

# Effect of Ramadan Fasting on Serum Lipid Profile among Healthy Students in UiTM

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**Abstract**—Ramadan is the holiest month in the Islamic calendar and the Muslim fast during this month. The cardiovascular disease (CVDs) is the number one cause of death globally that can be a major cause of mortality and morbidity in developed societies. Atherosclerosis was a disease that closed to CVDs and it risk factor can be reduced, for example with healthy lifestyle. Ramadan fasting can serve as an excellent research model for the study of human metabolism and lifestyle about the effect of Ramadan fasting on risk factors of atherosclerosis. Hence, this study was designed to evaluate the effect of Ramadan fasting on serum lipid profile among MLTs healthy students. Design of the research is randomized trial on 31 subjects from healthy male and female adult respondents in MLTs students in UiTM Puncak Alam, Selangor, Malaysia who fasted during Ramadan. Blood samples are drawn, before and during fasting Ramadan. The samples were evaluated for triglyceride (Tg), total cholesterol, low density lipoprotein cholesterol (LDL), high density lipoprotein cholesterol (HDL). It was found that TG, LDL and body weight decrease significantly during Ramadan fasting ( $p < 0.05$ ). The HDL cholesterol showed significantly increase during Ramadan fasting. There was no significant change in total cholesterol before and during Ramadan fasting ( $p > 0.05$ ). In conclusion, Ramadan fasting can give a good effect on serum lipid profile. It may reduce risk factors of atherosclerosis by improved the serum lipid profile during Ramadan fasting.

**Keywords**—Atherosclerosis, cholesterol, fasting, HDL, LDL Ramadan, triglyceride.

## I. INTRODUCTION

CARDIOVASCULAR diseases (CVDs) are the number one cause of death globally and more people die annually from CVDs than from any other cause. According by WHO (World Health Organization), CVDs are the world's largest killers, claiming 17.1 million lives a year (WHO, 2005). Then in Malaysia the statistic of death rate of 275.3/100,000 in both sexes in 2004 is due to CVDs [1]. It is the importance sources of illness and encourages disabilities to people. The atherosclerosis is can be treated and prevented by followed healthy life style for example stop smoking. Ramadan fasting can serve as an excellent research model for the study of human metabolism and lifestyle, it interest to

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know about the effect of Ramadan fasting on risk factors of atherosclerosis. Ramadan is Holy month of Muslim who is need to fasting from dawn to sunset. They are must to avoid intake food and water. Fasting Ramadan is one of five pillar of Islam. It is obligate to all adults and healthy Muslims. In Malaysia the Muslim are fasting around 11-12 hours in one day from pre-dawn meal (sahur) to iftar. During Ramadan the Muslim also refrain smoking, control the anger and doing the good deeds. The emotion also can be stabilizing during Ramadan and after Ramadan.

This study aims to evaluate the effect of Ramadan fasting and determine the association lipid profile and glucose with fasting Ramadan. This can be use as alternative treatment ACVD and assist to reduce the morbidity, disabilities and premature mortality due to CVDs. Fasting Ramadan is the good way to develop the healthy and personal life. According Hind A.E et.al (2006)[2] fasting Ramadan has their own spiritual, physical, physiological and social benefits but the problem may occur if fasting is not properly practice. Usually during fasting people normally intake 2 meals, one before dawn suhore and one just after sunset iftar. Moreover most Muslims people intake the greater food serving during Ramadan compare to other months for example there are intake lots of carbohydrate. Proportion of food consume are differ during Ramadan in fats, proteins and carbohydrate. As a result the changes of fasting Ramadan are giving the best way to determine metabolic and behavioural studies. Fasting Ramadan is one of best model to determine the changes of lipid profile and glucose during fasting. According to Lamsudin et.al. (1995) [3] using control trial by 60 subject determine fasting Ramadan decrease blood pressure are, total cholesterol and weight are significant. Then Adlouni et.al. (1997)[4], with 32 healthy men, there are different between before Ramadan and during Ramadan. Serum cholesterol and triglycerides significantly decrease in fasting Ramadan. Furthermore HDL (high density lipoprotein) increase and LDL also decrease significantly.

## II. METHODOLOGY

### A. Subject

The targets of population are MLT students in University Technology Mara (UITM) Puncak Alam, Malaysia that continue their daily activity in campus during fasting Ramadan. The subjects were evaluated on their cholesterol, triglycerides, HDL cholesterol, LDL cholesterol on before and during Fasting Ramadan. This study was approved by the

research ethics committee UiTM Puncak Alam, Selangor, Malaysia.

The subjects in 33 healthy MLT students in UiTM Puncak Alam, Malaysia. All subjects were interviewed and a questionnaire was used to collect data regarding age, medical history, body weight, waist and height. Informed consent for the participation to the study will be obtained from all participants. Inclusion criteria included healthy students and who indicated them going to be fast during Ramadan. In addition the excluded criteria were non healthy with any acute or chronic disease and fasting less than 15 days. All the subjects followed the same dietary regimen before and during Ramadan fasting and were encourage to continue their usual lifestyle and activities.

#### B. Time and collection of observation

The blood were collected one week before Ramadan on 14 Sh'aaban 1431 (4 August 2010) and last week of Ramadan at 27 Ramadan 1431 (1 September 2011). Samples were collected at Haematology Laboratory. The blood samples were collected after they take 'Sohour' in 8- 10 hour fast in before and during Ramadan. During Ramadan the last meal was taken at 4-6pm before dawn. In this study it used the period and before and after Ramadan to compare the results before and during Ramadan fasting.

Venous blood will be drawn by qualified registered nurses in the faculty. 5ml blood sample will be drawn from each subject between 3-4pm and transfer to gel tube. Serum will be separated by centrifugation at 3000rpm for 15 minutes and transferred immediately into plain tube and stored in -20 C until ready for analysis. All serum will be separated by batch daily to avoid mix up of blood. Sample will be transported in frozen with ice pack to the Pathology laboratory at Hospital Sultanah Bahiyah, Alor Setar, Malaysia. Samples will be analyze using the Olympus AU640 by enzymatic method with the supervision of the head of Chemical Pathology Department. Lipid profile parameter such as cholesterol, triglycerides, LDL, HDL and glucose will be tested and the sample will be discarded after analysis.

#### C. Data Analysis

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) version 17.0. Resulted were expressed as mean  $\pm$  standard deviation (SD). Student's paired t-test was used for data analysis. A p value of less than 0.05 was considered to be statistically significant.

### III. RESULT

The studies are evaluated from 33 healthy adult male and female from MLTs students in UiTM Puncak Alam, Selangor, Malaysia. Two students were dismissed from the study because there are not followed excluded and include criteria. Then 31 volunteers are taking as subjects in the studies. In order to see whether fasting during Ramadan will contributes to increasing or decreasing a cardiovascular risk, this will give effect on Ramadan fasting to lipid metabolism by following the changes with time of total cholesterol, triglycerides, HDL, LDL before and during Ramadan in 29 days fasting.

#### Lipid Profile Differences Before and During Ramadan fasting

It was found that Triglycerides, LDL decrease significantly during Ramadan fasting ( $p < 0.05$ ) and the HDL cholesterol also shows increase during Ramadan fasting compare to before fasting. The HDL cholesterol shows raise with  $1.17 \pm 0.28$  compare to before Ramadan  $1.07 \pm 0.204$ . The rising in HDL cholesterol is shows significance change ( $p = 0.015$ ) compare before and during Ramadan fasting period.

The total cholesterol shows increase and was no significant change in total cholesterol before and during Ramadan fasting ( $p > 0.05$ ).

TABLE I  
LIPID PROFILE DIFFERENCE BEFORE AND DURING RAMADHAN FASTING

Biochemical variable	Before Ramadhan (mean $\pm$ sd)	During Ramadhan	p-values
HDL cholesterol (mg/dl)	1.07 $\pm$ 0.204	1.17 $\pm$ 0.28	p=0.015
LDL cholesterol (mg/dl)	2.94 $\pm$ 0.83	2.20 $\pm$ 0.60	p=0.014
Total cholesterol (mg/dl)	4.22 $\pm$ 0.87	4.58 $\pm$ 0.89	p=0.052
Triglycerides (mg/dl)	1.34 $\pm$ 0.90	1.04 $\pm$ 0.45	p=0.011

sd –standard deviation

### IV. DISCUSSION

During the fasting month of Ramadan, Muslims are obligated to fast during daytime hours and restrict to food and drink intake to the period after sunset. Ramadan fasting are provides an excellent opportunity to study the effects of the prolonged reduction of meal frequency on body metabolism. In this study, there was no significance difference between of cholesterol before and during fasting Ramadan ( $p = 0.052$ ). The previous also showed cholesterol increase in subjects during fasting Ramadan and there was no significance difference [5][6]. But some studies have reported there are decreases in total cholesterol during fasting Ramadan. [4]

The changes are occurred probably due to the change of proportion and type fat intake of subjects. In the study subjects of 6 women and 5 men that the consumption of low fat diets induces a decrease of plasma cholesterol and accompanied with body weight reduction. [7] In addition, in other previous studies [4][5] it showed that the combination of sufficient fluid intake with medium calories balanced diets more effectively to reduce BMI, weight and serum cholesterol level.

Triglycerides shows significantly decrease during fasting Ramadan compare to before Ramadan. A reduction in the average of triglycerides value was observed during Ramadan fasting and the difference showed significantly. Study by [4] also showed a decrease triglycerides level during fasting Ramadan compare to period before Ramadan. In addition, the study reported the triglycerides was not changed and not significantly difference during the Ramadan fasting compare to before Ramadan. [8]

Previous studies of the triglycerides level showed significantly decrease during of Ramadan probably due to the change of the proportion of type of fat intake that observed in the studies and it showed that the consumption of low fat diet will induces decrease of triglycerides or the metabolic

changes.[4][9] It also was found that the significantly decrease during Ramadan in triglycerides either by the changes of fat intake or the inherent of the metabolic changes during Ramadan.[9]

The consumption carbohydrate to produce energy only enough in the half day, furthermore the adipose tissue will reduce progressively and produce fatty acid in plasma. It is important role in metabolism as energy sources and transporters of dietary fat. This will happen when hydrolysis triglycerides form fatty acid and glycerol and will oxidize to form energy. According the studies of [5] found that the improvement in HDL cholesterol with the higher of fat intake on the subjects. An increase of HDL cholesterol also correlated with the weight loss was also observed in these studies and others. The body weight are showed in this studied were significantly decrease. In previous studies [4] showed the HDL cholesterol marked increase during Ramadan. The increase of HDL cholesterol due to loss of body weight and change of meal frequency. Furthermore, the weight loss are clinically important of increasing HDL cholesterol, every of ~2.7kg of stable weight reduction were increase approximately 2mg/dl. Moreover, its also reported that eating one large quantity daily meal leads significant increase in HDL cholesterol. [10]

Moreover in LDL cholesterol showed significant decreased during Ramadan compare to before Ramadan. This studied were correlated and supported with the concentration of LDL cholesterol that shows reduce significantly. [4][8]

According to Adlouni et al (2007)[4], their study showed the total cholesterol and LDL cholesterol are significantly decreased during Ramadan and these finding are established that the LDL is known to be atherogenic lipoprotein. The low concentration of both indicators were contributing to low frequency of ischemic heart disease. [11]The finding is suggested able to against cardiovascular disease development. Its also showed the significant reduction in LDL occurred regardless of the tendency of consume fried food that increase during Ramadan compared to before Ramadan.[12] Anthony (2005) [13] showed the LDL cholesterol were forms the fatty deposits in arterial wall and which become plaques that grow, rupture and stimulate the formation of artery blocking blood clots. This LDL a potential causative role in atherosclerosis and heart disease.

## V. CONCLUSION

In conclusion Ramadan fasting were contribute the better effect to lipid profile. The serum lipid profile in healthy individuals is considered altered during Ramadan. It may reduce risk factors of atherosclerosis by improved the lipid profile. The limitation in this study was inability to find control group who did not fast during Ramadan Fasting in UiTM Puncak Alam, Selangor, Malaysia. Finally further research is necessary to clarify this point that effect of Ramadan fasting in healthy individual such as hereditary, climate, numbers of days fasting and type of consume food as well as special groups such as obese or diabetic patient.

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