

## **DIABETES AND RAMADAN FASTING**

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It is estimated that UAE's population currently stands at approximately 7.5 million (with 96% Muslims). Fasting during Ramadan, a holy month of Islam, is an obligatory duty for all healthy adult Muslims. A 20% prevalence of diabetes in UAE lead to the estimation that about one million people with diabetes in UAE fast during Ramadan.

A majority of patients prefer to fast during Ramadan despite having diabetes. While they are aware that they are exempt from fasting as it can have an adverse effect on their health, they are keen to follow all the rituals of Ramadan. Therefore, it is extremely important to provide them with all the information, help and medical advice necessary to ensure they do not suffer from complications of fasting.

In this article, we have refrained from the use of the terms "indications" or "contraindications" for fasting because fasting is a religious issue for which patients make their own decision after receiving appropriate advice from religious teachings and from their own health care providers. However, we emphasize that fasting, especially among patients with type 1 diabetes with poor glycemic control, is associated with multiple risks.

In addition to highlighting the potential risks, we provide suggestions on how to help and assist the patients with diabetes who decide to fast during Ramadan.

It is worth reemphasizing that fasting for patients with diabetes represents an important personal decision that should be made in light of guidelines for religious exemptions and after careful consideration of the associated risks following ample discussion with the treating physician. The high temperatures of the UAE and long hours of fasting, can serve as two powerful ingredients in putting the health of such individuals at major risk. Often, the recommendation will be to not undertake fasting. However, patients who insist on fasting need to be aware of the associated risks and be ready to adhere to the recommendations of their health care providers to achieve a safer fasting experience. Patients may be at higher or lower risk for fasting-related complications depending on the number and extent of their risk factors.

Conditions associated with "very high," "high," "moderate," and "low" risk for adverse events in patients with type 1 or type 2 diabetes who decide to fast during Ramadan are listed in the table given below. This classification is based on UAE National Diabetes Guidelines published in 2009 by Diabetes Care Continuum Program of Ministry of Health, UAE.

<b>Diabetes Type 1</b>	<b>Diabetes Type 2</b>
These patient's body produce no or very little insulin. They must be treated with multiple dose of Insulin injections(both short and long acting) daily	These patients are usually overweight or obese and have inadequate or sometimes high insulin production due to resistance to the actions of insulin. Usually can be managed by tablets only but after several years may need a single dose of long acting insulin (rarely multiple dosage)

## **Risk categories of people with diabetes, who fast during Ramadan**

<b>Very High Risk</b>
<ul style="list-style-type: none"> <li>• Severe hypoglycaemia (Low Blood Glucose) within the last 3 months prior to Ramadan</li> <li>• People with a history of recurrent hypoglycaemia</li> <li>• People with hypoglycaemia unawareness</li> <li>• People with sustained poor blood glucose control</li> <li>• Ketoacidosis (a serious diabetes complication) within the last 3 months prior to Ramadan</li> <li>• Type 1 diabetes</li> <li>• Acute illness</li> <li>• High blood glucose causing coma within the previous 3 months</li> <li>• People who perform intense physical activity.</li> <li>• Pregnancy</li> <li>• Patients on chronic renal dialysis</li> </ul>
<b>High Risk</b>
<ul style="list-style-type: none"> <li>• People with moderate hyperglycaemia (average blood glucose between 150 and 300 mg/dl, HbA1C 7.5 – 9.0%)</li> <li>• People with renal insufficiency</li> <li>• People with advanced macrovascular complications (prior heart disease, stroke etc)</li> <li>• People being treated with insulin or sulfonylureas</li> <li>• People living alone</li> <li>• People with co-morbid conditions that present additional risk factors (High blood pressure, Heart failure, thyroid disease, severe obesity, uncontrolled high cholesterol) <ul style="list-style-type: none"> <li>• Old age with bad health</li> <li>• Drugs that may affect mental state.</li> </ul> </li> </ul>
<b>Moderate Risk</b>
<ul style="list-style-type: none"> <li>• Well-controlled people treated with short-acting insulin secretagogues such as Repaglinide or Nateglinide</li> </ul>
<b>Low Risk:</b>
<ul style="list-style-type: none"> <li>• Well-controlled people treated with diet alone, Metformin, or Thiazolidediones (Pioglitazone)</li> </ul>
Note: Most Diabetologists agree that patients treated and controlled with diet alone or with Metformin, or Pioglitazone, or DPP4 inhibitors (Saxagliptine, Sitagliptine, Vildagliptine) or GLP-1 analogues (Exenatides or Liraglutides) or any combination of them also belong to low risk.

## **RISKS ASSOCIATED WITH FASTING IN PATIENTS WITH DIABETES**

Some of the major potential complications associated with fasting in patients with diabetes.

### **(A) Hypoglycemia**

Hypoglycemia is a condition characterized by an abnormally low level of blood sugar (glucose) Decreased food intake is a well-known risk factor for the development of hypoglycemia.

The main symptoms associated with hypoglycemia include sweating, fatigue and feeling dizzy.

Symptoms of hypoglycemia can also include:

- being pale
- feeling weak
- feeling hungry
- a higher heart rate than usual
- blurred vision
- temporary loss of consciousness
- confusion
- convulsions
- and even coma (in serious cases)

Most cases of hypoglycemia in adults happen in people with diabetes mellitus. People with type 1 diabetes must take insulin to control their glucose level; if they skip meals or have a decreased appetite without changing their insulin dose, they may develop hypoglycemia. Insulin is also used to treat some people with type 2 diabetes.

### **(B) Hyperglycemia**

Long-term studies in people with diabetes, demonstrated the link between hyperglycemia (high uncontrolled blood glucose) and various complications. Control of blood glucose in patients with diabetes who fasted during Ramadan has been reported to deteriorate, improve, or show no change. The extensive EPIDIAR study showed a fivefold increase in the incidence of severe hyperglycemia (requiring hospitalization) during Ramadan in patients with type 2 diabetes and an approximate threefold increase in the incidence of severe hyperglycemia with or without ketoacidosis in patients with type 1 diabetes. Hyperglycemia may have been due to excessive reduction in dosages of medications to prevent hypoglycemia during fasting.

### **(C) Diabetic ketoacidosis**

Patients with diabetes, especially those with type 1 diabetes, who fast during Ramadan are at increased risk for development of diabetic ketoacidosis, particularly if their blood glucose is uncontrolled and very high before Ramadan. In addition, the risk for diabetic ketoacidosis may be further increased due to excessive reduction of insulin dosages based on the assumption that food intake is reduced during the month.

### **(D) Dehydration and thrombosis**

Limitation of fluid intake during the fast, especially if prolonged, is a cause of dehydration. The dehydration may become severe in hot and humid climates and among individuals who perform hard physical labor, all conditions that result in excessive perspiration.

Patients with diabetes exhibit a hypercoagulable state due to an increase in clotting factors, a decrease in endogenous anticoagulants, and impaired fibrinolysis. Increased blood viscosity secondary to dehydration may enhance the risk of thrombosis.

## **MANAGEMENT**

### **1. Individualization.**

Perhaps the most crucial issue is the realization that care must be highly individualized and that the management plan will differ for each specific patient.

### **2. Frequent monitoring of blood glucose.**

It is essential that patients have the means to monitor their blood glucose levels multiple times daily. This is especially critical in patients with type 1 diabetes and in patients with type 2 diabetes who require insulin.

### **3. Nutrition.**

The diet during Ramadan should not differ significantly from a normal healthy and balanced diet. It should aim at maintaining a constant body mass. The common practice of ingesting large amounts of foods rich in carbohydrate and fat, especially at the sunset meal, should be avoided.

- (a) Because of the delay in digestion and absorption, ingestion of foods containing “complex” carbohydrates may be advisable at the predawn meal, while foods with more simple carbohydrates may be more appropriate at the sunset meal.
- (b) It is recommended that fluid intake be increased during non-fasting hours.
- (c) The predawn meal should be taken as late as possible before the start of the daily fast. It should never be skipped.

#### **4. Exercise.**

Normal levels of physical activity may be maintained. However, excessive physical activity may lead to higher risk of hypoglycemia and should be avoided, particularly during the few hours before the sunset meal.

#### **5. Breaking the fast.**

- (a) All patients should understand that they must always and immediately end their fast if hypoglycemia (blood glucose of <60 mg/dl [3.3 mmol/l]) occurs, since there is no guarantee that their blood glucose will not drop further if they wait or delay treatment.
- (b) The fast should also be broken if blood glucose reaches <70 mg/dl (3.9 mmol/l) in the first few hours after the start of the fast, especially if insulin, sulfonylurea drugs, or meglitinide are taken at predawn.
- (c) Finally, the fast should be broken if blood glucose exceeds 300 mg/dl (16.7 mmol/l).
- (d) Patients should avoid fasting on “sick days.”

#### **Pre-Ramadan medical assessment and educational counseling**

All patients with diabetes who wish to fast during Ramadan should undergo the necessary preparations to undertake the fast as safely as possible. These include medical assessment and educational counseling.

##### **(i) Medical assessment.**

This assessment should take place 1–2 months before Ramadan. Specific attention should be devoted to the overall well-being of the patient and to the control of so called ABC of Diabetes (Average Blood Glucose, Blood Pressure and Cholesterol). Specific medical advice and help must be provided to each individual patient, even if they fast against medical advice. During this assessment, necessary changes in their diet or medication regimen should be made so that the patient initiates fasting while being on a stable and effective program.

##### **(ii) Educational counseling.**

It is essential that the patients and family receive the necessary education concerning self-care, including signs and symptoms of hyper- and hypoglycemia, blood glucose monitoring, meal planning, physical activity, medication administration, and management of acute complications. Adequate nutrition and hydration should be emphasized, in addition to ensuring preparedness to treat hypoglycemia promptly should it occur, even if it is mild.

### Management of hypertension and dyslipidemia

Dehydration, volume depletion, and a tendency toward hypotension may occur with fasting during Ramadan, especially if the fast is prolonged and is associated with excessive perspiration. Hence, the dosage of antihypertensive medications may need to be adjusted to prevent hypotension.

Agents that were previously prescribed for the management of elevated cholesterol and triglycerides should be continued.

### Management of people with type 1 diabetes:

In general, people with type 1 Diabetes, especially if “brittle” or poorly controlled, are at a very high risk of developing severe complications and should strongly be advised not to fast during Ramadan. In addition, people who are unwilling or unable to monitor their blood glucose levels multiple times daily are at high risk of developing severe complications and should be advised not to fast.

Those who insist on fasting must discuss with suitable modifications in insulin regimen and precautions for fasting.

<b>Recommended changes to treatment regimen in people with type 2 diabetes who fast during Ramadan</b>	
<b>Before Ramadan</b>	<b>During Ramadan</b>
Controlled with diet & exercise only	Monitor blood glucose regularly, if required Metformin can be added (Low Risk)
Metformin 500 mg three times a day, or sustained release Metformin (Glucophage XR),	Metformin, 1,000 mg at the sunset meal (Iftar), 500 mg at the predawn meal (Suhur) XR formulations help avoiding multiple dose(Low Risk)
Pioglitazone once daily or DPP-4 Inhibitors daily (Sitagliptin or Vildagliptin or Saxagliptin) or their combination with Metformin)	Usually taken twice daily – take after Iftar and Suhoor(Low Risk)
Sulfonylureas once a day, e.g., Glimepiride 4 mg daily or Gliclazide MR 60 mg daily	Dose should be given before the sunset meal (Iftar): adjust the dose based on the glycaemic control and the risk of hypoglycaemia(High Risk)
Sulfonylureas twice a day, e.g., Glibenclamide 5 mg or Gliclazide 80 mg, twice a day (morning and evening)	Use half the usual morning dose at the predawn meal (Suhur) and the full dose at the sunset meal (Iftar), - based on the glycaemic control and the risk of hypoglycaemia (High Risk)