South Asian Guidelines for Management of Endocrine Disorders in Ramadan

South Asian Consensus Guideline: Use of insulin in diabetes during Ramadan

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ABSTRACT

A person with diabetes mellitus (DM) has every right to perform the ritual of fasting during Ramadan. In daily practice we come across both type 1 and type 2 DM who wish to fast. This Consensus Statement describes the pre-Ramadan assessment, planning, prescription, management, and monitoring of patients on insulin, who wish to fast.

Key words: Aspart, basal insulin, detemir, glargine, lispro, premixed insulin, regular insulin, type 1 diabetes, type 2 diabetes

Introduction

Fasting during Ramadan is one of the principal rituals and prayers for the Muslim. They remain on fast from dawn to sunset and abstain from taking food, drinks, and medications. Again they can take plenty of food, drinks, fruits at night according to own choice, customs, tradition, and habits. The type of food and its compositions are quite different from other days of the year. There are lots of metabolic changes during fasting state. When we take food insulin is released from beta-cells of pancreas to utilize fuel taken for instant energy production and subsequently to promote storage of fuel as glycogen and fat in muscle, liver, and adipose tissue. During the fasting state due to glucagon and other counter-regulatory hormones and low insulin secretion, there is release of glucose by increased hepatic glucose output and release of fatty acids from adipose tissue to supply vital organs. Considering these metabolic changes we have to adjust the management of diabetes during Ramadan. In our daily practice we come across both type 1 and type 2 DM and we have to manage them during the Ramadan period. Planning should be important to decide, whether they can fast and if they can fast how their diabetes can be managed while performing all the rituals of Ramadan.[1]

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A person with diabetes has every right to perform this ritual fasting. But when he or she intends to perform fasting in Ramadan, they should plan at least 3 months before, so that certain factors can be assessed by the physician.

1. Assessment of glycemic status- Avoid fasting if HbA_{1c} > 10%, or in the presence of frequent hypoglycemia, hypoglycemic unawareness, high fluctuation of blood glucose profile.
2. Assessment of complications and other comorbid conditions which may be aggravated by prolonged fasting, particularly chronic kidney disease, hepatic failure, severe cardiac problems- unstable angina, heart failure, etc.

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3. Change of diet and meal plan according to own customs and habit for Ramadan itself keeping daily calorie requirement same.
4. Possibility of dehydration and electrolyte imbalance should be looked for.

Risk Stratification

Very high risk

- Severe hypoglycemia within the last 3 months prior to Ramadan
- Patient with a history of recurrent hypoglycemia
- Patients with hypoglycemia unawareness
- Patients with sustained poor glycemic control
- Ketoacidosis within the last 3 months prior to Ramadan
- Hyperosmolar hyperglycemic coma within the last 3 months prior to Ramadan and acute illness
- Patients on dialysis.

High risk

- Patients with renal insufficiency
- Patients with advanced macrovascular complications – coronary, cerebrovascular and severe retinopathy
- Autonomic neuropathy – gastro paresis and postural hypotension
- People living alone that are treated with multiple insulin injection or sulfonylureas
- Old age with ill health.

Moderate risk

- Well-controlled patients treated with short-acting insulin secretagogues such as repaglinide or nateglinide.

Low risk

- Well-controlled patients treated with diet alone, metformin, or a thiazolidinedione who are otherwise healthy.

Always consider to avoid fasting in the presence of

- Pregnancy and lactation
- Acute peptic ulcer
- Severe bronchial asthma, pulmonary tuberculosis
- Cancer
- Overt cardiovascular diseases – recent MI, sustained angina
- Hepatic dysfunction.

Plan

1. Whether they can fast by checking renal, hepatic functions, electrolyte imbalance, infections etc.
2. Plan meals including composition, frequencies
3. Ensure adequate hydration and electrolyte during fasting state.[2,3]

Management of Patients with Type 1 Diabetes

Current recommendations aim at intensive glycemic management in patients with diabetes type 1 diabetes, which requires use of multiple daily insulin injections (three or more) or use of continuous subcutaneous insulin infusion through pump therapy.[4,5]

Few of the type 1 diabetes patients prefer to fast at Ramadan, and most of them change their insulin regimens immediately before, during, and a few days after this month.

Basal-bolus regimen is the preferred protocol of management as it is thought to be safer, with fewer episodes of hyper- and hypoglycemia.

Once- or twice-daily injections of intermediate or long-acting insulin along with pre meal rapid-acting insulin is the management of choice and it is unlikely that other regimens, including one or two injections of intermediate-, long-acting, or premixed insulin, would provide adequate insulin therapy.

Insulin detemir or glargine demonstrated a significant decline in mean plasma glucose with minimal episodes of mild hypoglycemia. Similar results seen with insulin glulisine, lispro, or aspart used instead of regular insulin in combination with intermediate-acting insulin injected twice a day. Compared with those who did not fast during Ramadan, patients with type 1 diabetes on insulin pump therapy who fasted showed a slight improvement in A_{1c} without increasing the risk of hypoglycemia.[6,7]

Management of Patients with Type 2 Diabetes on Insulin

Necessary levels of basal insulin are required to prevent fasting hyperglycemia. Judicious use of intermediate- or long acting insulin preparations plus a short acting insulin administered before meals appears to be effective.

One injection of a long-acting or intermediate-acting insulin can be useful in some patients as long as the dosage is appropriately individualized; however, most patients will require rapid- or short-acting insulin along with the basal insulin at meals, usually the evening meal typically comprises of a larger caloric load.

Use of a rapid acting insulin analog instead of regular human insulin before meals in patients with type 2 diabetes who fast during Ramadan is associated with less

hypoglycemia and smaller postprandial glucose excursions. It is recommended that insulin analogs be used in Ramadan in view of their safety and tolerability.

Hypoglycemia, though less frequent, is still a risk, especially in elderly patients or who have required insulin therapy for a number of years. This can be reduced by using basal insulin analogs such as insulin detemir or glargine, or rapid acting insulin analogs such as aspart, lispro, or glulisine.

Recommended changes to insulin regimen in patients with type 2 diabetes who fast during Ramadan

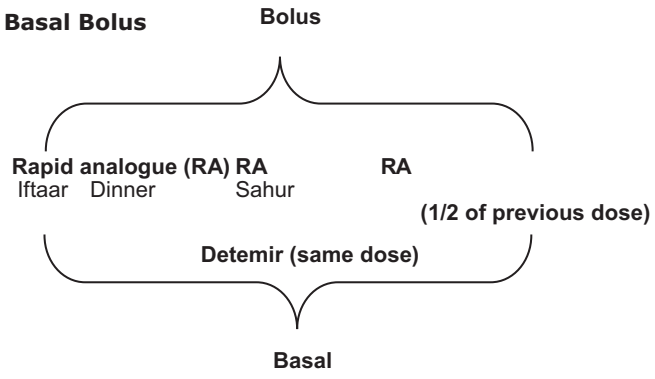
Change of insulin regimen should be customized and individualized according to food habit, food composition adopted specially during the fasting state and also the previous insulin regime the patient was using prior to the Ramadan month,

- **If patient is on premix insulin therapy**
  - Use the usual morning dose at the sunset meal (Iftar) and half the usual evening dose at predawn (*sahur*), e.g., 70/30 premixed insulin 30 units in the morning and 20 units in the evening before Ramadan (BHI 30 or BIAsp 30), during Ramadan recommended dose will be 30 units in evening and 10 units at *sahur*; also consider changing to basal plus bolus.

BIAsp 30/ BHI 30

Before Ramadan	During Ramadan
BIAsp 30 twice daily Morning Dinner (30 U) (20 U)	Iftaar Dinner Sahur Full M. Dose I/2 Din. Dose (30 U) (10 U)

- **If on Basal Bolus insulin therapy**
  - ***Bolus portion***
    - Morning dose: Transfer full dose at *iftaar*.
    - Evening dose: Transfer ½ dose at *sahur*.
    - Lunch dose: If patient takes dinner, transfer the full dose at dinner.
  - ***Basal portion***
    - If patient is on NPH: 50% dose at *sahur*.
    - If patient is on basal analog: Same dose at bed time.



- **If on split insulin therapy with short acting and intermediate acting**

Split with three time short acting and NPH at dinner

Morning short acting:	transfer full dose at *iftaar*
Lunch short acting:	transfer full dose at dinner if taken
Dinner short acting:	transfer ½ dose at *sahur*
Intermediate acting:	Keep ½ dose at *sahur*.

Split short acting and NPH twice daily

Morning short acting:	transfer full dose at *iftaar*
Morning intermediate:	transfer full dose at *iftaar*
Dinner short acting:	transfer ½ dose at *sahur*
Dinner intermediate:	transfer ½ dose at *sahur*.

acting

Before Ramadan	During Ramadan
Short Acting + Intermediate R + R + R + NPH	Iftaar Dinner Sahur M-R + L-R + N- ½ R + ½ NPH
Short Acting + Intermediate R + 0 + R NPH + 0+ NPH	Iftaar Dinner Sahur R + 0 + ½ R NPH + 0 + ½ NPH

- **If on bi-phasic insulin (BIAsp 30 or BILis 25 or BHI 30) + Metformin**
  - Give *iftaar* (evening dose) as same as for normal breakfast.
  - Take Metformin at *sahur* (early morning meal) and may not require insulin during *sahur* (early morning meal).
  - But if midday blood sugar control not good, add insulin at *sahur* (early morning meal), the dose being 50% of the normal evening dose.

NB: Adjustements in dosage of short acting insulin at *sahur* to be done by monitoring blood glucose 2 hours after *sahur*. For the long acting insulin dose at *sahur,* monitor the blood glucose levels midday and before iftar.

Advantages of Rapid Acting Analogs compared to Regular Human Insulin During Ramadan

- Rapid onset of action and higher peak with same dose
- Better control of post prandial blood sugar
- Lesser risk of hypoglycemia especially late postmeal period during the fast
- Offers meal time flexibility as it can be given just before the meals or even after completing the meals
- Safe to use in patients with renal and hepatic impairment (Insulin Aspart)
- Safe in pregnancy (Insulin Aspart, Lispro) with better glycemic control.

Advantages of Premix Analogs Compared to Human Premix Insulins

- Rapid onset of action
- Better control of post prandial blood sugar
- Lesser risk of night time hypoglycemia and hypoglycemia during the late postmeal period while the patient is fasting.
- Offers meal time flexibility as it can be given just before the meals or even after completing the meals
- Can be started once daily before *iftar (evening meal)* and then if needed can be upgraded to twice daily (*iftar and sahur)* and helps to reach target glycemic control in majority of patients without significant risk of hypoglycemia.

These newer insulins have made possible the near-physiological replacement of prandial as well as basal insulin with much convenience and have provided physicians with the appropriate tools to overcome the obstacles to improve metabolic control during without increasing the risk for hypoglycemia and also improve diabetes outcomes.

Blood Glucose Monitoring During Ramadan

- Blood glucose level monitoring during fasting
  - to recognize subclinical hypo- and hyperglycemia.
- 2 hours post-*sahur* and 1/2 hour pre *iftaar*
  - to pick subclinical hypoglycemia.
- 2 hours post-*iftaar*/dinner
  - to pick subclinical hyperglycemia.
- Adjust insulin dose at 3 days' interval
  - Pre-*iftaar*: adjust basal insulin dose
  - 2 hours post-*iftaar*: adjust *iftaar* bolus insulin dose
  - 2 hours postdinner: adjust dinner bolus insulin dose
  - 2 hours post-*sahur*: adjust *sahur* bolus insulin dose.

If blood glucose is noted to be low, fasting must be broken.

If blood glucose > 300 mg/dl or 16.66 mmol/L, ketones in urine should be checked.

Conclusion

It is possible for people with diabetes to fast safely during Ramadan, but requires careful planning in order to avoid problems that could be serious and have long-term effects. The choice of insulin therapy is decided by the previous therapy that the patient is taking and also the blood glucose profiles. The major objective of insulin therapy during Ramadan is to provide adequate insulin to prevent the post meal hyperglycemia and also prevent hypoglycemia during the period of fast. With the use of analogues these objectives may be met more easily.

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