes mellitus sufferers who consume more than 20 cigarettes per day with a difference of 33%. Based on Samudra et al., 2021 research also shows that the HDL cholesterol levels of diabetes mellitus sufferers in active smokers are lower than those in passive smokers.

CONCLUSIONS

There were no significant differences in the lipid profile levels of total cholesterol, LDL, triglycerides, and there were significant differences in the HDL lipid profile levels.

REFERENCE

Al-Jaf, D. A. H., & Al-Jaf, K. A. H. (2020). Effect of Smoking and Some Obesity Indexes on Serum Lipid Profile in Young Male Smokers. *Passer Journal of Basic and Applied Sciences*, *2*(1), 46–50.

Arum Pravitasari, S. (2021). Hubungan Kebiasaan Merokok Dengan Kadar LDL (Low Density Lipoprotein) Pada Pria Usia Produktif Di Dusun Tengklik Karangbangun Matesih Kabupaten Karanganyar. *Jurnal Analis Kesehatan*, *10*(2), 89.

Firdayanti, AprilliantiIdris, S., & Faudziah, L. (2017). *Profil Lipid Pada Penderita Diabetes Mellitus Dengan Kadar HbA1C Tinggi*. *2*(1), 2017.

Harahap, S. (2021). *Hubungan Perilaku Merokok dengan Penyakit Diabetes Melitus di Puskesmas Batugana Kecamatan Padang Bolak Julu Kabupaten Padang Lawas Utara Tahun 2021*. 1–10.

Hera Samudra, S., Haryanto, E., & Arifin, S. (2021). *Perbedaan Kadar Kolesterol Hdl Dan Kolesterol Total Pada Perokok Aktif Dengan Perokok Pasif Yang Menderita Diabetes Melitus Di Puskesmas Tanjunganom Kabupaten Nganjuk*.

Pinakesty, A., & Azizah, R. N. (2020). Hubungan Profil Lipid dengan Progresivitas Diabetes Melitus Tipe 2. *Jimki*, *8*(2), 66–72.

Pratiwi, M. Q. O. (2022). *Perbandingan Profil Lipid Pada Pasien Diabetes Melitus Tipe 1 Dan Diabetes Melitus Tipe 2 Di RSUD Pasar Rebo*. *8.5.2017*, hal. 2003–2005.

Qoridisa, K., Lestari, Y., & Sulastri, D. (2018). Hubungan Kebiasaan Merokok dengan Profil Lipid pada Laki-Laki Pegawai Negeri Sipil di Kantor Kecamatan Se-Kota Padang. In *Jurnal Kesehatan Andalas* (Vol. 7, Issue 3, p. 336).

Raditya, I. G. B. A. R., Cokorda, D. W. H. S., & I, W. K. (2019). Gambaran Kadar Kolestrol Low Density Lipoprotein (LDL) pada Perokok Aktif. *Meditory : The Journal of Medical Laboratory*, *6*(2), 78–87.

Riskesdas NTB, R. (2018). Laporan RISKESDAS NTB 2018. In *Journal of Physics A: Mathematical and Theoretical* (Vol. 44, Issue 8).

Seifu, W. (2015). Prevalence and Risk Factors For Diabetes Mellitus and Impaired Fasting Glucose among Adults Aged 15-64 Years in Gilgel Gibe Field Research Center, Southwest Ethiopia, 2013:Through a Who Step Wise Approach. *MOJ Public Health*, *2*(5), 4–11.

Suyatno, S., Kurniawan, B., & Suharmanto, S. (2021). Hubungan Profil Lipid Terhadap Kontrol Glikemik DM Tipe 2 Peserta Program Pengelolaan Penyakit Kronis (Prolanis) di fasilitas Kesehatan Provinsi Lampung Tahun 2021. *Jurnal Analis Kesehatan*, *10*(1), 35.