Diabetes and Ramadan: A Challenge and an Opportunity?

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Diabetes, Culture and Religion; Fasting

• Fasting is an important part of many religions across the globe

• The duration of fast per day, the number of days and the type of fast varies greatly across religions

• Healthcare professionals (HCP) treating people with diabetes need to understand the impact of the religious/cultural practices of their patients on their diabetes

• Consequently, this can improve the skills of HCP and the safety of people with diabetes wishing to fast.
Ramadan and diabetes

1 of the 5 pillars of Islam: Fasting for a month from dawn to sunset

Fasting involves refrain from intake of:
- Food
- Liquids
- Oral Medications

Religious fasting is not intended to create excessive hardship and ill individuals are exempt from fasting

However, many Muslims with diabetes choose to fast during Ramadan for religious, cultural or social reasons

Patients with diabetes worldwide may fast during Ramadan:
- >148 million Muslims with diabetes worldwide
- >116 million

Depending on the season and geographical location, the duration of fast will vary from 12–20 hours

Case Scenario

- Female 42 years of age. Works as a teacher
- Weight 70 kg; BMI 27 kg/m² BP 130/74
- Diagnosed with diabetes 6 years ago
- Mild background retinopathy. Renal function is normal
- Rx: Metformin and Sulphonylurea

- She attends your clinic before Ramadan and her latest HbA1c is 8.1%.
- She experienced symptoms of hypoglycaemia twice during busy days at work
- She always fasted Ramadan and she’s keen to fast and she asks for your advice
To Fast or not to Fast?

Level of risk grade?

How to Assess?

How to minimize her risk if she fasts Ramadan?
The majority of Muslims with T2DM fasted every day during Ramadan $^1,^2$

**Ramadan Prospective Study$^2$**

<table>
<thead>
<tr>
<th>Type</th>
<th>Fasted for at least 15 days</th>
<th>Fasted every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>72.3%</td>
<td>48.5%</td>
</tr>
<tr>
<td>Type 2</td>
<td>86.3%</td>
<td>57.3%</td>
</tr>
<tr>
<td>Overall</td>
<td>85.3%</td>
<td>56.7%</td>
</tr>
</tbody>
</table>

**CREED Study$^1$**

- ≥15 days (<every day): 67.6%
- Every day: 32.4%
- <15 days: 5.9%

94.2%

2. Hassanein et al, IDF 2017 Poster presentation
Sleep patterns change during Ramadan

Comparison of sleep and meal patterns during Ramadan and non-Ramadan periods

- Physiological changes are most marked in countries at higher altitudes with more daylight hours
- Sleeping patterns are often altered during Ramadan$^{1,2}$
- The impact of Ramadan on sleep includes:$^{2,3}$
  - Decreased total sleep time
  - Delayed sleep
  - Decreased sleep period time
  - Decreased REM sleep duration
  - Decreased proportion of REM sleep
  - Increased proportion of non-REM sleep

Blood glucose levels rise rapidly after iftar in patients with diabetes

- In the CGM study there was no difference in number of glycaemic events during Ramadan compared with pre-Ramadan.
- Major inter- and intra-individual variability in CGM profiles were observed.
- Rapid rise in blood glucose after iftar was recorded.

Mean CGM profiles from patients with diabetes before and during Ramadan.

CGM, continuous glucose monitoring

Key risks associated with Ramadan fasting in patients with diabetes


- Hypoglycaemia <70 mg/dL (3.9 mmol/L)
- Hyperglycaemia >300 mg/dL (16.7 mmol/L)
- Diabetic ketoacidosis
- Dehydration and thrombosis

Summer fasting periods can last up to 20 hours per day and are often undertaken in hot and humid conditions which can exacerbate the risks.
## T2D Confirmed Hypoglycemia

<table>
<thead>
<tr>
<th>CREED Study</th>
<th>BR - T2DM (n=3250)</th>
<th>DR-T2DM (n=3250)</th>
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<tr>
<td>Patients reporting hypoglycemia</td>
<td>175 (5.4)</td>
<td>285 (8.8)</td>
</tr>
</tbody>
</table>

Diabetes and Ramadan *International Prospective Study*¹


Hypoglycemia before and during Ramadan among DM Type II *(Eligible population N=1885)*

<table>
<thead>
<tr>
<th>Hypoglycemia</th>
<th>Period 4 weeks before Ramadan</th>
<th>During Ramadan</th>
<th>P value ²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of patients</td>
<td>%*</td>
<td>Number of patients</td>
</tr>
<tr>
<td>Confirmed hypoglycemia</td>
<td>85</td>
<td>4.9</td>
<td>171</td>
</tr>
<tr>
<td>Severe hypoglycemia</td>
<td>4</td>
<td>0.2</td>
<td>14</td>
</tr>
</tbody>
</table>

**CREED Study²**

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¹. Hassanein et al, IDF 2017 Poster presentation
CREED Study: Incidence of hypoglycaemia during Ramadan for individuals who had no episodes of hypoglycaemia before Ramadan (black bars) and for individuals who did have episodes of hypoglycaemia before Ramadan (grey bars).
DKA in Ramadan

A prospective multi-country observational trial to compare the incidences of diabetic ketoacidosis in the month of Ramadan, the preceding month, and the following month (DKAR international)


(Continued from previous page)

Conclusion: In concordance with DKAR1, DKAR international showed higher rates of DKA during Ramadan when compared to preceding Lunar month (Shaaban). In Shawal, however, the rates of DKA admission were higher than the average monthly DKA admissions. The duration of acidosis was longer in Ramadan group and positively correlated with duration of diabetes. Many patients did not receive structured education about diabetes and fasting Ramadan. Our study calls for formal pre-Ramadan education and enforces the need for advice against fasting in patients who already experienced DKA in the months preceding Ramadan.

Keywords: Ramadan, DKA, Length of stay, Length of acidosis, Shaaban
Invited review

Diabetes and Ramadan: Practical guidelines

Mohamed Hassanein a,*, Monira Al-Arouj b, Osama Hamdy c, Wan Mohamad Wan Bebaker d, Abdul Jabbar e, Abdulrazzaq Al-Madani f, Wasim Hanif g, Nader Lessan h, Abdul Basit i, Khaled Tayeb j, MAK Omar k, Khalifa Abdallah l, Abdulaziz Al Twaim m, Mehmet Akif Buyukbese n, Adel A. El-Sayed o, Abdullah Ben-Nakhi b, On behalf of the International Diabetes Federation (IDF), in collaboration with the Diabetes and Ramadan (DAR) International Alliance

a Dubai Hospital, Dubai Health Authority, Dubai, United Arab Emirates

HCPs and religious leaders must deliver the same message regarding which patients should not fast

- Not all patients will consult HCPs prior to fasting
- Some patients prefer to discuss fasting with their local imam rather than their physician\(^1,2\)
- Disparity has existed between medical and religious advice on diabetes and Ramadan fasting


IDF-DAR Practical Guidelines include the religious opinion from the Mofty of Egypt

Category 1: very high risk
Listen to medical advice
MUST NOT fast

Category 2: high risk
Listen to medical advice
Should NOT fast

Category 3: moderate/low risk
Listen to medical advice
Decision to use licence not to fast based on discretion of medical opinion and ability of the individual to tolerate fast

In all categories people with diabetes should follow medical opinion if the advice is not to fast due to high probability of harm.

It should be noted that some countries may have different religious views.

Both diabetes and patient characteristics influence the risk of Ramadan fasting

- Safety of fasting is paramount and various elements should be considered when quantifying the risk for such patients
- Risk quantification must be carried out on an individual basis for each patient looking to fast
- The care given must be personalised according to the patient’s specific circumstances

**Factors for risk quantification**

<table>
<thead>
<tr>
<th>Type of diabetes</th>
<th>Patient medications</th>
<th>Individual hypoglycaemic risk</th>
<th>Presence of complications and/or comorbidities</th>
<th>Individual social and work circumstances</th>
<th>Previous Ramadan experience</th>
</tr>
</thead>
</table>


1. Al-Arouj M. 2015.
Pre-Ramadan diabetes education should focus on six key areas

- When to break the fast
- Risk quantification
- Blood glucose monitoring
- Fluids and dietary advice
- Exercise advice
- Medication adjustments

Key components of a Ramadan-focused educational programme

Impact of Day-time Hypoglycemia

% of patients who broke the fast due to hypoglycemia

- Breaking the fast: 65%
- Not breaking the fast: 31%
- Missing: 4%

Individualisation of treatment is key to the management of diabetes during Ramadan

- Despite the risks, many people with diabetes will fast during this month.
- Most patients with T2DM can do so safely as long as medical advice is sought and followed prior to and during fasting.

**Before**
- Pre-Ramadan assessment
  - Categorise risk
  - Create individualised management plan
  - Provide advice on self-management

**During**
- Individualised management plan
  - Nutritional plan
  - Medication adjustments
  - SMBG

**After**
- Post-Ramadan follow-up
  - Discuss medication and regimen readjustments

SMBG, self-monitoring of blood glucose; T2DM, type 2 diabetes

Impact of Patient Education on Hypoglycaemic Events

![Bar graph showing the impact of patient education on hypoglycaemic events. The graph compares education and no education groups, with a 4 times increase in hypoglycaemic events in the no education group.]

© 2010 The Authors.
Journal compilation © 2010 Diabetes UK. *Diabetic Medicine*, 27, 327–331
Patients are advised to monitor their blood glucose several times during the day\(^1\)

Levels should be checked at any time when symptoms of hypoglycaemia are recognised.

1. Pre-dawn meal (suhoor)
2. Morning
3. Midday
4. Mid-afternoon
5. Pre-sunset meal (iftar)
6. 2-hours after iftar
7. At any time when there are symptoms of hypoglycaemia/hyperglycaemia or feeling unwell
# The 10 principles of the RNP

1. Divide an adequate amount of calories between suhoor, iftar and if necessary, 1–2 snacks

2. Meals should be balanced, with 45–50% carbohydrate, 20–30% protein and <35% fat

3. Design meals using the “Ramadan plate” method

4. Avoid sugar-heavy desserts

5. Low-GI, high-fibre carbohydrates are preferable

6. Hydration should be maintained between meals by drinking water and non-sweetened beverages

7. Take suhoor as late as possible

8. Adequate protein and fat should be consumed at suhoor to induce satiety

9. Iftar should begin with water to rehydrate, and 1–2 dates to raise blood glucose

10. Low calorie snacks such as fruit, nuts, or vegetables may be consumed between meals

GI, glycaemic index; RNP, Ramadan Nutrition Plan

Diabetes and Ramadan *International Prospective Study*


Anti-diabetic medications/ doses change for Ramadan

<table>
<thead>
<tr>
<th>Medication Type</th>
<th>Change (%)</th>
<th>No Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>48.9%</td>
<td></td>
</tr>
<tr>
<td>Oral Anti-diabetic drugs</td>
<td>35.6%</td>
<td></td>
</tr>
<tr>
<td>Insulin</td>
<td>63.3%</td>
<td></td>
</tr>
<tr>
<td>GLP1 Receptor Agonists</td>
<td>5.6%</td>
<td></td>
</tr>
</tbody>
</table>

Hassanein et al, IDF 2017 Poster presentation
All patients should break their fast if:

- Blood glucose <70 mg/dL (3.9 mmol/L)
  - Re-check within 1 h if blood glucose 70–90 mg/dL (3.9–5.0 mmol/L)
- Blood glucose >300 mg/dL (16.7 mmol/L)**
- Symptoms of hypoglycaemia or acute illness occur

Structured education for all patients, to include:
1. Risk quantification
2. The role of SMBG
3. When to break the fast
4. When to exercise
5. Fluids and meal planning
6. Medication adjustments during fasting

To stratify risk and develop an individualised management plan
1. Detailed history
2. Patient’s experience during previous Ramadan
3. Patient’s ability to self-manage diabetes

All patients should schedule a visit with HCP 6–8 weeks before Ramadan

Frequency of SMBG:
- Very high risk group: several times a day
- High risk group: 1–2 times a day
- Moderate/low risk group: 1–2 times a day

**Metformin**
Daily dose remains unchanged
Immediate release: OD – Take at iftar; BID – Take at iftar and suhoor; TID – Morning dose at suhoor, combine afternoon and evening dose at iftar
Prolonged release: Take at iftar
| **Metformin** | Daily dose remains unchanged  
Immediate release: OD – Take at iftar; BID – Take at iftar and suhoor; TID – Morning dose at suhoor, combine afternoon and evening dose at iftar  
Prolonged release: Take at iftar |
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Acarbose</strong></td>
<td>No dose modifications</td>
</tr>
</tbody>
</table>
| **TZDs** | No dose modifications  
Dose can be taken with iftar or suhoor |
| **Short-acting insulin secretagogues** | TID dosing may be reduced/redistributed to two doses taken with iftar and suhoor |
| **GLP-1 RAs** | Once appropriate dose titration has been achieved no further dose modifications are needed |
| **DPP-4 inhibitors** | No dose modifications |
| **SU** | Switch to newer SU (gliclazide, glimepiride) where possible, glibenclamide should be avoided  
OD – Take at iftar.* Dose may be reduced in patients with good glycaemic control  
BID – Iftar dose remains unchanged.** Suhoor dose may be reduced in patients with good glycaemic control |
| **SGLT2 inhibitors** | No dose modifications  
Dose should be taken with iftar  
Extra clear fluids should be ingested during non-fasting periods  
Should not be used in the elderly, patients with renal impairment, hypotensive individuals or those taking diuretics |

**Insulin therapy**

Switch to insulin analogues where possible

- **Long- or intermediate-acting basal insulin:**
  - OD – NPH*/detemir/glargine/degludec. Take preferably at iftar. Reduce dose by 15–30%.
  - BID – NPH/detemir/glargine. Take usual morning dose at iftar. Reduce evening dose by 50% and take at suhoor.

- **Rapid- or short-acting prandial/bolus insulin:**
  - Take normal dose at iftar. Omit lunch-time dose. Reduce suhoor dose by 25–50%.

- **Premixed insulin:**
  - OD – Take normal dose at iftar.
  - BID – Take usual morning dose at iftar. Reduce evening dose by 25–50% and take at suhoor.
  - TID – Omit afternoon dose. Adjust iftar and suhoor doses.

Dose titration should be performed every three days and dose adjustments made according to BG levels.

<table>
<thead>
<tr>
<th>Fasting/Pre-iftar/Pre-suhooor BG</th>
<th>Pre-iftar**</th>
<th>Post-iftar**/Post-suhooor***</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 70 mg/dL (3.9 mmol/L) or symptoms</td>
<td>Reduce by 4 units</td>
<td>Reduce by 4 units</td>
</tr>
<tr>
<td>70–90 mg/dL (3.9–5.0 mmol/L)</td>
<td>Reduce by 2 units</td>
<td>Reduce by 2 units</td>
</tr>
<tr>
<td>90–126 mg/dL (5.0–7.0 mmol/L)</td>
<td>No change required</td>
<td>No change required</td>
</tr>
<tr>
<td>126–200 mg/dL (7.0–16.7 mmol/L)</td>
<td>Increase by 2 units</td>
<td>Increase by 2 units</td>
</tr>
<tr>
<td>&gt; 200 mg/dL (16.7 mmol/L)</td>
<td>Increase by 4 units</td>
<td>Increase by 4 units</td>
</tr>
</tbody>
</table>

- **Insulin pump:**
  - Basal rate – Reduce dose by 20–40% in the last 3–4 h of fasting. Increase dose by 0–30% early after iftar.
  - Bolus rate – Normal carbohydrate counting and insulin sensitivity principles apply.

Summary

- The rising prevalence of diabetes in the Muslim population, combined with the high numbers that participate in fasting, creates a pressing need for effective guidance for the management of diabetes during Ramadan.

- The *IDF-DAR Practical Guidelines* have been designed to provide HCPs with background and practical information in order to optimise care for patients with diabetes who plan to fast during Ramadan.

- Individualised Ramadan-specific treatment regimens should be provided for each patient, which are sensitive to regional and cultural factors.

- Education, communication and accessibility are all critical to the success of the guidance provided in these guidelines.

- More research is required to increase understanding and safety of Diabetes and Ramadan.
Thank You

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