OBSERVATIONS

Ramadan Fasting: A Study of Changes in Glucose Profiles Among Patients With Diabetes Using Continuous Glucose Monitoring

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Fasting during the Muslim holy month of Ramadan entails abstinence from eating, drinking, and smoking from dawn to sunset. Although the sick are exempted (Holy Koran, Al-Bakarah, 183–185), many patients, including those with diabetes, choose to go ahead with fasting, often for social and cultural as well as religious reasons (1).

We have explored changes in glucose profiles of patients with type 2 diabetes in a prospective observational study using continuous glucose monitoring (CGM; Medtronic MiniMed CGMS Gold). This was performed for at least 3 consecutive days during Ramadan (2). Nonfasting CGM for the same length of time was obtained on each patient either before or after Ramadan. A mean CGM curve for all patients was obtained during and outside the Ramadan fasting period (3).

Twenty-three (18 male, 5 female; age 42.9 ± 11.9 years; BMI 28.7 ± 4.2 kg/m^2; glycosylated hemoglobin 6.9 ± 1.1%) patients consented and completed the study. Medication ranged from none (n = 1) to a mixture of oral agents (five including a sulphonylurea, eight including sitaglitin or vildagliptin) with (n = 2) or without insulin (n = 17), exenatide alone (n = 1), and exenatide plus oral agents (n = 1). During Ramadan, changes to medication followed American Diabetes Association guidelines (4) and included a 20–30% reduction in dose in patients on sulphonylureas or insulin. In other patients (n = 13) there were no dose changes to antidiabetic drugs. There was no episode of symptomatic hypoglycemia during Ramadan fasting, although CGM recorded at least one hypoglycemic event (≤70 mg/dL) in 14 patients. Individual CGM traces both within and outside Ramadan showed great inter- and intraindividual variability. The variability was greater during Ramadan with the nadir and peak glucose noted on the mean CGM curve of 113.9 mg/dL and 179.3 mg/dL occurring before and after iftar (breaking of the fast), respectively. Corresponding values outside Ramadan fasting period were 126.4 mg/dL and 151.0 mg/dL, both occurring in the morning. With Ramadan fasting, there was a small, but significant increase in sensor-recorded glucose (median 137.9 vs. 141.0 mg/dL), but not in duration of time spent in hypoglycemia, hyperglycemia, or euglycemia (Wilcoxon signed rank test).

In spite of the small number of subjects and only minor changes in indicators of overall glucose control, we have documented important differences in glucose excursions and variability during Ramadan fasting. The major glucose rise at iftar time—likely to be greater in patients with poor control—may be related to consumption of sweet and carbohydrate rich food used to break the fast. Other factors including the delay in timing of the medication and hormonal changes of fasting may also contribute to this phenomenon. This glucose rise is a short-term risk to the patient with diabetes practicing Ramadan fasting (1). More research is needed to determine its longer-term effects.

Our study further underlines the importance of focused pre-Ramadan counseling for patients with diabetes specifically addressing nutritional issues as well as timing and dose changes to antidiabetic medication. Further and larger studies of Ramadan fasting can improve the knowledge base for such advice on dietary and treatment changes.

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