Effect Of Ramadhan Fasting On Apolipoprotein B And Small Dense Ldl In Type 2 Diabetes Mellitus Patients

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Abstract.

This study's objective was to ascertain how type 2 Diabetes Mellitus patients' apolipoprotein B and small dense LDL were affected by Ramadan fasting. On 19 patients who had been diagnosed with type 2 DM at H. Adam Malik General Hospital Medan, a longitudinal prospective study from the fasting month of Ramadan until the end of the 2015 Ramadan fast was employed as the research methodology. The information was gathered by obtaining blood samples at the start and end of the Ramadan fast, after which the levels of apolipoprotein B and small dense LDL were determined. The T-Test and Wilcoxon tests were then used to assess the data. According to the study's findings, 13 respondents (68.4%) of the 19 patients with type 2 diabetes were men, and their average age was 57.26 years. Apoliprotein B (p=0.0001), small dense LDL (p=0.022), 2-hour PPG DGD (p=0.039), and mean body weight (p0.001) all indicated statistically significant changes. According to the study's findings, type 2 DM patients' apolipoprotein B and small dense LDL are significantly affected by Ramadan fasting.

Keywords: *Ramadan fasting, apolipoprotein B and small dense LDL.*

I. INTRODUCTION

All Muslims worldwide are required to observe the Ramadan fast, which is observed during the ninth month of the Lunar/Hijri calendar and is characterized by the practice of abstaining from food and liquids as well as the need to engage in spiritual activities. There is a difference in the number of days in each year between the Gregorian/AD calendar and the Lunar/Hijri calendar; specifically, the Lunar/Hijri year is 11 days shorter than the Gregorian/AD year, allowing for the implementation of fasting to take place in different seasons and for various fasting durations around the world. Muslims who reside near the equator in Indonesia are required to observe Ramadan by fasting for roughly 13.5 to 14 hours each day. Ramadan will also create various changes in Muslims' daily routines, including their eating habits, working hours, and the addition of nighttime rituals like tarawih and tadarusan prayers, which will result in more nighttime physical activity.Ramadan is derived from the verb "to burn" in the root wordرم ضان . This is further demonstrated by Muslims who truly observe Ramadan by fasting to burn all sins and uncleanness, rearrange and rejuvenate their bodily, spiritual, and behavioral strengths, and behave in a holy manner once more. The physiological process of burning in the body might refer to the oxidation of substances there to create an energy source that is healthy for everyone.

Every Muslim is required to fast, including those with managed blood sugar levels and under a doctor's supervision who suffer from chronic illnesses like Diabetes Mellitus (DM). The physiology of the human body when fasting will change as a result of changes in dietary habits and religious rituals, such as circumcision prayers, which include physical activity [1], [2], [3]. When a person is fasting, certain physiological changes in the body may take place, including those that affect blood parameters, lipid profiles, hs-CRP, leptin, ghrelin, albumin, and other metabolic processes [1], [2], [3], [4], [5].Apolipoprotein B, a blood-borne lipoprotein component, is crucial in controlling how lipoproteins interact with various tissues throughout the body, including the walls of blood vessels. According to Sniderman et al., an increased incidence of coronary heart disease was significantly correlated with an increase in the concentration of apoliprotein B (Apo B), an atherogenic liprotein component, and a decrease in the concentration of apo A-I,

an anti-atherogenic liprotein component [6].In a study by Ahmed Adlouni et al. in Morocco, they measured the concentrations of apo A-I and apo B to see how fasting during Ramadan affected lipoprotein metabolism.

They found that those who fasted during Ramadan experienced a decrease in apo B concentrations compared to before fasting (p 0.05) and an increase in apo A-I concentration of 11.8% (p 0.05) (7). A considerable rise in serum apo B concentrations was seen, according to Meghit et al's investigation on the effects of a Ramadan fasting diet on obese female patients with type 2 diabetes (1.29 0.36 mmol L-1; p 0.0001) [21].It has been established via a number of clinical and experimental research that there is a connection between blood levels of LDL cholesterol and the onset of atherogenesis. However, it was shown that certain CHD patients had LDL cholesterol levels that were within normal ranges but had elevated amounts of tiny dense LDL [31]. Small dense LDL cholesterol is LDL that is heavier while being smaller than typical LDL cholesterol. There hasn't been any published research to far on how fasting during Ramadan affects tiny dense LDL concentrations.Based on the findings of the previous study, it was determined that a second study, never before conducted in Indonesia, was necessary to ascertain the impact of the approximately 12-hour Ramadan fast on the concentration of apoliprotein B and small dense LDL in type 2 DM patients.

II. METHODS

Cohort research (prospective study) is this kind of investigation. The study's subjects were type 2 diabetes mellitus (DM) patients who had been diagnosed with the condition and either had not undergone anti-diabetic medication therapy (OAD) or had. It was carried out at the Haji Adam Malik Hospital in Medan. inclusion standards: a) Muslims who have been diagnosed with Type 2 DM and are ready to fast for the entire month of Ramadan. b) Do not currently take statin medication c) Type 2 diabetics without problems.

Exclusion standards: a) Patients who are not Muslims and have type 2 diabetes. b) patients with problems from DM. c) Not doing insulin therapy at the moment. d) Hepatic cirrhosis. e) Malnutrition, f) Hypothyroidism.Patients with type 2 diabetes in Medan made up the study's population, and patients at Haji Adam Malik Hospital Medan made up the study's sample. The minimal sample size for this investigation was 16 individuals, determined by dividing the sample size by the mean of the paired groups. In this study, operational definitions include:

Type 2 diabetes mellitus (Type 2 DM) is a set of metabolic disorders characterized by:

a) Hyperglycemia that results from changes in insulin production, insulin action, or both.
b) Body Mass Index (BMI) is calculated by dividing body weight (kg) by height (meters).
c) The concentration of apo B in the subject's serum is known as apo B.
d) Low density lipoprotein = Cholesterol LDL/ApoB 1.2
e) Trial participants: Type 2 DM patients who have given written agreement to participate in the trial and are seen at the internal medicine outpatient polyclinic at HAM Hospital in the city of Medan.
f) Age is determined via the KTP identity card, with years serving as the output unit.
g) Gender: Determined by the information on the identity card (KTP), with outcomes either male or female.
h) Blood pressure: The researcher used a sphygmomanometer to measure the average blood pressure. The average was derived from the results of two tests, the results of which were expressed in mmHg.
i) Height (TB) in meters (m) is one of the anthropometric parameters. Using a microtop, measurements were taken from the bottoms of the feet to the crown of the head. Body weight (BB) was measured using a digital scale from the Camry brand while the subject was standing erect. The measurement findings were represented in kilograms (kg), and the BMI was calculated using kilograms per square meter (kg/m2). A tape measure is used to measure the waist circumference (LP) while the subject is standing straight, barefoot, and with 25–30 cm between the legs. The halfway between the iliac crest's peak and the final rib's lower border in the medial axillary served as the starting point for measurements taken in a circular, horizontal fashion.

Tabulations are used to present a descriptive image of the research data. If the data is regularly distributed, the paired t-test is used to process and analyze it. Data transformation is done first if the data is not normally

distributed. A Wilcoxon test is carried out using the SPSS Version-17 program with a significance level of p0.05 if the transformation results are not normally distributed. A paired T test is carried out if the transformation results are normally distributed.

III. RESULT AND DISCUSSION

Research result

Respondent Demographic Characteristics

19 type 2 DM patients who matched the inclusion criteria participated in this study. The average age of the 13 respondents (68.4%), who ranged in age from 57 to 26, was 26. An average systolic blood pressure of 136.62 mmHg and a diastolic blood pressure of 86.58 mmHg were determined from the blood pressure measurement data. The survey respondents are 156.74 cm tall on average.

Table 1. Respondent Demographic Characteristics

Demographic Characteristics	**n =19**	**p value**
Gender **n(%)**		-
Man	6 (31.6)	
Woman	13 (68.4)	
Age (Years)	57.26 (± 10)	-
Systolic Blood Pressure **(mmHg)**	136.62 (± 13.83)	-
Diastolic Blood Pressure **(mmHg)**	86.58 (± 7.46)	-
Height **(cm)**	156.74 (± 7.84)	-
Body weight **(kg)**		< 0.001
Before fasting	66.21 (± 13.91)	
After fasting	64 (± 13,8)	
Fasting blood sugar levels **(mg/dL)**		0.432
Before fasting	122.89 (± 72.20)	
After fasting	117.89 (± 52.42)	
Hemoglobin		0.044
Before fasting	13.36 (± 1.31)	
After fasting	13.10 (± 1.37)	
Leukosit		0.904
Before fasting	7.84 (± 2)	
After fasting	7.98 (± 2.68)	
Trombosit		0.247
Before fasting	266.63 (± 54.12)	
After fasting	258.53 (± 54.71)	

A significant difference between Hb levels before and after fasting was discovered by the study using paired t test (p=0.044). Before fasting, the average hemoglobin level was 13.36 mg/dl, and after fasting, it was 13.10 mg/dl. Leukocytes and platelets, however, did not exhibit a statistically significant difference on average (p>0.05).KGD and body weight reduced from before to after the fast, according to the results. Statistical analysis revealed a substantial change in the patient's mean weight when fasting (p 0.0001), according to the findings. Despite a drop in fasting KGD, a substantial difference was not visible in the patient's KGD. There was no discernible difference in the triglyceride and HDL levels before and after fasting, according to the analysis's Wilcoxon test findings (p> 0.05). The analysis utilizing the paired t test showed that there was no significant variation in LDL levels between before and after fasting (p=0.561, p>0.05). Despite the statistical test showing no significant change, it was observed that the average triglyceride and LDL levels decreased towards the end of the fast. Contrarily, HDL levels demonstrate

Table 2. Differences in Lipid Profiles between Before and After Fasting

	Before Fasting	End of Fasting	P
Trigliserida (mg/dL)	151.89 (+ 9.39)	149.95 (+ 14.86)	0.986
LDL (mg/dL)	152 (+ 27.7)	149.26 (+ 31,09)	0.561
HDL (mg/dL)	46.32 (+ 7.96)	47.11 (+12)	0.809

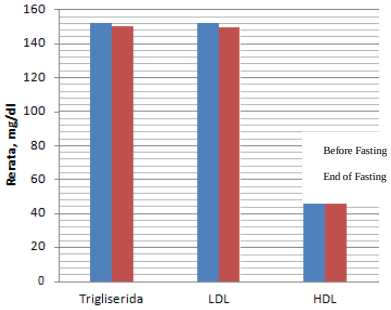

Fig 1. Histogram graph of differences in triglyceride, LDL and HDL levels between before and after fasting

When comparing the levels of Apo B before and after fasting, the Wilcoxon test revealed a significant difference (p0.0001). Apo B levels appeared to drop even more from 121.68 to 112.16 at the end of the fast. Contrary to this, a paired sample T-test revealed that tiny dense-LDL increased significantly after fasting (p=0.022). While the Wilcoxon test in this study did not find a significant change in HS CRP levels before and after fasting (p=0.888), the HS-CRP parameter did increase.

Table 3. Differences in Apo B and sd-LDL Concentrations

	Before Fasting	End of Fasting	P
Apolipoprotein B	121.68 (14.16)	112.16 (14.99)	0.0001
Small dense LDL	1.25 (0.16)	1.33 (0.19)	0.022

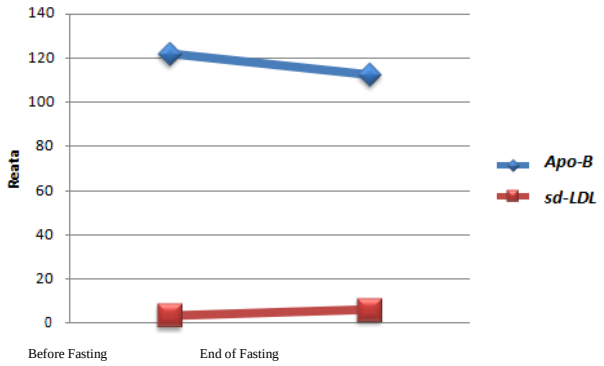

Fig 2. Linear graph of differences in Apo B and sd-LDL levels between before and after fasting.

Discussion

19 participants met the requirements, according to the findings of a study done on type 2 DM patients who underwent fasting. There was no discernible difference in the triglyceride and HDL levels before and after fasting, according to the analysis's Wilcoxon test findings (p> 0.05). The analysis utilizing the paired t test showed that there was no significant variation in LDL levels between before and after fasting (p=0.561, p>0.05). According to a study by Jamil-ul-Rehman [7], although statistical tests did not reveal any differences that were statistically significant, it was observed that average triglyceride and LDL levels decreased at the end of the fast, while HDL levels increased.Hypertriglyceridemia is the most prevalent lipid disorder in type II diabetes.(20) Decreased adipose tissue and muscle lipoprotein lipase activity can be used to explain the connection between hyperglycemia and hypertriglycerideaemia.(21) Hepatic lipase, on the other hand, is crucial for both Low Density Lipoprotein (LDL) and High Density Lipoprotein (HDL). Small dense LDL particles and lower HDL cholesterol levels are linked to high hepatic lipase activity and the Ramadan fast's metabolic alterations, which may affect all or some of the processes of energy metabolism. Some researchers contend that changes in lipid, or food yield, are caused by Muslim eating practices during

Ramadan. According to El-Hazmi et al., eating a lot of food after a long period of fasting can increase the production of endogenous cholesterol, [35].We discovered a significant decrease in apolipoprotein B concentrations in this study (Apo B, mean before fasting 121.68 (+ 14.16) and after fasting 112.16 (+ 14.99, p=0.0001), which is consistent with Ahmed Adlouni et al.'s findings in Morocco [7] but not with those of Meghit et al., who conducted a study on female patients with type 2 DM and obesity and found a significant increase in serum This, in our opinion, results from changes in the kinds and amounts of food eaten while fasting throughout Ramadan.

Non-HDL cholesterol concentrations and apoB concentrations are correlated, however the assay is more expensive. If ApoB is looked at, the treatment target is 80 mg/dL for individuals at very high risk and 100 mg/dL for people at high risk. [32] Several prospective studies have demonstrated that apoB can predict cardiovascular risk more accurately than LDL cholesterol, particularly when DM, metabolic syndrome, and CKD are present along with hypertriglyceridemia.Non-HDL cholesterol can be thought of as an atherogenic lipid because of its concentration's strong correlation with apoB concentrations, even though research findings on the strength of this relationship in predicting cardiovascular disease are inconsistent. [6], [33], [34] Researchers have not yet discovered any additional studies on the impact of Ramadan fasting on small dense-LDL, but this one discovered that it had a substantial impact (sd-LDL mean before fasting 1.25 (+ 0.16) and after fasting 1.33 (+ 0.19), p=0.022). Numerous variables, including insulin resistance and type 2 DM patients' increased synthesis of triglyceride-rich VLDL by the liver, are likely to blame for this rise in small dense LDL. It is not advised to examine apoB/apoA1 while risk-screening. Given that no clinical trials have explored the association between a decrease in the number of tiny dense LDL particles and a reduction in cardiovascular risk beyond that achieved by lowering LDL cholesterol concentrations, it is presently not advised to analyze small dense LDL, [32].

IV. CONCLUSION

According to the study's findings, Ramadan fasting had a negative impact on apolipoprotein B concentrations while having a positive impact on small dense LDL.

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