Blinded Continuous Glucose Monitoring During Yom Kippur Fasting in Patients With Type 1 Diabetes on Continuous Subcutaneous Insulin Infusion Therapy

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Patients with type 1 diabetes (T1D) are generally discouraged from fasting (1,2,3). However, basal-bolus insulin regimens, by multiple injections or insulin pump therapy (CSII), allow distinctive delivery of basal and short-acting insulin and are theoretically compatible with short or prolonged fasting (4). Although many physicians consider that fasting is contraindicated, Jewish patients who renounce fasting often deeply regret not fully participating in the Yom Kippur holiday, which entails total 25-h fluid and food abstention. Conversely, some patients forsake medical advice and endanger themselves. Our study aimed to show that prolonged fasting can be safely attempted with appropriate preparation.

We recruited 10 male adult patients with T1D (aged 46 ± 12 years), on CSII for at least 1 year, willing to fast on Yom Kippur. Average diabetes duration was 27 ± 7 years. Some patients had already fasted and some had never tried to. Exclusion criteria included HbA_{1c} levels >9% (74.9 mmol/mol), estimated high risk of dehydration, and recent severe hypoglycemia or ketoacidosis. Average HbA_{1c} was 7.3 ± 0.6% (56.3 ± 6.5 mmol/mol), average basal rate was 27 ± 11 units/day, and average total insulin dose was 0.65 ± 0.17 units/kg/day.

A blinded continuous glucose monitoring device (iPro2 CGMS; Medtronic) was inserted a few days before the fast, which began on Friday at 1700 h and ended on Saturday at 1800 h. Prefast meal bolus (around 1600 h) was decreased by 20–40% and basal rate decreased by 20–40%, based on patients' previous experience and expected activity levels (5). Patients were advised to record unusual events and food intake and to perform self-monitoring of blood glucose during the fast, preferably in the morning and in case of suspected hypoglycemia or hyperglycemia. Relevant treatment of these situations was reviewed individually.

Complete 25-h CGMS recording was obtained in eight patients and self-monitoring of blood glucose without CGMS in one patient. Average CGMS glucose levels were 185 ± 69 mg/dL. Seventy-seven percent of values were 70–250 mg/dL, 5% were <70 mg/dL, and 18% were >250 mg/dL, including 5% >300 mg/dL. Six patients had no hypoglycemia, and one patient suffered from mild symptomatic hypoglycemia before the end of the fast. Two patients with known hypoglycemia unawareness suffered from prolonged asymptomatic nocturnal hypoglycemia. In one case, prefast CGMS showed no hypoglycemia, and basal rate had been reduced by 40% for the fast. In the other case, where basal rate had been reduced by 20% only for the fast, CGMS had recorded an asymptomatic nocturnal hypoglycemia during the prefast night. Real-time availability of CGMS data analyzed retrospectively could have contributed to better control. No patient suffered from hypoglycemic coma or ketoacidosis during the fast or from subsequent deterioration of glucose control.

Our study suggests that prolonged 25-h Yom Kippur fasting is feasible and safe in a selected population of well-controlled patients with T1D on CSII. It also suggests that current basal rates partially cover prandial insulin requirements. Based on these results, we would recommend insulin dose reductions of 30–40% for basal rates and of 40–50% for prefast meal bolus. Optimal adaptation of basal rates for fasting should be further evaluated.

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