Lipid Management in Ramadan

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Abstract

During Ramadan fast, Muslims must refrain from smoking, eating, drinking, having sexual activity, and consuming oral medications from sunrise to sunset. It has been previously shown that Ramadan fasting induces favourable changes on metabolic parameters, reduces oxidative stress and inflammation and promotes cardiovascular benefits. Although ill people are exempted from fasting, most patients with chronic diseases are keen on performing this Islamic-ritual. During recent years, Risk stratification and treatment adjustment during Ramadan are well known and structured in several guidelines for patients with diabetes mellitus. Data related to the effect of Ramadan fast on lipid profiles are less known and several controversies have been reported. Here, we focus on lipid profile and lipid management during Ramadan taking into account comorbidities and cardiovascular risk.

Keywords: Ramadan Fasting, Lipids, Management, Risk stratification, Comorbidities.

Introduction

Fasting in Ramadan, one of the five pillars of Islam, is practiced by millions of Muslims around the world. Every year during the ninth month of the lunar calendar, Muslims refrain from eating, drinking and smoking from sunrise to sunset.[1]

During the last couple of decades, there has been an increasing interest towards a better understanding of various effects of Ramadan fasting. The studies in question lead to organizing an international conference in 1996 in Casablanca, Morocco where about 50 papers were presented.[2] The current opinion highlighted during the meeting was that Ramadan fasting had beneficial effects on health, especially on some cardiometabolic parameters. In agreement, numerous epidemiologic studies that followed the meeting showed positive effects of this Islamic pillar on various parameters in healthy and unhealthy individuals.[3]

High level of Triglycerides (TG) and low level of high-density lipoprotein cholesterol (HDL) are known to be components of the metabolic syndrome.[4] Furthermore, elevated low-density lipoprotein cholesterol (LDL) and decreased HDL, known as dyslipidaemia, is a risk factor for atherosclerosis in coronary artery disease (CAD).[5-7]

In order to decrease cardiovascular risk, therapeutic strategies usually focus on lowering LDL with scarce effect on HDL increase. Dietary and lifestyle changes remain the only option that helps increase the HDL levels.[8] Studying the effects of Ramadan fasting on lipid profile will therefore shed new insight into the impact of such dietary lifestyle changes on Muslim patients who choose to fast.

In this review, we report on the current knowledge of the effects of Ramadan fasting on lipid profile and how patients with dyslipidaemia could be advised its management during the Islamic Holy month.

Lipid Profile during Ramadan Fasting

When mining data related to the effect of Ramadan fasting on lipid profile, several contradictory results were encountered. From the religious aspect, once the day fast is accomplished, there is no restriction on the quantity or quality of food, which is from sunset to sunrise of the following day; this often contributes to the differences noticed in lipid profiles.

The first paper that highlighted the effect of Ramadan fasting on lipid profile in 1978, showed that uric acid levels increase linearly with the duration of fasting, which positively correlates with serum triglycerides but not with cholesterol or phospholipids.[9]

Several studies involving patients with Type 2 diabetes mellitus (T2DM) reported decreased total cholesterol (TC), triglyceride (TG), very-low-density lipoprotein cholesterol (VLDL), low-density lipoprotein cholesterol (LDL) and apolipoprotein B (Apo-B), a major protein component of LDL, as well as increased high-density lipoprotein cholesterol (HDL) and apolipoprotein AI (Apo-AI)levels after fasting in Ramadan.[10] These changes in lipid profile, however, may vary depending on the quality and quantity of food intake as well as the physical activity of the individuals.[11]

A recent observational study recruiting 1301 Muslim diabetic patients from Qatar, showed that the average levels of TC, LDL and TG were significantly lower during

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Ramadan as compared to before Ramadan (P<0.001 each).[12] This has also been reported for other Muslim populations.[13,14]

According to Adlouni et al.[13] Apo-AI increased on day 8 and day 29 of Ramadan Fasting and remained elevated for up to one month later in comparison to baseline values. However, Apo-B levels were lower during the second and the last week of Ramadan fasting and were maintained at the same level one month after Ramadan fasting.

Al-Shafai demonstrated that lipid levels return to their baseline values 6 weeks post-fasting.[14]

It has also been shown that combining exercise with Ramadan fasting favourably reduces body mass and body fat, as well as improves lipid profiles and inflammatory status in soccer players.[15] These changes could be explained by physiological adaptations during the month of fasting which leads to an increase in reliance on fat as a source of fuel during daytime fasting.[16]

Feizollahzadeh et al. showed that Ramadan fasting is associated with a significant increase in serum level of adiponectin among men with risk factors of T2DM.[17] An increase in serum adiponectin is known to be followed by an improvement in insulin sensitivity[18] as well as an enhancement in cell protection against injuries induced by autoimmunity and lipotoxicity.[19] Many studies have shown a significant decrease in BMI after Ramadan fasting,[15,20,21] suggesting that post-Ramadan adiponectin levels can be attributed to weight loss and decreased body fat. However, weight loss in not observed in all patients as it largely depends on food intake and physical activity during this Holy month.[3,20-22] Likewise, it has been reported that physical parameters such as visceral adiposity index or biological markers such as serum apelin-13 levels did not change during Ramadan.[23]

A recent observational study has shown decreased serum LDL/HDL and TG/HDL ratios. Strikingly, LDL/HDL and especially TG/HDL ratios have been proposed to be better predictors of cardiovascular disease than lipid alone.[24] TG/HDL ratio is inversely correlated with protective forms of HDL (large and less dense HDL2 particles) and is associated with insulin resistance.

Putative anti-atherogenic effects of HDL are summarized in Table-1.[25]

Together, these cellular and molecular effects lead to endothelial protection and prevention against atherosclerotic diseases.

Ramadan positively influences the inflammatory status by decreasing in the pro-inflammatory cytokine (ie, IL-6) concentrations associated with reductions in both high-sensitive C-reactive protein (hs-CRP) and homocysteine.[25]

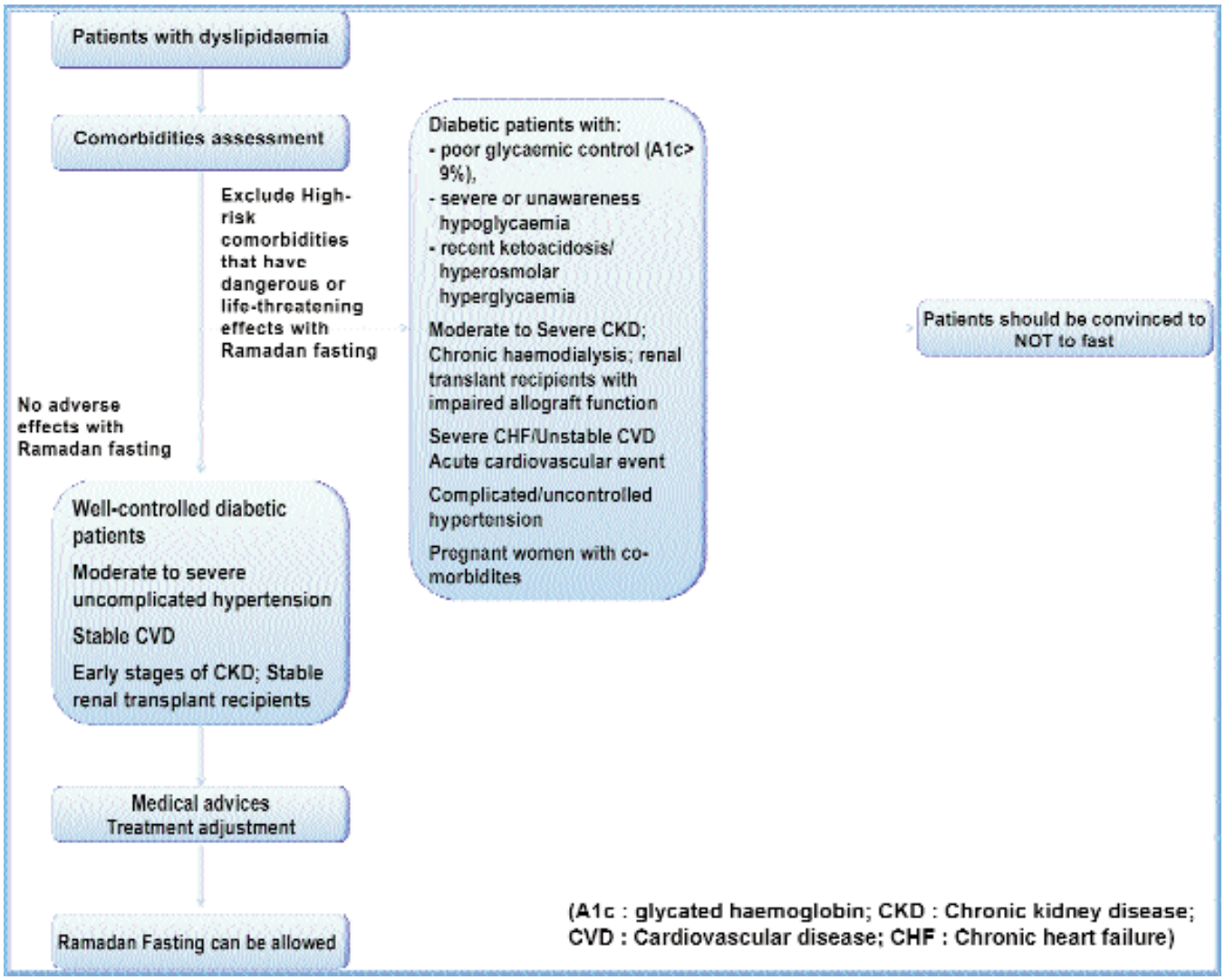
Table-1: Anti-atherogenic effects of HDL.

Effect of HDL	Mechanism
1. Counteraction of the harmful pro-atherogenic lipid particles such as LDL.	HDL facilitates reverse cholesterol transport and delivers cholesterol from the vasculature to the liver for excretion from the body for example
2. Antioxidant effect	HDL reduces vascular oxidative stress and improves vascular reactivity by vasodilatation thorough inducing nitric oxide production.
3. Anti-inflammatory effect	HDL inhibits inflammation and facilitates the emigration of macrophages out of the arterial wall. It inhibitis chemo taxis.
4. anti-apoptotic effects on endothelial cells and endothelial progenitors	HDL enhances the proliferation and migration of endothelial cells and endothelial progenitor cells and thereby promotes the restoration of the endothelium's integrity

Interestingly, independent studies showed that serum level of TG were either unaffected or significantly increased during the fasting period in healthy, obese or diabetic patients.[14,24,26-29] Other studies have also shown a decreased level of HDL and/or increased level of LDL.[12,31]

These discrepancies might be attributed not only to variable diet, physical activity and sleep patterns, but also to number of fasting days, period of daily fasting, time of sampling and genetic differences.[32] In fact, some people tend to decrease their levels of activity during Ramadan, while others practice physical activities after dinner or increase their prayer time which is equivalent to moderate physical activity.[33] Moreover, dietary habits vary between countries. In obese patients with type 2 diabetes, dietary fat consumption, especially saturated fats (231 kcal/day or 43.25% of total fat 8), is greater than that of non-obese patients (35.84 versus 25.36%). Total cholesterol intake, as well as total and low-density lipoprotein cholesterol concentrations, increased significantly in non-obese patients with type 2 (n= 57) (p <0.03)[34] and in type 2 patients with hyperlipidaemia on diet, fibrates or statins.[35] Also sleeping habits may be altered and smoking is limited to non fasting time only.

Taken together, the current results suggest it that Ramadan fasting could be a key factor enabling protection against coronary artery disease as it has a positive effect on TG/HDL ratio. Fasting-triggered increase of HDL may therefore constitute one of the best non-



Flow Chart-1: Impact of different types of comorbidities in patients with dyslipidaemia on the decision to fast in Ramadan.

pharmacological methods known to date to significantly improve HDL levels.

Lipid Management during Ramadan Fasting

Diabetes Safety: When managing patients with dyslipidaemia, it is important to consider co-morbidities such as type 2 diabetes mellitus, hypertension, cardiovascular diseases and chronic kidney disease. The current knowledge about risk stratification during Ramadan is restricted to diabetic patients with treatment.[36] Based on this stratification, we can consider that patients with stable dyslipidaemia and a pre-Ramadan assessment and educational counseling, can be allowed to fast (Flow Chart-1).

Pre-Ramadan Counseling: In patients with lipid abnormalities, fresh statin prescription should be avoided prior to Ramadan because of common effects such as fatigue and/or myalgia that may hamper the ability to fast. Nevertheless, if the use of statin is necessary, they should be started at lowest dose and monitored clinically, and if necessary by checking muscle enzymes. Patients on stable dose of statin may continue their regimen.[37]

During Ramadan: Due to major diet changes during Ramadan, patients with dyslipidaemia should pay more attention to their life style habits. Healthy diet or lifestyle modifications are recommended as background therapy for the RCTs of cholesterol-lowering drug therapy in the 2013 Lifestyle Management Work Group Guideline for lifestyle recommendations.[38] Patients who decide to fast and who would benefit from LDL-C lowering should:

i. Follow a dietary pattern that emphasizes intake of vegetables, fruits, and whole grains; includes low-fat dairy products, poultry, fish, legumes, non-tropical vegetable oils, and nuts; and limits intake of sweets, sugar-sweetened beverages, and red meats.

ii. Adapt this dietary pattern to appropriate calorie requirements, personal and cultural food preferences, and nutrition therapy for other medical conditions (including diabetes).

iii. Achieve this pattern by following plans such as the DASH dietary pattern, the USDA Food Pattern, or the AHA Diet.

iv. Aim at a dietary pattern that achieves 5%-6% of calories from saturated fats.

v. Reduce percent of calories from saturated fat.

vi. Reduce percent of calories from trans-fat.

The above recommendations should be reinforced in patients with dyslipidaemia during Ramadan because in general there are major alterations in food quality and quantity according to cultural habits. Nomani (1997)[39] has suggested that when energy is limited, a dietary fat increase from 30% to 36% reduces the breakdown of body protein content including labile LDL cholesterol receptors that are protein in nature.

Another important point that should also be discussed is the timing of meals. Fasting is performed from dawn to dusk. Each day before dawn, Muslims takr a pre-fast meal called Suhur. At Sunset, the fast-breaking meal (generally more caloric than the first one) is called Iftar. Islamic rules encourage the uptake of the Iftar meal as soon as possible upon sunset. This is important as it was recently shown that in healthy subjects, the timing of meals is correlated with overall energy intake.[40] The same study has demonstrated in multivariate analyses controlling for age, sex, sleep duration, and timing, that eating more frequently, late timing of the last meal, and a shorter duration between last meal and sleep onset, predicted higher total caloric intake. This suggests that eating close to sleep, could lead to weight gain due to a greater number of eating occasions and higher total daily caloric intake.

Interestingly, between the Iftar meal and sleeping time, the Tarawih prayer, an optional Ramandan-specific prolonged prayer, is usually performed by Muslims. This prayer may be considered as moderate physical activity. More advice for physical activity during Ramadan is presented in Table-2.[41]

Finally, precaution for lipid assessment should be taken during Ramadan as the 10 hours overnight fasting before blood sampling for lipid levels might be challenging. This is due to the sunset meal timing which may induce errors in interpreting the results.

Table-2: Physical activity recommendation during Ramadan (adapted from[40]).

Before Ramadan	During Ramadan
On diet and exercise control	Modifying frequency and intensity of physical activity; eg. 2 hours post-sunset meal (Iftar); ensure adequate fluid intake to avoid dehydratation.
Preferable mode of exercise	Maintin normal daily routine, walking, stationary cycling If performed, Tarawih parayer
Exercise timing	2-hours After sunset meal (Ifar) After night prayer (Isha) After midnight prayer (Tahajjud) Avoid exercise before Iftar.

Conclusion

Significant progress has been accomplished during the couple of last decades in understanding the mechanisms that govern metabolism regulation during Ramdan fasting as well as the strategies to be followed by patients with metabolic diseases who choose to fast prior, during and upon this Holy month. Results from several studies reported controversial effects on lipid profiles depending on fluctuant dietary habits, variable physical activity levels and sleep patterns of the patients involved in the studies. Therefore, in order to achieve beneficial effects in the case of patients with dyslipidaemia who decide to fast, a structured pre-Ramadan risk stratification and counseling should be followed. Additionally, a reinforcement of lifestyle recommendations to prevent cardiovascular risk is needed for patients with dyslipidaemia with or without comorbidities.

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