

# South Asian Guidelines for Management of Endocrine Disorders in Ramadan

## Diabetic emergencies including hypoglycemia during Ramadan

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### ABSTRACT

Majority of physicians are of the opinion that Ramadan fasting is acceptable for well-balanced type 2 patients conscious of their disease and compliant with their diet and drug intake. Fasting during Ramadan for patients with diabetes carries a risk of an assortment of complications. Islamic rules allow patients not to fast. However, if patient with diabetes wish to fast, it is necessary to advice them to undertake regular monitoring of blood glucose levels several times a day, to reduce the risk of hypoglycemia during day time fasting or hyperglycemia during the night. Patient with type 1 diabetes who fast during Ramadan may be better managed with fast-acting insulin. They should have basic knowledge of carbohydrate metabolism, the standard principles of diabetes care, and pharmacology of various antidiabetic drugs. This Consensus Statement describes the management of the various diabetic emergencies that may occur during Ramadan.

**Key words:** Diabetic ketoacidosis, fasting, hyperglycemia, hypoglycemia, infection, ketosis

### INTRODUCTION

It is estimated that there are 1.1–1.5 billion Muslims worldwide comprising 18–25% of the world's population.<sup>[1,2]</sup> The population-based epidemiology of Diabetes and Ramadan (EPIDIAR) study involving 12,243 people with diabetes in 13 Islamic countries found that about 43% of people with type 1 diabetes and 79% of people with type 2 diabetes fast during Ramadan.<sup>[3]</sup> Based on a worldwide prevalence of 4.6%, we can estimate that

upto 50 million people with diabetes worldwide fast for a month each year.

The Qura'n (the sacred religious text of Islam, specifically exempts people with a medical condition from the duty of fasting, especially if it might have harmful consequences. People with diabetes fall within this category since this is a chronic metabolic disorder which can place them at high risk for various complications if the pattern and amount of their meals and fluid intake are altered markedly. Nevertheless, many people with diabetes insist on fasting during Ramadan. The decision to fast is usually taken by three people: the person with diabetes, his or her healthcare providers, and a religious advisor. It is therefore of utmost importance that people with diabetes and their healthcare providers are aware of the potential risk associated with fasting. This familiarity and knowledge is as important in India, Pakistan, Bangladesh, Indonesia, Palestine, and the Middle East as it is in Europe, North America, New Zealand, and Australia.

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Fasting in Islam means absolute self-restrain from food, drink, and sex from dawn to sunset which is not a very difficult duty for healthy subjects; nevertheless, it might be difficult or impossible for sick people to cope with fasting, thereby by the mercy of Allah they were exempted from fasting Ramadan. The period of fast may vary depending on the geographical location of the country and the season of the year.<sup>[4]</sup> However, people with diabetes find it psychologically unacceptable not to fast and they do not agree to be considered as ill people, therefore they usually attempt to fast and on most occasions they succeed.

## MAJOR DIABETIC EMERGENCIES ASSOCIATED WITH FASTING

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

- Hypoglycemia
- Hyperglycemia
- Diabetic ketoacidosis
- Dehydration and thrombosis

### Hypoglycemia

Decreased food intake is a well-known risk factor for hypoglycemia. There are no reliable estimates concerning the contribution of hypoglycemia to mortality in type 2 diabetes; however, it is felt that hypoglycemia is an infrequent cause of death in this group of patients. Rates of hypoglycemia are some several folds lower in patients with type 2 diabetes when compared with type 1 diabetes,<sup>[3]</sup> with rates being even lower in patients with type 2 diabetes treated with oral agents.<sup>[3]</sup> Loke SC *et al.* in their prospective cohort study on the effect of various risk factors on hypoglycemia in diabetics who fast during Ramadan reported the rate of hypoglycemia to be 1.6 times higher during the fasting compared with non-fasting periods.<sup>[5]</sup> The difference was smaller than indicated in the EPIDAR study.<sup>[2]</sup> They observed that good metabolic control (<8%) and old age (>60 years) increased RR more than twice, while taking breakfast prior to fasting reduces RR to less than half. The effect of fasting during Ramadan on rates of hypoglycemia in patients with diabetes is not known with certainty. The EPIDAR study<sup>[3]</sup> showed that fasting during Ramadan increased the risk of severe hypoglycemia (defined as hospitalization due to hypoglycemia) some 4.7-fold on patients with type 1 diabetes (from 3 to 14 events/100 people/month) and 7.5-fold in patients with type 2 diabetes (from 0.4 to 3 events/100 people/month). Severe hypoglycemia was more frequent in patients in whom the dosage of oral hypoglycemic agents or insulin was changed and in those who reported a significant change in their life style.<sup>[3]</sup>

### Hyperglycemia

Long-term mortality and morbidity studies in people with diabetes, such as the DCCT and the UKPDS, demonstrated the link among hyperglycemia, microvascular complications, and possible macrovascular complications.<sup>[6,7]</sup> However, there is no information linking repeated yearly episodes of short-term hyperglycemia and diabetes-related complications during Ramadan fasting. Control of glycemia in patients with diabetes who fasted during Ramadan has been reported to deteriorate, improve, or show no change.<sup>[8-12]</sup> The extensive EPIDIAR study showed a 5-fold increase in the incidence of severe hyperglycemia (requiring hospitalization) during Ramadan in patients with type 2 diabetes (from 1 to 5 events/100 people/month) and an approximately 3-fold increase in the incidence of severe hyperglycemia with or without ketoacidosis in patients with type 1 diabetes (from 5 to 17 events/100 people/month).<sup>[3]</sup> Hyperglycemia may have been due to excessive reduction in dosage of medications to prevent hypoglycemia. Patients who reported an increase in food and/ or sugar intake had significantly higher rates of severe hyperglycemia.<sup>[3]</sup>

### Diabetic ketoacidosis

The risk of Diabetic ketoacidosis (DKA) is thought to be higher during Ramadan (at least theoretically) as fasting will result in hypoinsulinemia and hyperglucagonemia and ketones body formation and eventually development of DKA.<sup>[13]</sup> However, this remains just a speculation as there are no studies showing that incidence of DKA is actually increased during Ramadan, as a matter of fact there are some evidence against this assumptions. For instance, Kadika reported that only 2.5% of Libyan diabetes in a study developed DKA during Ramadan fasting; similarly in another study Abusreiwil reported that 1.8% of type 1 diabetes patients developed DKA during Ramadan fasting figures that are comparable with the non-fasting months.<sup>[14,15]</sup> Similarly, Rafik *et al.* 2009 reported that there was no increase in the incidence and mortality from DKA during Ramadan which might indicate that Ramadan fasting is not a significant risk factor for DKA.<sup>[16]</sup>

Risks of DKA associated with Fasting in Patients with Diabetes:

- Patients with diabetes, especially those with type 1 diabetes, who fast during Ramadan, are at an increased risk for development of DKA, particularly if they are grossly hyperglycemic before Ramadan.<sup>[3]</sup> In addition, the risk for DKA may be further increased due to excessive reduction of insulin dosages based on the assumption that food intake is reduced during the month.

- Patients with diabetes exhibit a hypercoagulable state due to an increase in clotting factors and impaired fibrinolysis. Increased blood viscosity secondary to dehydration may enhance the risk of thrombosis.
- Additionally, patients are at high risk if they have moderate to severe hyperglycemia (average blood glucose 150–300 mg/dl) before fast, renal insufficiency, advanced micro- and macrovascular complications and other comorbid conditions.
- Dose reduction in the setting of acute infection that becomes insufficient to meet the stress demands induced by raised catecholamines and steroids.

### Dehydration and thrombosis

Limitation of fluid intake during the fast, especially of prolonged, is a cause of dehydration. Limitation of fluid intake during the fast especially if prolonged is a cause of dehydration. Dehydration may become severe in hot and humid climates and among individuals who perform hard physical labor, all conditions that result in excessive perspiration. In addition, hyperglycemia can result in osmotic diuresis and continue to volume and electrolyte depletion. Orthostatic hypotension may develop especially in patients with pre-existing autonomic neuropathy.

## MANAGEMENT

It is worth emphasizing that fasting for patients with diabetes represent an important personal decision that should be made in light of guidelines for religious exemptions and after careful considerations of the associated risks following ample decision with the treating physicians. The ritual of fasting in the month of Ramadan is compulsory for all mature followers of Islam, but exemptions are there to accommodate individuals who cannot fast for various reasons. These includes, but are not limited to, very old/very young, the sick, the travellers, pregnant and lactating women, and women during their postdelivery and menstrual periods. Those people who fall into the above-specified categories and avail themselves of the provision of exemption should compensate for the missed/lost days of fasting of Ramadan by various means described in religion. Individuals who are permanently incapacitated are also given leverage to compensate accordingly. Explanation of these issues to high-risk patients will help reduce the incidence of diabetic emergencies.

Patients who insist on fasting need to be aware of the associated risks and be ready to adhere to the recommendations of their healthcare providers to achieve a safer fasting experience.

## PREVENTION OF COMPLICATIONS/ EMERGENCIES

### General considerations

Several important issues deserve special attention. Patients should be encouraged to maintain their good dietary habits and to resist any temptation to break their dietary restrictions, as during Ramadan, social functions are frequent and food is a common way of hospitality. It is always emphasized that adherence to diabetic diet is essential during Ramadan in order to avoid the potential risk of hypoglycemia. This is particularly important since some patients may gorge excessively after the fast is broken and others may completely stop their medication during the holy month.

The following life style should be re-enforced before and during Ramadan:

- Arrange your pre-Ramadan fasting consultation with the doctor or diabetes educator to review your control and feasibility of fasting safely and make note of the changes you need to do during the fast.
- Record weight daily and inform doctor of a change of more than 2 kg.
- Learn the warning symptoms of hyperglycemia and hypoglycemia.
- Take medication regularly as instructed.
- Continue gentle to moderate physical activity particularly in the evening.
- Do not overeat after the fast is broken and minimize eating sweet or fatty foods.
- Record daily diet intake to help prevent excessive or very low consumption.
- If a complication occurs, break the fast immediately and seek medical help. Resist any temptation to persevere with the fasting till the end of the day.
- Test blood glucose before and 2 hours after Iftar, before Sohur and at mid day.
- At the end of Ramadan, reflect on your achievements and problems and feed back to the doctor/diabetes educator.

### Frequent monitoring of glycemia

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. Regular glucose testing will help in early detection of glycemic swings and minimize complications.

Testing 2 hours after the dawn meal (Sahoor) is necessary as well. It should be stressed that its essential for patients at least do frequent SMBGs in the first few days of fast

so that they become aware of their glycemic profile with the changed level of meal intake and with altered dosage of medications and/or insulin. Thereafter they can reduce the frequency of testing.

### 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. If Tarawaih prayer (multiple prayers after the sunset meal) is performed, then it should be considered a part of the daily exercise program. In some patients with poorly controlled type 1 diabetes, exercise may lead to extreme hyperglycemia.

### Breaking the fast

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. 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. Finally, the fast should be broken if blood glucose exceeds 300 mg/dl (16.7 mmol/l). Patients should avoid fasting on “sick days.”

## MANAGEMENT OF DIABETES DURING RAMADAN

The guidelines suggested in other South Asian Consensus Statements should be followed to minimize emergencies.

## 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. It is common practice that the intake of foods rich in carbohydrates and saturated fats is increased during Ramadan. Appropriate counseling should be given to avoid this practice, and agents that were previously prescribed for the management of elevated cholesterol and triglycerides should be continued.

## CONCLUSION

Apart from a detailed understanding of the management of diabetes during Ramadan, healthcare providers should have in-depth understanding of the diabetic emergencies

encountered during this holy month. They should be aware of the pathophysiology, as well as preventive and management strategies of these medical conditions.

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