

Ramadan Fasting; Effects on Lipid Profile of medical students aged between 18 to 28 years

Daimi Sayed Badar^{1*}, Sayeda Khuteeja Ruhi², Ameet Fadia³, Amarnath Solepure⁴

¹Assistant Professor, ⁴Dean and Professor, Department of Physiology, Indian Institute of Medical Science and Research, Aurangabad-Jalna Road, Warudi, Taluka-Badnapur, Jalna, Maharashtra, INDIA.

²Co-ordinator and Faculty of Biotechnology/Biochemistry, Apex Medical Academy, Naaz Complex, Altamash Colony, Near Mohammadiya Masjid, Central naka, Aurangabad, Maharashtra, INDIA.

³Professor, Department of Physiology, Seth G S Medical College and K E M Hospital, Parel, Mumbai, Maharashtra, INDIA.

Email: albadar085@gmail.com

Abstract

Introduction: Throughout the world, millions of healthy adult Muslims fast during the month of Ramadan; to fulfill their religious obligation. Dyslipidaemia is a known risk factor of Coronary Artery Disease(CAD). Present study was planned to study the effect of Ramadan fasting on lipid profile of medical students. **Material and Methods:** Present study was performed among 40 healthy, volunteer students of medical college between ages of 18 to 28 years. Pre-Ramadan assessment of lipid profile was done 2 to 3 days before Ramadan and post-Ramadan assessment was done on 28th day of Ramadan. **Result:** Results were summed up and compared statistically, LDL-C post Ramadan (106.03±12.637 mg/dl) was significantly lowered(p<0.0023) than pre-Ramadan (116.19±15.94 mg/dl) and HDL-C post Ramadan(43.98±3.99mg/dl) was highly significantly raised (p<0.001) than pre-ramadan (38.90±2.01mg/dl). **Conclusion:** Ramadan fasting has beneficial effect on Lipid profile and a good and well-tolerated eating pattern for the same.


Keywords: Ramadan fasting, Lipid profile, Coronary Artery Disease, Medical students.

*Address for Correspondence:

Dr. Daimi Sayed Badar, Flat No.10, Naaz Complex, Near Mohammadiya Masjid, Altamash Colony, Central Naka, Aurangabad, Maharashtra,, INDIA.

Email: albadar085@gmail.com

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INTRODUCTION

Fasting in general has been used in medicine for medical reasons including weight management, giving rest to the digestive tract and for lowering lipids. Hippocrates, Paracelsus and Ayurvedic medicine, the world's oldest healing system, has long advocated fasting as a major modality of treatment. An absolute fast is normally defined as abstinence from all food and drink for a defined period, usually a single day (24 hours), or several daytime periods. The fast may also be

intermittent, spanning an irregular set of days. Intermittent fasting is not about eating nothing, but it is about just taking a short break in eating, in order to elicit natural hormonal and evolutionary genetic responses at the cellular level for better health (and weight loss does happen in the process). Ramadan fasting is a type of intermittent fasting. Ramadan fasting is one of the most significant worships of Islam. Fasting in the month of Ramadan is obligatory for every healthy adult Muslim who is sane and is able to perform it without harm to his health. However exemption is given to the sick, travelers and pregnant, lactating and menstruating women yet they should fast later, when they have no reason for exemption. The Arabic word Sawm is used for fasting which literally means 'to refrain' but its implied meaning is to refrain from food, drinks and sexual activity from dawn to sunset.⁽¹⁾ traditionally the practice is to eat 2 meals, 1 before dawn, "sahar", and 1 just after sunset, "iftar". They perform all physical activities during this month of fasting as they have been performing earlier.

High intake of dietary fat is a risk factors for coronary artery disease (CAD)². LDL-cholesterol

normally carries about 2/3rd of the total cholesterol of plasma. It is positively related with CAD³. Rhoads, *et al* Showed that elevated LDL-c is an independent risk factor for development of CAD. HDL-cholesterol is inversely related to the risk of CAD⁽⁴⁾. High levels of LDL-cholesterol and low concentrations of HDL-cholesterol are accompanied by accelerated development of atherosclerosis. One study demonstrated that, prolonged intermittent fasting in a model like Ramadan fasting, has some positive effects on the inflammatory status of the body and on the risk factors for cardiovascular diseases such as homocysteine, CRP and STC/HDL ratio.⁵ Studies on biochemical parameters are also done like–Serum Total Cholesterol, Serum Triglycerides, High Density Lipoprotein-Cholesterol (HDL-C), Low Density Lipoprotein-Cholesterol (LDL-C), Very Low Density Lipoprotein-Cholesterol (VLDL-C)⁶, Blood Glucose level⁷, Serum Uric Acid⁸ Changes in eating patterns, eating frequency and sleep patterns during Ramadan fasting may leads to many physiological changes and metabolic shifts in the body. Apart from the religious and spiritual considerations, it is often a subject of discussion and there has been much contention in the scientific field whether or not Ramadan fasting confers any harmful or beneficial effects on the body. Studies related to these effects are not done extensively in the Indian population and particularly in our region. Very few studies, if any, done are documented or available as a source of literature. So this gave an impetus to study the effect of Ramadan fasting on lipid profile in medical students.

MATERIALS AND METHODS

This is a cross sectional analytical study. The study was conducted at Seth G S Medical College and KEM Hospital, Mumbai after approval was taken by institutional ethical committee. Duration of study was six months (July to December 2009). Medical students fulfilling inclusion criteria were included in the study.

Inclusion Criteria

- Male medical students aged between 18 to 28 years. Females were excluded because menstruating females are exempted from fasting.
- The students who don't have major illness like hypertension, type-2 diabetes mellitus, hyperthyroidism or hypothyroidism, Cushing's disease etc. and not on any medications (screened by history taking, general and systemic examination).
- They should be fasting according to the recommendations of Ramadan fasting for the whole month.
- Students who have given written informed consent voluntarily.

Out of all students, 40 fulfilled the inclusion criteria. Written informed consent was taken from each volunteer before procedure. A detailed history regarding present and past history, personal and family history of any acute or chronic diseases was recorded. Thorough general examination was done before doing a systemic examination of the cardiovascular, respiratory, alimentary and nervous system. The students fast in the month of Ramadan (August-September 2009), when average duration of fast was 14 hours a day. Volunteers fast during the daylight hours (dawn to dusk) and were allowed to eat freely from dusk to dawn. Subjects were asked to come after overnight fast (8 to 10 hours) 2 to 3 days before commencement of the month of Ramadan for assessment of lipid profile. For the assessment of post-Ramadan readings, subjects were called on 28th day of fast in the afternoon (8 to 10 hours after the morning meal, 'Sahar'). Lipid profile was estimated by Semi-automated Biochemistry Analyzer, Model:X-Monza, manufactured by Randox, United Kingdom. Parameters in Lipid Profile include Serum Total Cholesterol (STC), Serum Triglycerides (STG), High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL), Very Low Density Lipoprotein (VLDL) was calculated from values of STC, STG and HDL. We also calculated Cholesterol to High Density Lipoprotein ratio. The data was recorded in MS-EXCEL-2007 format and the statistical analysis was done using SPSS software 16.0 version. Quantitative data were reported as Mean \pm Standard Deviation (M \pm SD) and Pre Ramadan and Post Ramadan fasting values were compared using the paired two-tailed student's "t" test.

RESULT

In this study comparison is done between pre-Ramadan lipid profile of healthy subjects and post-Ramadan lipid profile of the same subjects. Pre-Ramadan and post-Ramadan assessment was done 2 to 3 days before Ramadan fasting and on completion of 4 weeks of fasting respectively.

As shown in table no. 1 and diagram no. 1, there is decrease in Pre-Ramadan serum total cholesterol (STC) from 173.85 \pm 17.96 mg/dl (M \pm SD) to Post-Ramadan value of 167.30 \pm 14.78 mg/dl (M \pm SD), but the difference was not significant statistically (p = 0.07). Serum Triglycerides (STG) decreased from Pre-Ramadan level of 93.55 \pm 13.77mg/dl (M \pm SD) to Post-Ramadan levels of 92.20 \pm 10.84mg/dl (M \pm SD) and this change is not significant statistically (p>0.05). Levels of Very Low Density Lipoprotein (VLDL) decreased from 18.71 \pm 2.754mg/dl (M \pm SD) Pre-Ramadan value to 18.44 \pm 2.167mg/dl (M \pm SD) which is not significant statistically (p>0.05). However there is statistically

significant reduction ($p = 0.0023$) in Pre-Ramadan Low Density Lipoprotein levels from 116.19 ± 15.94 mg/dl ($M \pm SD$) to Post-Ramadan levels of 106.03 ± 12.637 mg/dl ($M \pm SD$). Also the levels of High Density Lipoprotein (HDL) increased from Pre-Ramadan 38.90 ± 2.01 mg/dl

($M \pm SD$) to Post Ramadan 43.98 ± 3.99 mg/dl ($M \pm SD$) and the difference is highly significant ($p = 0.0001$). Cholesterol to HDL ratio was also reduced from 4.469 to 3.80.

Table 1: Effect of Ramadan Fasting on Lipid Profile

Lipid profile parameter	Pre-Ramadan(Mean \pm SD) mg/dl	Post-Ramadan(Mean \pm SD) mg/dl	T-test Value	P-Value	Significance
STC	173.85 \pm 17.96	167.30 \pm 14.78	1.781	0.0788	NS
STG	93.55 \pm 13.77	92.20 \pm 10.84	0.4872	0.6275	NS
HDL	38.90 \pm 2.01	43.98 \pm 3.99	7.1837	0.0001	HS
LDL	116.19 \pm 15.94	106.03 \pm 12.637	3.1586	0.0023	S
VLDL	18.71 \pm 2.754	18.44 \pm 2.167	0.4872	0.6275	NS

STC- Serum Total Cholesterol, **STG**- Serum Triglycerides, **HDL**- High Density Lipoprotein, **LDL**- Low Density Lipoprotein, **VLDL**- Very Low Density Lipoprotein; **NS**- statistically not significant, **S**- statistically significant, **HS**- statistically highly significant

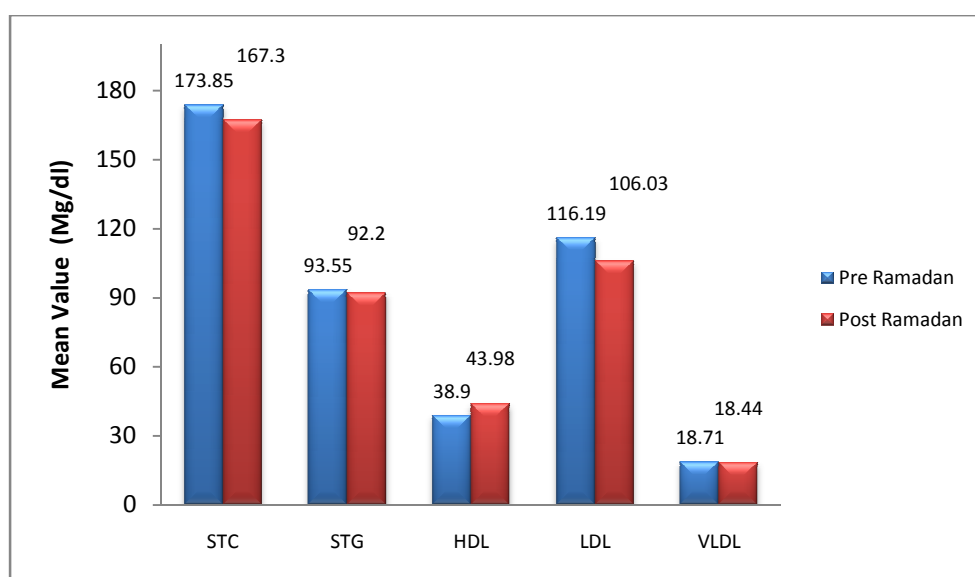


Figure 1: Effect of Ramadan Fasting on Lipid Profile

DISCUSSION

The biological effects due to changes in life style during holy month of Ramadan are expected. The effects are physiological, behavioral and especially metabolic. The present study demonstrates a decrease in the Serum Total Cholesterol of the subjects after Ramadan Fasting. This result is in line with findings reported by Aldouni *et al* (1997)⁶ and Nomani MZA (1992).⁹ This study also showed slight decrease in Serum Triglycerides (Serum TG) and VLDL-Cholesterol (VLDL) levels after fasting. However this reduction was statistically not significant. This non-significant decrease is also consistent with the observation of other authors [Aldouni A 1997⁽⁶⁾; Hallack MH and Nomani MZ 1988¹⁰] who reported decrease in Serum TG levels. Few studies found non-significant elevations in end-fasting Serum TG and VLDL-Cholesterol [Nagra SA *et al* 1998¹¹]. This study also found a significant reduction in LDL-Cholesterol as

evident from Table 1 and chart 1. This is consistent with the findings of many studies. [Aldouni *et al* 1997⁸; Dowod TAHM 2004⁷]. The study conducted by Mafauzy M *et al* (1990)⁽¹²⁾ reported significant reduction in LDL-Cholesterol, which was maintained one month after Ramadan. It is observed from Table 1 that, there was increase in Mean HDL-Cholesterol value from 38.90 ± 2.01 mg/dl ($M \pm SD$) to 43.98 ± 3.990 mg/dl ($M \pm SD$). This elevation in HDL-Cholesterol was found to be statistically significant (P value < 0.01). The improved HDL-Cholesterol profile in this study is supported by many studies [Aksungar FB 2005⁵; Nagra SA *et al* 1998¹¹]. The body has regulatory mechanisms that are activated during fasting. There is a marked decrease in the activity of HMG-CoA-reductase during fasting resulting in reduced synthesis of cholesterol depicted as low blood cholesterol levels. Triacylglycerol (TG) biosynthesis is also decreased due to lesser availability of

the precursor molecules acetyl-CoA and glycerol in fasting as a consequence of reduced glucose oxidation. Furthermore, the activity of dehydrogenases of pentose phosphate pathway is also reported to decrease in fasting and are mandatory requirements for the synthesis of fatty acids and cholesterol. This will lead to lowering of the blood levels of Cholesterol, TG, and LDL-Cholesterol during fasting. The benefits of Ramadan dietary habits in terms of reduction in cholesterol, TG and LDL levels and rise in HDL levels are transient and may be helpful only if the diet pattern is framed according to the routine followed in Ramadan on regular basis. [Jamil-ur-Rehman, Mohammad Shafiq 2000¹³]. Reductions in Atherogenic Index (decreased total cholesterol and increased HDL-cholesterol) were associated with decreased morbidity and mortality from coronary heart disease in both primary and secondary prevention trials.¹⁴ Nomani MZA (1992)⁹, examined the relation of Fasting to coronary events and found that the number of cases with acute coronary heart disease events were significantly lower in Ramadan than before or after Ramadan. Ramadan fasting appears to have significant effect on LDL-Cholesterol and HDL-Cholesterol that should translate into a significant reduction in coronary risk. Thus, Ramadan fasting contributed to better blood lipid profiles and is an excellent model of how dietary modifications may improve the lipid profile.

CONCLUSION

In the present study, an attempt has been made to evaluate the effects of Ramadan fasting on human body in terms of certain physiological and biochemical parameters. All the study subjects were healthy male volunteers aged between 18 to 28 years. The subjects fasted for complete one lunar month (August-September 2009) according to recommendations of Ramadan. The assessment of physiological and biochemical parameters was done before and on completion of 4 weeks of Ramadan. This study indicates Ramadan fasting leads to statistically significant reduction in LDL-Cholesterol and statistically significant elevation in HDL-Cholesterol levels. The levels of serum Total cholesterol and serum triglycerides was reduced but the result was not significant statistically. Ramadan type of intermittent fasting has many health benefits in terms of improvement in Lipid profile and Body fat. It gives solution to Obesity, which has been recognized as a serious risk factor for mortality and morbidity due to cardiovascular diseases, stroke, diabetes mellitus, in the general population. Thus, it is beneficial, if the diet pattern is framed according to the routine followed in Ramadan on regular intervals.

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