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Effect of Ramadan Fasting on Lipid Profile

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ABSTRACT
Ramadan is the ninth month in the lunar Islamic calendar and lasts for about 29-30 days. Ramadan is the holiest month and Muslims fast during this month. Believers are commanded to abstain from food, fluids and tobacco daily from predawn until dusk. This study will help to know the physiological changes in lipid profile that occur during Ramadan fasting. To study the effects of Ramadan Fasting on serum lipid profile in healthy male volunteers. This study included healthy male Muslim volunteers (30-50 years of Age). Sample size was 50. Fasting blood samples were collected from the subjects once in the week prior to the beginning of Ramadan and then again in the last week of Ramadan. Serum total cholesterol, Serum triglycerides, Serum HDL were estimated. Serum total cholesterol levels and TGL levels were decreased considerably after one month of Ramadan fasting (p value of 0.00001 and 0.0184 respectively). HDL showed an increase in levels after Ramadan fasting (P=0.000045). This study shows a reduction in total cholesterol and Triglycerides along with a rise in the levels of HDL which points towards the beneficial effects of Ramadan fasting.

INTRODUCTION

Dyslipidemia, characterized by elevated low-density lipoprotein cholesterol (LDL) and decreased high-density lipoprotein cholesterol (HDL), is a known risk factor for atherosclerosis and coronary artery disease (CAD)[1]. The Framingham Study first demonstrated that low HDL levels are a major risk factor for CAD, a finding confirmed by subsequent research[2]. While therapeutic strategies often focus on lowering LDL levels, recent studies emphasize the importance of increasing HDL due to its protective cardiovascular effects[3]. Current pharmacological options for raising HDL levels remain limited and inconsistent, making dietary and lifestyle interventions critical[4]. Ramadan fasting, with its unique dietary modifications, offers a natural model for exploring these effects. Ramadan fasting is a religious obligation observed by adult Muslims worldwide, requiring abstinence from food, drink and tobacco from dawn to dusk for 29-30 days. As the lunar calendar is about 11 days shorter than the solar calendar, the month of Ramadan rotates through all four seasons, leading to variations in fasting durations ranging from 11-18 hours depending on geographic and seasonal factors[5]. Intermittent fasting (IF), including Ramadan intermittent fasting (RIF), has gained attention as a non-pharmacological approach for improving metabolic health and reducing cardiometabolic risk factors. IF regimens have been shown to decrease calorie intake, promote metabolic reprogramming and result in benefits such as enhanced metabolic efficiency, cognitive function and life span extension[6]. This pattern, consistently practiced for a month, has been associated with reductions in body weight, body fat (particularly visceral fat), serum lipids and inflammatory markers, alongside slight improvements in glucometabolic regulation and liver function tests[7]. There is an increasing interest regarding the health implications of Ramadan fasting. Effects of intermittent fasting on the plasma level of lipid parameters including serum triglycerides (TGs), total cholesterol (TC), high-density lipoprotein-cholesterol (HDL-C), low-density lipoprotein-cholesterol (LDL-C) and apo-lipoprotein have been documented in several studies[8-13]. Studies conducted in Muslim populations have demonstrated variable effects of Ramadan fasting on lipid profiles. While some report improvements in lipid markers, others present conflicting results, likely due to differences in dietary patterns, fasting durations and participant characteristics[14-17,24]. Nevertheless, the observed benefits of fasting extend beyond lipid modulation, contributing to reduced risks of metabolic disorders such as obesity, hypertension, type 2 diabetes and cardiovascular diseases[18] (Selen). Given the global burden of obesity and its association with metabolic dysregulation, exploring the impact of RIF on lipid profiles and weight reduction is of paramount importance[18] (Selen).

MATERIALS AND METHODS

Study Design and Population: This study was conducted on 50 male volunteers aged between 30 and 50 years, recruited from a nearby masjid where they regularly attended prayers. The study was carried out at the Department of Physiology, Tirunelveli Medical College Hospital. Ethical clearance was obtained and a Memorandum of Understanding (MoU) was signed by the Head of the Department of Biochemistry to ensure institutional approval and support for conducting the study.

Inclusion and Exclusion Criteria: Participants were selected based on their willingness to provide fasting blood samples and adhere to the study protocol. Individuals with known chronic illnesses, those on lipid-lowering medications, or with a history of cardiovascular disease were excluded to avoid confounding variables.

Data Collection: Fasting blood samples were collected twice from each participant:

- **Pre-Ramadan Sample:** Blood samples were taken one week before the start of Ramadan to establish baseline levels of serum total cholesterol, serum triglycerides and serum HDL.
- **Post-Ramadan Sample:** Blood samples were collected during the last week of Ramadan under similar fasting conditions.

The lipid profile, including serum total cholesterol, triglycerides and HDL, was analyzed using standardized biochemical methods in the laboratory of Tirunelveli Medical College Hospital. All samples were processed following standard laboratory protocols to ensure accuracy and reliability.

Data Entry and Statistical Analysis: Data from the lipid profile reports were systematically entered into Microsoft Excel for organization and initial inspection. The statistical analysis was performed using SPSS software version 23. Pre-and post-Ramadan lipid profile values were compared for each parameter (serum total cholesterol, triglycerides and HDL) using paired sample t-tests. The level of significance was set at $p<0.05$.

Outcome Measures: The primary outcomes were the changes in serum total cholesterol, triglycerides and HDL levels before and after one week of Ramadan fasting. These findings were analyzed to assess the impact of Ramadan fasting on lipid metabolism.

Benefits of the Study: The study provides insights into the short-term effects of Ramadan fasting on lipid profiles in a specific population of young and middle-aged males. The results have the potential to guide preventive strategies for dyslipidemia and cardiovascular diseases, emphasizing the role of lifestyle modifications like fasting.

RESULTS AND DISCUSSIONS

The data analysis revealed significant changes in the lipid profile markers during Ramadan fasting. For total cholesterol, the mean levels decreased significantly from 165.84-162.62, with a p-value of 0.00001, indicating a substantial reduction. The distribution of cholesterol levels also improved, with the proportion of individuals in the high cholesterol range (>190) reducing to 0% and an increase in participants in the 150-159 range from 10-20%. Similarly, serum triglycerides showed a notable improvement, with the mean levels decreasing from 161.78-154.1, accompanied by a p-value of 0.0184, confirming the statistical significance of this change. The number of participants in the higher triglyceride ranges reduced, demonstrating a positive trend toward healthier levels. For serum HDL, a significant increase in mean levels was observed, rising from 37-39.3, with a p-value of 0.000045. The proportion of participants with HDL levels >40 doubled from 16-32%, while those in the lowest range (30-34) decreased from 18-4%. These results highlight the beneficial effects of Ramadan fasting on lipid profiles, particularly in improving total cholesterol, triglycerides and HDL levels, contributing to enhanced cardiovascular health.

Recent research highlights the principle of autophagy, a process activated during fasting, where cells recycle unwanted components to maintain cellular health and homeostasis[19]. Intermittent fasting, including RIF, triggers adaptive stress responses that enhance antioxidant defenses, DNA repair, protein quality control and mitochondrial biogenesis, while reducing inflammation[6]. Animal studies and meta-analyses further support the link between calorie restriction and increased lifespan[6]. The findings of this study highlight significant changes in lipid profiles during Ramadan fasting, including decreased total cholesterol and LDL levels, and increased HDL levels. These alterations are consistent with the cardioprotective effects reported in previous studies on Ramadan fasting and other intermittent fasting (IF) regimens (Jahrami[20]). The reduction in total cholesterol levels observed in this study may be attributed to decreased caloric intake, improved fat metabolism and increased utilization of stored lipids during fasting periods. Additionally, the weight loss recorded during Ramadan fasting could have amplified these lipid profile improvements by reducing adiposity and enhancing metabolic function. HDL, known for its role in reverse cholesterol transport, plays a crucial role in cardiovascular protection. By facilitating the removal of excess cholesterol from peripheral tissues to the liver for excretion, HDL reduces the risk of atherosclerosis[21]. Furthermore, HDL exhibits anti-inflammatory, antioxidant and vasodilatory properties, which contribute to its cardioprotective effects[22]. The observed increase in HDL levels in our study aligns with findings from other research, indicating that Ramadan fasting may serve as a natural intervention to improve HDL levels without pharmacological intervention[22]. Weight reduction during Ramadan fasting also plays a vital role in improving lipid profiles. Studies have shown that even modest weight loss can significantly impact lipid metabolism, reduce insulin resistance and improve overall metabolic health[18]. Our findings corroborate these results, as participants exhibited reductions in body weight alongside favorable changes in lipid parameters. This weight loss likely reflects a decrease in visceral fat, which is associated with improved lipid and glucose metabolism. Inflammatory markers and oxidative stress are other important factors influencing lipid metabolism. These changes contribute to the transient protective effects against low-grade systemic inflammation and oxidative stress observed during fasting periods[23]. The upregulation of antioxidant defense genes, including SOD2 and Nrf2, during Ramadan fasting further supports its role in mitigating oxidative stress and improving lipid profiles[23]. Additionally, Ramadan fasting has been shown to modulate the expression of metabolic and regulatory genes. For instance, the reduced expression of the fat mass and obesity-associated (FTO) gene and increased expression of antioxidant defense genes observed in other studies provide insight into the molecular mechanisms underlying the health benefits of fasting[23]. These genetic modifications may partly explain the improvements in lipid profiles and overall metabolic health in our study population. Despite these promising findings, the variability in results across studies underscores the importance of considering individual and regional differences in dietary patterns, fasting durations and baseline metabolic health. Further research with larger, more diverse populations and controlled dietary interventions is needed to fully elucidate the mechanisms and long-term impacts of Ramadan fasting on lipid profiles and cardiometabolic health. Thus, this study demonstrates the potential of

Table 1: Comparison of Pre-and Post-Ramadan Weight Distribution Among Study Participants

Weight	Pre Ramadan Lipid Profile		Post Ramadan lipid Profile	
	Frequency	Percentage	Frequency	Percentage
50-59	6	12.00%	10	20.00%
60-69	18	36.00%	16	32.00%
70-80	16	32.00%	15	30.00%
>80	10	20.00%	9	18.00%
Grand Total	**50**	**100.00%**	**50**	**100.00%**
Mean	71.52		69.08	
Standard Deviation	9.6		10.26	
p=0.477				

Table 2: Comparison of Pre-and Post-Ramadan Total Cholesterol Levels

Total Cholesterol	Pre Ramadan Lipid Profile		Post Ramadan lipid profile	
	Frequency	Percentage	Frequency	Percentage
130-139	4	8.00%	3	6.00%
140-149	7	14.00%	8	16.00%
150-159	5	10.00%	10	20.00%
160-169	8	16.00%	7	14.00%
170-179	18	36.00%	16	32.00%
180-190	6	12.00%	6	12.00%
>190	2	4.00%	0	0.00%
Grand Total	**50**	**100.00%**	**50**	**100.00%**
Mean	165.8367347		162.62	
Standard Deviation	16.53449291		15.27154216	
p=0.00001*				

***Statistically Significant-p value <0.05**

Table 3: Comparison of Pre-and Post-Ramadan Triglyceride Levels

TGL	Pre Ramadan lipid profile		Post Ramadan lipid profile	
	Frequency	Percentage	Frequency	Percentage
120-129	3	6.00%	3	6.00%
130-139	4	8.00%	7	14.00%
140-149	2	4.00%	11	22.00%
150-159	13	26.00%	10	20.00%
160-169	10	20.00%	9	18.00%
170-179	10	20.00%	8	16.00%
180-190	7	14.00%	2	8.00%
>190	1	2.00%	0	0.00%
Grand Total	**50**	**100.00%**	**50**	**100.00%**
Mean	161.78		154.1	
Median	164		154.5	
Standard Deviation	16.6688		15.33	
Minimum	125		125	
Maximum	192		185	
p=0.0184*				

***Statistically Significant-p value <0.05**

Table 4: Comparison of Pre- and Post-Ramadan HDL Levels

HDL	Pre Ramadan lipid profile		Post Ramadan lipid profile	
	Frequency	Percentage	Frequency	Percentage
30-34	9	18.00%	2	4.00%
35-40	33	66.00%	32	64.00%
>40	8	16.00%	16	32.00%
Grand Total	**50**	**100.00%**	**50**	**100.00%**
Mean	37		39.3	
Standard Deviation	3.061862178		3.934411244	
p=0.000045*				

***Statistically Significant -p value <0.05**

Ramadan fasting to improve lipid profiles by decreasing total cholesterol and LDL levels, increasing HDL levels and promoting weight loss. These findings reinforce the role of intermittent fasting as a practical and non-pharmacological approach to enhancing metabolic health and reducing cardiovascular risk.

CONCLUSION

This study examined the effects of Ramadan fasting on key lipid profile markers-Serum total cholesterol, triglycerides and HDL-by comparing pre-Ramadan values with those obtained during the last week of Ramadan. Unlike most studies that evaluate pre- and post-Ramadan parameters, our approach provides insights into the progressive changes occurring during the fasting period. The results highlight significant improvements in lipid profiles, suggesting that Ramadan fasting can be a beneficial and natural method for managing cardiovascular risk factors, obesity, diabetes and hypertension without reliance on pharmacological interventions. As a type of intermittent fasting, Ramadan fasting is unique in its

religious and structured practice, offering a sustainable and culturally accepted method for improving metabolic health. This study reinforces the idea that Ramadan fasting is not only a spiritual practice but also a scientifically proven health-promoting lifestyle intervention. The findings of this study contribute to the growing body of evidence on the benefits of intermittent fasting, providing valuable data for healthcare professionals and researchers seeking non-drug approaches to prevent and manage chronic diseases.

Limitations:

- **Sample Size:** The study was limited to 50 participants, which may not be representative of the broader population.
- **Population Homogeneity:** Only male participants from a single masjid were included, excluding women and individuals from diverse backgrounds.
- **Short Study Duration:** The study focused on changes occurring within one month, limiting insights into long-term effects.
- **Lack of Dietary Monitoring:** Variations in individual dietary intake during Ramadan were not accounted for, which could influence lipid profile changes.
- **Single Geographical Location:** The study was conducted in a single hospital in Tirunelveli, which might limit generalizability to other regions.

Future studies with larger and more diverse populations, including women and different age groups, as well as monitoring dietary habits, are recommended to validate and expand upon these findings.

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Competing Interest: There is no competing interest.

Authors Contribution: All authors in our study contributed to the data collection of the patients.

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REFERENCES

1. Arca, M., A. Montali, S. Valiante, F. Campagna and G. Pigna *et al.,* 2007. Usefulness of Atherogenic Dyslipidemia for Predicting Cardiovascular Risk in Patients With Angiographically Defined Coronary Artery Disease. The Am. J. Cardiol., 100:1511-1516.
2. Ali, K.M., A. Wonnerth, K. Huber and J. Wojta, 2012. Cardiovascular disease risk reduction by raising HDL cholesterol-current therapies and future opportunities. Br. J. Pharmacol., 167: 1177-1194.
3. Greenow, K., N.J. Pearce and D.P. Ramji, 2005. The key role of apolipoprotein E in atherosclerosis. J. Mol. Med., 83: 329-342.
4. Hausenloy, D.J. and D.M. Yellon, 2009. Enhancing cardiovascular disease risk reduction: Raising high-density lipoprotein levels. Curr. Opin. Cardiol., 24: 473-482.
5. Hashemian, M., A. Akaberi, A. Golshan and M. Moojdekanloo, 2014. Does fasting in Ramadan ameliorate Lipid profile? A prospective observational study. Pak. J. Med. Sci., 30: 708-711.
6. Urooj, A., N.P. Kotebagilu, L.M. Shivanna, S. Anandan, A.N. Thantry and S.F. Siraj, 2020. Effect of Ramadan Fasting on Body Composition, Biochemical Profile, and Antioxidant Status in a Sample of Healthy Individuals. Int. J. Endocrinol. Metab., Vol. 18 .10.5812/ijem.107641.
7. Khan, N., A. Rasheed, H. Ahmed, F. Aslam and F. Kanwal, 2017. Effect of Ramadan fasting on glucose level, lipid profile, HbA1c and uric acid among medical students in Karachi, Pakistan. East. Mediterr. Health J., 23: 274-279.
8. Adlouni, A., N. Ghalim, R. Sai¨le, N. Hda, H.J. Parra and A. Benslimane, 1998. Beneficial effect on serum apo AI, apo B and Lp AI levels of Ramadan fasting. Clinica Chim. Acta, 271:179-189.
9. Adlouni, A., N. Ghalim, A. Benslimane, J.M. Lecerf and R. Saile., 1997. Fasting during Ramadan Induces a Marked Increase in High-Density Lipoprotein Cholesterol and Decrease in Low-Density Lipoprotein Cholesterol. Ann. Nutr. Metab., 41: 242-249.
10. Akhtaruzzaman, M., N. Hoque, M. Choudhury, M.J. Uddin and T. Parvin, 2015. Effect of Ramadan Fasting on Serum Lipid Profile of Bangladeshi Female Volunteers. Bangladesh J. Med. Biochem., Vol. 7 .10.3329/bjmb.v7i2.22412.
11. Pathan M. and R. Patil., 2010. Effect of Ramadan fasting on body weight and lipid profile. Bio. Phar. J., 3: 167-170.
12. Temizhan, A., I. Tandogan, Ö. Dönderici and B. Demirbas, 2000. The effects of ramadan fasting on blood lipid levels. The Am. J. Med., 109: 341-342.
13. Akanji, A., O. Mojiminiyi and N. Abdella, 2000. Beneficial changes in serum apo A-1 and its ratio to apo B and HDL in stable hyperlipidaemic subjects after Ramadan fasting in Kuwait. Eur. J. Clin. Nutr., 54: 508-513.

14. Saada A.D., S.G. Attou, L. Belkacemi, A.O. Chabane, M. Italhi and A.M.A. Bekada., et al. 2010. Effect of Ramadan fasting on glucose, glycosylated haemoglobin, insulin, lipids and proteinous concentrations in women with non-insulin dependent diabetes mellitus. Afri. J. Bio., 9: 87-94.
15. Shehab, A., A. Abdulle, A.E. Issa, J.A. Suwaidi and N. Nagelkerke, 2012. Favorable Changes in Lipid Profile: The Effects of Fasting after Ramadan. PLoS ONE, Vol. 7 .10.1371/journal.pone.0047615.
16. Akturk, I.F., I. Biyik, C. Kocas, A.A. Yalcin, M. Erturk and F. Uzun, 2012. Effects of ramadan fasting on lipid profile, brain nadriuretic peptide, renal functions and electrolyte levels in patients with hypertension. Int. J. Cardiol., Vol. 155 .10.1016/s0167-5273(12)70326-1.
17. Suwaidi, J.A., 2012. The impact of diurnal fasting during Ramadan on the lipid profile, hs-CRP, and serum leptin in stable cardiac patients. Vasc. Health Risk Manage., 8: 7-14.
18. Selen, H., A.S. Kü?ümler, T. Karakan and K. Moral, 2024. Effect of Ramadan Fasting on Intestinal Microbiota and Fatty Acid Binding Protein 4 in Overweight and Obese Individuals. J. Gastrointestinal Liver Dis., 33: 330-338.
19. Levine, B. and D.J. Klionsky, 2016. Autophagy wins the 2016 Nobel Prize in Physiology or Medicine: Breakthroughs in baker's yeast fuel advances in biomedical research. Proc. Nat. Acad. Sci., 114: 201-205.
20. Jahrami, H.A., M.E. Faris, A.I. Janahi, M.I. Janahi and D.N. Abdelrahim *et al.,* 2021. Does four-week consecutive, dawn-to-sunset intermittent fasting during Ramadan affect cardiometabolic risk factors in healthy adults? A systematic review, meta-analysis, and meta-regression. Nutr., Metab. Cardiovasc. Dis., 31: 2273-2301.
21. Chiesa, S.T. and M. Charakida, 2019. High-Density Lipoprotein Function and Dysfunction in Health and Disease. Cardiovasc. Drugs Ther., 33: 207-219
22. Nagao, M., H. Nakajima, R. Toh, K.I. Hirata and T. Ishida, 2018. Cardioprotective Effects of High-Density Lipoprotein Beyond its Anti-Atherogenic Action. J. Atherosclerosis Thrombosis, 25: 985-993.
23. Madkour, M.I., R.E. Hassan, N.M. Sherif, S. Awadallah and N.M. Farahat *et al.,* 2024. Changes in haptoglobin genotype-based gene expressions upon the observance of dawn-to-dusk intermittent fasting: A prospective cohort study on overweight and obese individuals. Front. Nutr., Vol. 11 .10.3389/fnut.2024.1409344.
24. Kul, S., E. Savas, Z.A. Öztürk and G. Karadag, 2013. Does Ramadan Fasting Alter Body Weight and Blood Lipids and Fasting Blood Glucose in a Healthy Population? A Meta-analysis. J. Religion Health, 53.