

Australian Diabetes Society Position Statement:

Management of people with diabetes who choose to fast during Ramadan

Authors

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Purpose of the Position Statement

To provide healthcare providers with:

1. An understanding of the significance of Ramadan for Muslims with diabetes.
2. Knowledge of the implications & potential complications of fasting during Ramadan
3. Practical recommendations and strategies to safely and confidently provide management advice to people with diabetes who choose to fast during Ramadan.

SIGNIFICANCE OF RAMADAN

What is Ramadan and how it is performed?

During the holy month of Ramadan, one of the five pillars of Islam, Muslims refrain from food, water, smoking and sexual activities from dawn to sunset to further understand human suffering and allow for spiritual growth. Depending upon the geographical location and season, the fast may extend up to 23 hours (1). Currently, in Australia, the average fasting hours per days is about 12 for most capital cities. Usually, two meals are consumed, Suhoor, before dawn, and Iftar, after sunset (2-4). During the non-fasting period, sunset to dawn, some individuals may consume large quantities of carbohydrate rich meals as there are no limitations on food and fluid consumption during this period(5).

Fasting during Ramadan for people with diabetes

Whilst fasting during Ramadan is compulsory for healthy adult Muslims, the Koran exempts those with chronic illnesses, such as diabetes, the elderly and women who are pregnant, menstruating or breastfeeding (1). Guidelines by the International Diabetes Federation (IDF), likewise advise against the absolute fasting for people with diabetes (2, 4). However, globally, up to 50 million people with diabetes will choose to fast during Ramadan (6), despite their health exemptions, to gain a closer spiritual connection to God (2). The population-based The Epidemiology of Diabetes and Ramadan (EPIDIAR) study (6) demonstrated that 42.8% of Muslims with type 1 diabetes and 78.7% of Muslims with type 2 diabetes, fasted for at least 15 days during Ramadan (6). Therefore, it is important healthcare providers are equipped to offer advice to Muslims with diabetes who choose to fast in order to avoid the common potential complications, such as hypoglycaemia, hyperglycaemia, and diabetic ketoacidosis (6).

Challenges of healthcare delivery during Ramadan

Barriers for people with diabetes receiving optimal and specific care during this period include insufficient provision of timely education and advice (7), coupled with a lack of relevant and necessary experience by physicians (8). Furthermore, many Muslims find it difficult to notify their treating physician about their intent to fast during Ramadan, as some consider it a sensitive subject (8) believing they will be advised against fasting.

RECOMMENDATIONS FOR THE HEALTHCARE PROVIDER

As a healthcare provider, it is important to provide education and careful planning, as below, usually one to two months before Ramadan begins, in a culturally sensitive manner.

Providing targeted education

Education topic	Principles discussed
Self-blood glucose monitoring	<ul style="list-style-type: none"> ▪ Emphasising the importance of regular blood glucose monitoring if <ul style="list-style-type: none"> ○ on sulphonylureas and insulin ○ concerned about hypoglycaemia or feel unwell. ▪ Reassure the person that administering insulin and measuring blood glucose through a finger prick device does not break the fast (9-11). ▪ For those on insulin, especially for people with type 1 diabetes, continuous or flash glucose monitoring, if available, is advisable. (4) ▪ Recommended timing of when to check blood glucose (4) <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <ol style="list-style-type: none"> 1. Pre-dawn meal (suhoor) 2. Morning 3. Midday 4. Mid-afternoon 5. Pre-sunset meal (iftar) 6. Two hours after iftar 7. Any time when unwell / symptoms of hyper or hypoglycaemia </div>
Hypoglycaemia management	<ul style="list-style-type: none"> ▪ Educating about hypoglycaemia, ensuring people with diabetes are able to recognise symptoms of and manage hypoglycaemia including understanding when to seek help (11-13) ▪ Opportunity to engage with Diabetes Educators
Safe blood glucose targets	<ul style="list-style-type: none"> ▪ Advising when it is necessary to break the fast (4): <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <ul style="list-style-type: none"> ○ Blood glucose < 3.9 mmol/L ○ Blood glucose > 16.6 mmol/L ○ Symptoms of hypoglycaemia or acute illness </div>

	<ul style="list-style-type: none"> ▪ Those on insulin pump technology may suspend their pump at a blood glucose level of < 5 mmol/L and cease fasting if blood glucose is < 3.9 mmol/L (4)
Ketone Monitoring	<ul style="list-style-type: none"> ▪ For Muslims with type 1 diabetes with blood glucose levels > 15mmol/L, or those with type 2 diabetes on Sodium-glucose Cotransporter-2 (SGLT-2) inhibitors, periodic measurement of ketones when unwell or signs of ketoacidosis is present is recommended(14). ▪ Educate on signs of ketosis including dyspnoea, tachypnoea, nausea, vomiting, abdominal pain, fatigue, confusion ▪ Ensure ketone testing kits are available
Dietary Advice	<ul style="list-style-type: none"> ▪ Dietary advice should aim to prevent an increase in total daily consumption during Ramadan (12) ▪ Consume low glycaemic index foods, avoiding saturated fats and refined sugars (10) ▪ During non-fasting times <ul style="list-style-type: none"> ○ Avoid overeating to prevent high blood glucose (10) ○ Avoid excessive carbohydrate intake ○ Keep well hydrated with water or unsweetened beverages (4) ▪ Opportunity for Dietitian review
Exercise	<ul style="list-style-type: none"> ▪ Avoid strenuous physical activity, especially towards the end of each fasting period (10) ▪ Advise to regularly monitor blood glucose if activity is undertaken if on agents such as sulphonylureas and insulin ▪ Be prepared to recognise and managing hypoglycaemia (10, 11)

Medication modification: Type 2 Diabetes – Oral agents

Oral medications	Safety during Ramadan	Recommendations
Metformin	Overall risk of severe hypoglycaemia is thought to be low (2 , 15)	<p>Once daily: No dose titration needed. Recommended to take at Iftar (4)</p> <p>Twice daily dosing: No dose titration needed. Take at Suhoor and Iftar (4)</p> <p>Three times dosing: Consider distributing the dose across two meals during Ramadan if normally taken three times a day (15). Take morning dose at Suhoor and remaining doses combined at Iftar.</p>
Sulphonylureas	<p>Concerns exist regarding hypoglycaemia.</p> <p>Lower incidence in gliclazide compared to other second generation sulphonylureas (16-19)</p>	<p>Best to switch to another drug class given risk of hypoglycaemia (2).</p> <p>If decide to continue, consider switching to newer generations such as slow release gliclazide (2) and follow dosing schedule as below (4):</p> <p>Daily dosing: recommend at Iftar</p> <p>Twice daily: Evening dose taken at Iftar. Morning dose taken at Suhoor at reduced dose.</p> <p>Consider ceasing Suhoor dose altogether if concern for hypoglycaemia.</p>
Dipeptidyl peptidase-4 (DPP-4) inhibitors	Lower incidence of hypoglycaemia compared to sulphonylureas (20-26)	No dose titration needed. Can be used safely as either a monotherapy or combined therapy (15)
Glucagon-like peptide-1 (GLP-1) receptor agonists	Overall a well-tolerated, effective and safer choice in comparison to sulphonylureas (27-29)	<p>Can usually be continued during Ramadan, either daily or weekly injections.</p> <p>Ideally commence medication at least four weeks before Ramadan (2, 15)</p> <p>Advantages include reducing appetite and therefore overconsumption of food during Iftar and in turn, less weight gain potential.</p>

		Weekly dosing allows flexibility in administration, which is independent of meals, allowing a simplified regimen.
Sodium-glucose Cotransporter-2 (SGLT-2) inhibitors	<p>Caution regarding genitourinary tract infections and volume depletion</p> <p>A decreased incidence of hypoglycaemia was observed in those who were on dapagliflozin and canagliflozin as compared to sulphonylureas during Ramadan (30, 31).</p> <p>No increase in ketonemia (as measured by plasma beta-hydroxybutyrate levels) during Ramadan(32). However limited studies are available.</p>	<p>Can continue to take SGLT-2 inhibitors without need for dose adjustments (4) if not: (i)hypotensive, (ii)on diuretics, (iii)those with renal impairment or (iv)the elderly (2).</p> <p>Recommended to initiate at least 4 weeks prior to Ramadan (4).</p> <p>Best given at Iftar with instructions to maintain adequate, clear fluid intake as much as possible during the non-fasting periods (30, 31)</p> <p>Check for ketones when unwell or if signs of ketoacidosis(14)</p>
Other less commonly used oral agents	Acarbose and Thiazolidinediones both have low risk of hypoglycaemia (4).	No dose modifications are required. Advised to take at Iftar(4).

Medication modification: Type 2 Diabetes – Insulin therapy

Insulin	Safety during Ramadan	Recommendations *
Long-acting or Basal Insulin	Basal insulin analogues are considered safe during Ramadan with minimal risk of hypoglycaemia (33)	Once-daily: Reduce dose by 15-30% and take at Iftar (4) Twice-daily: Take largest dose at Iftar and consider reducing Suhoor dose by 50% (4)
Short- acting or Prandial insulin	Usually less post-prandial hyperglycaemia (34).	Suhoor dose can be reduced by 50 % (4) Lunch-time dose can be omitted Normal dose at Iftar
Pre-mixed	In one study, there was no observed difference in hypoglycaemia between the different types of intermediate-acting pre-mixed insulins during Ramadan (35). However, newer ultralong-acting formulations deliver similar glycaemic control with the benefit of lower overall and nocturnal hypoglycaemic risk (36).	Once daily dosing: Take usual dose at Iftar Twice Daily dosing: Take largest dose at Iftar and reduce Suhoor dose by 20 – 50 % (4). Three times dosing: Omit lunchtime dose. Use twice daily dosing schedule as above (4).

*Dose adjustments may be needed during Ramadan.

Recommend to adjust insulin doses every 2-3 days based on the trends observed in blood glucose levels using the following titration-scale which can be applied for Basal/ Prandial or Pre-mixed insulin (4).

Pre-Suhoor / Pre-Iftar Blood glucose	Insulin dose adjustments
<3.9 mmol/L or symptoms	Reduce by 4 units
3.9 – 4.9 mmol/L	Reduce by 2 units
5.0-7.0 mmol/L	No change required
7.1- 16.6 mmol/L	Increase by 2 units
>16.7 mmol/L	Increase by 4 units

Medication modification: Type 1 Diabetes

Insulin	Safety during Ramadan	Recommendations *
Long-acting or Basal Insulin	Basal insulin produces better control without increasing the risk of hypoglycaemic events in comparison to premixed insulin (2, 15).	<p>Pre Ramadan HbA1c < 7.5 %: Basal insulin should be reduced by 10-30% to prevent hypoglycaemic events (37) (4) Take at Iftar or pre-Ramadan bedtime (4)</p> <p>Pre Ramadan HbA1c >7.5 %: Best to keep doses stable initially and adjust as necessary according to glucose response during Ramadan (4)</p>
Short- acting or Prandial insulin	Usually, dose adjustments will be necessary according to blood glucose and carbohydrate content or both to avoid hypo and hyperglycaemia.	<p>If patients are on fixed doses: No dose change at Iftar Reduce Suhoor dose by 50% (4)</p> <p>If patients are on flexible dosing according to insulin-to-carbohydrate ratio or insulin sensitivity factor: To continue the same principles at Iftar and Suhoor (4)</p> <p>Correction doses: If the post- Iftar meal blood glucose levels are elevated, extra or correction doses of insulin may be required (38) . This is calculated as per the insulin sensitivity factor and the target blood glucose level.</p> <p>To prevent an insulin stacking effect, corrective doses should not be given less than three hours apart (38).</p>
Pre-mixed	Usually not advisable for people with type 1 diabetes. A shift to basal-bolus or pump therapy is preferred (4).	If continuing pre-mixed insulin, follow principles as for those with type 2 diabetes as per table above.
Insulin Pump	Pump therapy has better glycaemic control in comparison to conventional insulin therapy (39, 40)	Basal rate of insulin should be appropriately reduced by 10-25% during Ramadan (39) up to four hours before Iftar Then, consider increasing basal rate by 10-30 % from Iftar to midnight(4). Use Pre Ramadan insulin to carbohydrate ratios

Advising pregnant women with diabetes who choose to fast

Fasting during Ramadan amongst pregnant women, without diabetes, is common (41) despite Koranic exemptions. In women with diabetes, there is added concern given the risk of hyperglycaemia and hypoglycaemia (42). Overall, robust evidence regarding foetal and maternal outcomes of fasting during Ramadan in pregnant women with diabetes is lacking. Therefore, at present, a cautious approach, advising women against fasting is recommended until further evidence is available (4). Should women remain intent on fasting, the aforementioned “targeted education principles” along with the following suggestions may be offered to support women through their decision. A multidisciplinary approach with regular antenatal consultations is recommended (2).

Glycaemic targets as advised by the International Diabetes Federation and Diabetes and Ramadan Alliance (4) are in line with the current Australasian Diabetes in Pregnancy Society guidelines (43).

Glycaemic targets (4, 43):	When to break the fast
Fasting 3.9 – 5.0 mmol/L 2-hour Post-prandial < 6.7 mmol/L.	Blood glucose levels < 3.9 mmol/L anytime during their fast General unwellness. Reduced foetal movement.

Insulin is considered safe and tolerable in pregnant women with diabetes during Ramadan (44, 45) and dose adjustments are similar as previously described for type 1 and type 2 diabetes.

Fasting during Ramadan during Covid-19

If elderly or severely unwell with Covid-19, recommend ceasing agents such as metformin, GLP-1 RA and SGLT-2 inhibitors and advise not to fast(46). Consideration for increasing or substituting with alternative glucose-lowering agents will need to be considered to ensure glucose levels remain stable throughout this period.

If mild symptoms, can consider continuation of fasting, ensuring regular self-blood glucose monitoring and hydration in non-fasting periods occurs.

Checklist of main principles for healthcare providers to discuss with Muslims with diabetes who chose to fast

- Self- blood glucose monitoring recommendations
- Ketone monitoring recommendations
- Dietary advice
- Exercise advice
- Ensure patient can recognise symptoms of hypoglycaemia & hyperglycaemia
- Ensure patient knows when to break the fast
- Medication adjustment recommendations
- Post-Ramadan follow-up

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