Blood Glucose Fluctuation During Ramadan Fasting in Adolescents With Type 1 Diabetes: Findings of Continuous Glucose Monitoring

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Because of the scant data about the effect of fasting on the blood glucose (BG) profile in adolescents with type 1 diabetes (T1D), health care providers have been giving conflicting advice about the feasibility of fasting during the month of Ramadan for this group of patients. This study was done in adolescents with T1D to assess the ability and safety of fasting during Ramadan and to monitor the BG profile with a continuous glucose monitor (CGM).

Adolescents with T1D who intended to fast during the month of Ramadan in 2013 were asked to wear a CGM while fasting and to report any episode of severe hypoglycemia or diabetic ketoacidosis or emergency room visit. Pump basal rate was modified according to the eating pattern during Ramadan. The averages of all daily readings were calculated to express the BG values every 5 min. The average BG during fasting and eating hours was compared using Student t test. Hyperglycemia and hypoglycemia were identified as BG > 300 mg/dL (16.7 mmol/L) or < 70 mg/dL (3.9 mmol/L), respectively (1).

A total of 21 patients were enrolled (15 women), age (mean ± SD) was 15 ± 4 years, and duration of diabetes was 6 ± 3 years. Eighteen patients were on Medtronic MiniMed Paradigm 722 and used the Medtronic iPro CGM system, and three patients were taking glargine and rapid-acting insulin analogs and used the Medtronic Guardian REAL-Time CGM system. Total fasting time was 14.5 h. Subjects were able to fast 85% of the days, and the vast majority (76%) could fast 25 or more days of the month. There were no reported episodes of severe hypoglycemia or diabetic ketoacidosis or emergency room visits throughout the whole month. The average BG during fasting (9.5 ± 0.3 mmol/L) was lower than that during the eating hours (10.9 ± 0.9 mmol/L) (P < 0.05). Hypoglycemia and hyperglycemia were observed in 16.7% (4 h) and 29.3% (7 h) of the 24-h CGM readings, respectively. Hypoglycemia during fasting hours was 14.2% versus 2.5% during eating hours (P < 0.05), while hyperglycemia was observed in 12% versus 17% (P < 0.05) of the fasting and eating hours, respectively.

To our knowledge, this is the first study that assesses BG fluctuation with CGM during Ramadan fasting in adolescents with T1D. Our findings are similar to the findings of other studies (2–4) in that the majority of patients with T1D could fast 15 or more days during Ramadan. Nonetheless, symptomatic hypoglycemia was reported and resulted in breaking the fast in 15% of the days. More importantly, wide BG fluctuation during fasting and eating hours and episodes of unreported hypoglycemia were clearly noted in the CGM data.

While T1D is listed as one of the very high-risk factors for fasting (5), our patients were able to fast most of the month of Ramadan without adverse clinical events. However, there was wide BG fluctuation during fasting and eating hours, with significant periods of unrecognized hypoglycemia during fasting. Frequent BG monitoring is essential to recognize the incidence of hypoglycemia and take the proper action to control it. Well-designed, randomized controlled trials are needed to identify a better insulin regimen to minimize BG fluctuations throughout the fasting and eating hours.

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Duality of Interest. No potential conflicts of interest relevant to this article were reported.

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References