Diabetes control during Ramadan fasting

ABSTRACT

For diabetic patients, fasting during Ramadan, the ninth month of the Islamic calendar, can cause wide fluctuations in blood sugar levels, posing a medical challenge for patients and physicians and increasing the risk of acute metabolic complications including hypoglycemia, hyperglycemia, diabetic ketoacidosis, dehydration, and thrombosis. Proper patient education, risk stratification, and modification of antidiabetic medications can reduce the risk of complications.

KEY POINTS

A diabetic patient who develops signs or symptoms of hypoglycemia during Ramadan fasting should break the fast to avoid serious complications.

Management of complications in diabetic patients during Ramadan is similar to that for nonfasting diabetic patients. Complications include hypo- and hyperglycemia, diabetic ketoacidosis, and dehydration.

A common misconception among patients is that pricking the finger for blood sugar testing during fasting hours breaks the fast; this should be addressed during Ramadan-focused diabetes education.

AN ESTIMATED 50 MILLION patients with diabetes worldwide practice daily fasting during Ramadan, the ninth month of the Islamic calendar, which lasts 29 or 30 days. In the United States, Ramadan begins this year at sundown on Friday, May 26, and ends at sundown on Sunday, June 25.

According to the Multi-Country Retrospective Observational Study of the Management and Outcomes of Patients With Diabetes During Ramadan, conducted in 13 countries, 94.2% of Muslim diabetic patients fasted at least 15 days, and 67.6% of these fasted every day.1

The daily fasting period, which may extend from 14 to 18 hours, starts before sunrise and ends after sunset. The meal taken before sunrise is called Suhur, and the meal after sunset is called Iftar. The fast requires abstaining from eating, drinking, sexual activity, medications, and smoking. For diabetic patients, this poses medical challenges, increasing the risk of acute metabolic complications.

The goal of caring for diabetic patients during Ramadan fasting is to help them to fast without major complications and to empower them to modify their lifestyle in order to achieve this goal.

POSSIBLE METABOLIC COMPLICATIONS

Metabolic complications during Ramadan fasting include hypoglycemia, hyperglycemia, diabetic ketoacidosis, dehydration, and thrombosis.

Hypoglycemia
For patients with type 1 diabetes, fasting increases the risk of hypoglycemia 4.7 times, and the risk is 7.5 times higher for patients with...
type 2 diabetes. However, this is often under-reported, as mild to moderate hypoglycemia does not usually require medical assistance.

Precipitating factors include long fasting hours, missing the Suhur meal, and failure to modify drug dosage and timing.

Hyperglycemia
The risk of severe hyperglycemia during fasting is 3.2 times higher in patients with type 1 diabetes and 5 times higher in those with type 2 diabetes. Precipitating factors include lack of diet control during the Iftar meal and excessive reduction in the dosage of diabetes medications due to fear of hypoglycemia.

Diabetic ketoacidosis
Ketoacidosis can be precipitated by a lack of diet control during the Iftar meal, excessive reduction in the dosage of insulin due to fear of hypoglycemia, acute stress, and illness or infection.

Dehydration and thrombosis
Patients can become dehydrated during long fasting hours in especially hot weather, by sweating during physical activity, and by osmotic diuresis in poorly controlled diabetes.

Diabetes is a procoagulant condition, and dehydration increases the risk of thrombosis.

## OVERALL MANAGEMENT GOALS DURING RAMADAN FASTING

Important aspects of managing diabetes during Ramadan fasting are:
- The pre-Ramadan evaluation and risk stratification
- Promoting patient awareness with Ramadan-focused diabetes education
- Providing instruction on dietary modification
- Modification of the dosage and timing of diabetes medication
- Encouraging frequent monitoring of blood glucose levels
- Advising the patient when to break the fast
- Managing complications.

## PRE-RAMADAN MEDICAL EVALUATION AND RISK STRATIFICATION

All diabetic patients who fast during Ramadan should undergo an evaluation 1 or 2 months before the start of Ramadan to determine their level of diabetes control and the presence of acute and chronic complications of diabetes and other comorbid conditions. Also important is to determine the patient’s social circumstances, ie, knowledge about diabetes, socioeconomic factors, religious beliefs, educational status,
DIABETES CONTROL DURING RAMADAN

Table 2
Exemption from fasting during Ramadan

Generally exempted from fasting:
- Children
- Elderly people
- People with acute illness
- Pregnant women
- Developmentally disabled people
  (with serious physical handicaps, intellectual disability)
- People with chronic illness with multiple complications
- People who must travel long distances daily

Diabetes-related exemptions from fasting:
- Type 1 diabetes
- Type 2 diabetes with unstable disease
- Complications of diabetes
- Pregnancy and diabetes
- Older age with diabetes

Breaking the fast is recommended in the following cases:
- If blood glucose < 3.3 mmol/L (60 mg/dL) or symptoms of hypoglycemia
- If blood glucose > 16.7 mmol/L (300 mg/dL)
- If blood glucose < 3.9 mmol/L (70 mg/dL) in the morning, if patient is already on insulin or a sulfonylurea

DIET AND EXERCISE

All diabetic patients should be encouraged to remember to eat the predawn meal on fasting days. They should maintain a balanced diet, with complex carbohydrates with slow energy release for the predawn meal and simple carbohydrates for the sunset meal. Foods with a low glycemic index and high fiber content are recommended, and patients should be advised to avoid saturated fats and to drink plenty of fluids between sunset and sunrise to avoid dehydration.

Diabetic patients can perform their usual physical activity, including moderate exercise, but should avoid excessive physical activity especially toward evening hours to prevent hypoglycemia.

Some patients may decide not to monitor their blood glucose as they believe that pricking the finger for blood sugar testing breaks the fast. Patients should be advised that this is a misconception.

ADJUSTING DIABETES MEDICATIONS

Oral diabetes drugs

Drugs such as metformin, alpha glucosidase inhibitors, thiazolidinediones, the short-acting insulin secretagogue nateglinide, dipeptidyl peptidase 4 inhibitors (eg, sitagliptin), and glucagon-like peptide 1 receptor agonists are associated with a lower risk of hypoglycemia and can be used during Ramadan fasting without significant changes in the daily dose.

Sulfonylureas carry a higher risk of hypoglycemia and should be used cautiously during fasting, with appropriate modification in dose and timing.

Sodium-glucose cotransporter 2 inhibitors, when not combined with insulin or sulfonylureas, carry a lower risk of hypoglycemia, but during Ramadan fasting there is an increased risk of dehydration, urinary tract infection, and postural hypotension since fluids cannot be taken during fasting hours.

Dipeptidyl peptidase 4 inhibitors carry a low risk of hypoglycemia and can be used during Ramadan without dosing modification. Glucagon-like peptide 1 agonists also can be used without adjusting the dosage.

As diabetes is a procoagulant condition, dehydration can increase the risk of thrombosis.
Insulins

Insulin treatment is associated with a higher risk of hypoglycemia during Ramadan fasting. During fasting, the risk of hypoglycemia from premixed insulin can be minimized by changing to a multiple-dose regimen involving a basal insulin and short-acting insulin before meals, with adjustment of the short-acting insulin dose based on the anticipated carbohydrate intake for each meal.

Some patients may avoid pricking the skin to test the blood as they believe, mistakenly, that it breaks the fast.

TABLE 3

Recommendations for adjusting diabetes medications during Ramadan fasting

<table>
<thead>
<tr>
<th>Medication</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>Risk of hypoglycemia is low, so usually no dosage modification required</td>
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<tr>
<td></td>
<td>Split the dose: one-third predawn, the rest at sunset</td>
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<tr>
<td>Sulfonylurea</td>
<td>High risk of hypoglycemia</td>
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<td>Glimepiride, gliclazide, and glipizide are preferred over conventional sulfonylureas such as glibenclamide because of comparatively fewer hypoglycemic events</td>
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<tr>
<td>Thiazolidinedione</td>
<td>Risk of hypoglycemia is low, so usually no dosage modification required</td>
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<td></td>
<td>If taken with other antidiabetic drugs, take one-fourth of the dose predawn,</td>
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<td></td>
<td>the rest at sunset</td>
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<tr>
<td>Alpha glucosidase inhibitor</td>
<td>Risk of hypoglycemia is low</td>
</tr>
<tr>
<td></td>
<td>Gastrointestinal side effects can be problematic</td>
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<tr>
<td>Nonsulfonylurea secretagogues (glinides)</td>
<td>Low risk of hypoglycemia, so no adjustment required for twice-daily dosing</td>
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<td>Because of faster onset and shorter duration of action, nateglinide is</td>
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<td></td>
<td>preferred over repaglinide during Ramadan fasting as the risk of fasting</td>
</tr>
<tr>
<td></td>
<td>hypoglycemia is low</td>
</tr>
<tr>
<td>Glucagon-like peptide 1 receptor agonist</td>
<td>Risk of hypoglycemia is low, so no dosage modification required if taken alone</td>
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<tr>
<td></td>
<td>If taken with sulfonylurea, dose reduction required</td>
</tr>
<tr>
<td>Dipeptidyl peptidase 4 inhibitor</td>
<td>Risk of hypoglycemia is low, so no dosage modification required</td>
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<tr>
<td>Sodium-glucose cotransporter 2 inhibitor</td>
<td>Avoid during Ramadan fasting due to risk of osmotic diuresis, dehydration,</td>
</tr>
<tr>
<td></td>
<td>and ketoacidosis</td>
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<tr>
<td>Insulin</td>
<td>High risk of hypoglycemia</td>
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<td></td>
<td>Premixed 70/30 insulin during Ramadan fasting more likely to cause</td>
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<tr>
<td></td>
<td>hypoglycemic episodes than premixed 50/50</td>
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<td></td>
<td>Usual morning dose at sunset, and half of nighttime dose predawn</td>
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<td></td>
<td>Insulin analogues are associated with a lower risk of hypoglycemia than</td>
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<td></td>
<td>human insulin</td>
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<td></td>
<td>Reduce dose of long-acting insulin analogues by 20%</td>
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<td></td>
<td>During Ramadan fasting, a basal bolus regimen is preferred, including a</td>
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<td></td>
<td>long-acting basal insulin (eg, glargine, detemir, degludec) with a short-</td>
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<tr>
<td></td>
<td>acting insulin (eg, glulisine, aspart, lispro) before meals</td>
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</table>
FREQUENT MONITORING
OF BLOOD GLUCOSE DURING FASTING

Frequent monitoring reduces the risk of both hypoglycemia and hyperglycemia and helps control blood sugar levels during Ramadan fasting. As mentioned above, pricking the finger for blood sugar testing during fasting hours does not break the fast, and this should be emphasized during Ramadan-focused diabetes education.

The exact frequency of blood sugar testing is not defined. In patients with well-controlled diabetes without complications, testing once or twice a day is enough. Patients with poorly controlled diabetes and those with complications should test more often.

ADVICE REGARDING WHEN TO BREAK THE FAST

If signs or symptoms of hypoglycemia develop, the patient should break the fast in order to avoid serious complications. This is acceptable under Islamic law.3,19–21

MANAGEMENT OF COMPLICATIONS

Management of diabetic complications in patients during Ramadan fasting is similar to that for other diabetic patients and includes management of hypo- and hyperglycemia, diabetic ketoacidosis, and dehydration.

REFERENCES