Ramadan: A practical guide for the care of people with type 2 diabetes

Alia Gilani

Ramadan or the Arabic translation, "sawm", means "abstention from". Fasting is from the period of dawn (sahur) to sunset (iftar) and so most individuals observing Ramadan will have two meals in a 24-hour period. In the UK, each fast can last between 10 and 20 hours. Healthcare professionals need to be aware of the cultural practices within ethnic groups that can influence disease management. Understanding the religious practice of Ramadan will allow a shared agreement between the healthcare provider and the person with diabetes and help contribute to a safer Ramadan. This article presents a summary of the key aspects of Ramadan, diabetes treatment adjustments and practical advice on preparing people with diabetes for Ramadan.

The post-World War 2 economic boom accounted for the start of a significant influx of immigrants to the UK. Today our society is increasing in diversity, and immigration patterns suggest that this is set to continue. As a result, healthcare professionals need to be aware of the cultural practices within ethnic groups that can influence disease management.

It is estimated that there are 2 869 000 Muslims in the UK (Pew Research Center Publications, 2010). The number of those who have diabetes is approximately 325 000 (Holt and Kumar, 2010). According to the findings of an epidemiological study on Ramadan, the majority of Muslims with diabetes are found to participate in Ramadan (Salti et al, 2004). Furthermore, those with type 2 diabetes who participated in fasting were overweight on average, with a mean BMI of 27.2±4.9 kg/m^2. A pre-Ramadan assessment presents a good opportunity to encourage lifestyle modification, such as smoking cessation and weight loss. Many of those fasting are of South Asian origin, and this population has been found to be at a higher risk of developing diabetes for a given BMI compared with white European people. Gray et al (2011) suggested that immigrant South Asians with a BMI of 23–28 kg/m^2 should be classified as obese and at a high risk of developing diabetes.

For those people with diabetes, healthcare professionals need to have an understanding of Ramadan, and its impact, if they are to minimise any of the risks associated with fasting and be competent in offering advice to and managing people with the condition (*Box 1* provides further details on Ramadan).

Impact of Ramadan

Psychological

The fasting period is one where individuals practice self-restraint and sacrifice. Individuals can feel more spiritual by offering more prayers and Quranic recitation. The principle of fasting should be more than just abstinence from food and water but a period of humility, self-reflection and charitable offerings. Thus, those who do not participate in Ramadan often feel guilty and left out from the spiritual reward that would be obtained in this period.

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Article points

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2. Understanding the religious practice of Ramadan will allow a shared agreement between the healthcare provider and the person with diabetes and help contribute to a safer Ramadan.
3. Working with religious leaders will afford an opportunity to deliver clearer messages of education to the Muslim community on the risks of Ramadan.

Key words

- Fasting
- Glycaemic control
- Islam
- Muslim
- Ramadan

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Box 1. Details about Ramadan.

What
Ramadan or the Arabic translation, "sawm", means "abstention from". Fasting is from the period of dawn (sahur) to sunset (iftar) and so most individuals observing Ramadan will have two meals in a 24-hour period. In the UK, each fast can last between 10 and 20 hours. During the period of fasting an individual must refrain from smoking, eating, drinking, sexual activity, consuming oral medications and using intravenous fluids. The fasting period lasts for 29–30 days.

Why
Ramadan is one of the five fundamental pillars of Islam, which is the religion practised by Muslims. Islam means submission to the commands of Allah (a name for God, in Islamic belief), which are written in the holy book, the Quran. Ramadan represents the period of revelations of God to mankind via the Quran and is considered to be one of the holiest periods in the Muslim calendar.

When
The Islamic calendar (Hijri) is lunar based and has 354 days; thus Ramadan comes forward every year by 10–11 days. In 2012, Ramadan will commence on approximately 20 July.

Who
The Quran indicates that fasting is observed by all healthy and responsible Muslims once they reach the age of puberty or 15 lunar years (whichever comes first).

Exemptions
Not all Muslims are expected to fast. If fasting is considered detrimental to an individual's health, he or she will be exempt from participating. Furthermore, within the exemption category, individuals can be either permanently or temporarily exempt. Those who are permanently exempt include the frail, older people, those with learning difficulties, those with severe mental health illness and those with a chronic condition in whom fasting would be detrimental to their health. Individuals with a chronic condition who are able to partake in Ramadan will need to revisit their exemption status annually as their health may deteriorate from one year of fasting to another. The temporary exemption category includes pregnant and breastfeeding women, travellers (journeys >50 miles) and those who are acutely unwell. Those who are temporarily exempt may make up their fasts at a later date. Those who are permanently exempt must pay compensation in the form of giving alms to the poor. In the UK this is around £3.50 per fast missed (Islamic Relief, 2012).

Physiological

Azizi (2010) report that the fasting state commences 8 hours after eating, with insulin levels decreasing. There is an increase in the levels of the counter-regulatory hormones glucagon and catecholamine. Up to 16 hours into the fasting state, energy is obtained predominantly by depleting glycogen stores. After this period, energy is mobilised via gluconeogenesis, which allows the formation of glucose. Fuel for the body is also obtained by lipolysis in the adipose tissue releasing fatty acids (Azizi, 2010).

Biochemical

There are studies that have found that there is an increase in total and LDL cholesterol levels during Ramadan (Yarahmadi et al, 2003). Other studies have suggested a favourable shift in cardiovascular lipid profile during Ramadan (Adlouni et al, 1997). This benefit may not remain after the fasting period as other evidence suggests that a decrease in total cholesterol levels reverts to normal levels after the fasting period (Gumaa et al, 1978; El-Hazmi et al, 1987). Similarly, HDL cholesterol levels can rise during the fasting period and revert to normal levels post-Ramadan (Mafauzy et al, 1990). In terms of body weight during the fasting period it mostly decreases or remains unchanged (Salti et al, 2004; Azizi, 2010).

The Epidemiology of Diabetes and Ramadan (EPIDIAR) study – the largest Ramadan study – did not assess average glycaemic levels (Salti et al, 2004). It did, however, establish the increased risk of hypo- and hyperglycaemia during Ramadan for people with type 1 and type 2 diabetes. The risk of severe hypoglycaemia was increased by about 7.5-fold in type 2 diabetes and the risk of severe hyperglycaemia was increased five-fold (for comparison, the respective values for type 1 diabetes were 4.7-fold and three-fold; Salti et al, 2004; Al-Arouj et al, 2010). The risks of hypo- and hyperglycaemic events were both thought to be underestimated in this study as only those who required third-party assistance were accounted for. An observational study based in England found that individuals had a four-fold increase in the risk of hypoglycaemia during the Ramadan period (Bravis et al, 2010a). In terms of HbA_{1c} levels, studies have found there is no change (Chandalia et al, 1987; Yarahmadi et al, 2003; Sari et al, 2004) or a decrease (Mafauzy et al, 1990; Sulimani et al, 1991; Ait Saada et al, 2010) during Ramadan.

Dehydration

There is a potential risk of dehydration in particular among those whose employment entails physical labour (although it is not as great in the UK as in hotter or more humid climates). Individuals should be encouraged to have ample fluid intake during the sahur and iftar period.

Pregnancy

Pregnant women are in the very high risk category and are not required to fast if there is risk to the mother, the fetus or both. There are limited studies on outcomes for pregnant women who have diabetes. Owing to the risks for the unborn fetus of dysglycaemia, pregnant women should be especially discouraged from fasting.

Blood pressure

There are variable results as to the impact of Ramadan on blood pressure. Some evidence suggests a decrease in systolic and diastolic blood pressure during Ramadan (Sarraf-Zadegan et al, 2000) while another study found no change in blood pressure (Fakhrzadeh et al, 2003). Changing the dosing schedule of anti-hypertensive medication during Ramadan has been found to have no effect on the efficacy of the agent (Perk et al, 2001).

Medication

The EPIDIAR study found that one in four individuals on oral antidiabetes drugs (OADs) and one in three individuals on insulin adjusted their medication during Ramadan (Salti et al, 2004). Prior to Ramadan an individual's medicines may need to be adjusted. In general, for those on OADs it is recommended that the higher dose is given in the evening reflecting the larger meal. The recommended dose adjustment for each diabetes medication, where applicable, is listed below.

Metformin

The risk of hypoglycaemia in people treated with metformin is minimal, but the timing of doses may be adjusted. If people are on a three-times-daily dose, the middle dose should be omitted and the total daily dose split with two-thirds taken before the sunset meal and one-third before the predawn meal (Al-Arouj et al, 2010; Hui et al, 2010). Those on a twice-daily regimen can maintain the same dose. Those who experience gastrointestinal side effects or symptoms of hypoglycaemia should have their dose reduced.

Sulphonylureas

Al-Arouj et al (2010) recommend that long-acting agents, such as glibenclamide, should be avoided to reduce the risk of hypoglycaemia. Overall, for those treated with a sulphonylurea, short-acting agents should be used. The larger dose of the sulphonylurea should be given at night and the morning dose can be reduced (Al-Arouj et al, 2010; Hui et al, 2010).

The Glimepiride in Ramadan Study Group (2005) reported that its prospective study found no difference in the rate of hypoglycaemia before Ramadan compared with after when glimepiride had been switched from a morning to an evening dose during Ramadan. Two further studies have assessed the impact of using glimepiride during Ramadan, with a relatively low risk of adverse effects being found (Sari et al, 2004; Anwar et al, 2006).

A prospective study of 136 males in South Asia found that switching the dose of a modified release preparation of gliclazide (60 mg) from a morning to an evening dose had no adverse effect (Zargar et al, 2010). The limitation in this study was the inclusion of males only and a lack of a control group. An observational study in five different countries found that those treated with a sulphonylurea during Ramadan had an average rate of hypoglycaemia of 20% with a range of between 14 and 26% depending on the drug used (Aravind et al, 2011). Limitations were that each country used different agents and lifestyle factors were not accounted for.

Thiazolidinediones

Those on pioglitazone do not require a dose adjustment as the risk of hypoglycaemia is low (Al-Arouj et al, 2010; Hui et al, 2010). A double-blind randomised controlled trial of pioglitazone found no increase in the risk of hypoglycaemia when added to an individual's usual OAD regimen compared with placebo as add-on (Vasan et al, 2006).

Incretin-based therapies

Therapies exploiting the "incretin effect" include glucagon-like peptide-1 (GLP-1) receptor agonists – exenatide and liraglutide – and dipeptidyl peptidase-4 (DPP-4) inhibitors – linagliptin, saxagliptin, sitagliptin and vildagliptin. Incretin-based therapies are relatively new and it is anticipated there will be future studies for this group of drugs during Ramadan. As the incretin-based therapies have a glucose-dependent action it is the author's view that they have a minimal risk of hypoglycaemia during Ramadan.

The use of incretin-based therapies during Ramadan is discussed in recommendations by Al-Arouj et al (2010) and a clinical review by Hui et al (2010). The author's consideration of evidence is provided below.

GLP-1 receptor agonists

In a small study of people with type 2 diabetes, exenatide plus metformin resulted in less hypoglycaemia compared with metformin plus gliclazide (Bravis

Page points

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2. Overall, for those treated with a sulphonylurea, short-acting agents should be used. The larger dose of the sulphonylurea should be given at night and the morning dose can be reduced.
3. The Glimepiride in Ramadan Study Group (2005) reported that its prospective study found no difference in the rate of hypoglycaemia before Ramadan compared with after when glimepiride had been switched from a morning to an evening dose during Ramadan.
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Page points

1. Overall, any dose adjustment of insulin should be done with careful supervision from an individual's clinician and should take into consideration the duration of fast, diet, lifestyle and temporal factors. Regular blood glucose monitoring and review may be required in the first few days of fasting.
2. It is advisable that healthcare professionals review their Muslim patients prior to the Ramadan period in the form of a pre-Ramadan assessment. This could coincide with annual reviews and should entail a review of blood pressure, lipids and glycaemic control.

et al, 2010b). A trial investigating treatment with liraglutide during Ramadan is currently being carried out and will close in July 2012 (UK Clinical Research Network, 2012). Hypoglycaemia is not independently associated with this class, although in non-Ramadan studies hypoglycaemia did occur more often when a sulphonylurea was used in combination (Norris et al, 2009). Hui et al (2010) therefore suggest that no dose adjustment of the GLP-1 receptor agonist is required, but other agents used in combination may require dose reduction.

DPP-4 inhibitors

Al-Arouj et al (2010) note that DPP-4 inhibitors do not require dose modification during Ramadan, and Hui et al (2010) suggest, based on a retrospective audit, that it "may be safer" to use DPP-4 inhibitors in place of sulphonylureas in combination with metformin for individuals who are planning to fast during Ramadan and are not well controlled on metformin alone.

There have been a few studies looking at the adjustment of treatment with the DPP-4 inhibitors during Ramadan. An observational study compared hypoglycaemia rates in two groups: vildagliptin added to metformin or gliclazide added to metformin. The vildagliptin group had a lower incidence of hypoglycaemia and improved glycaemic control compared with people taking gliclazide (Devendra et al, 2009). It should be noted, however, that the gliclazide group of people were at least a decade older. Another study of vildagliptin was a prospective, non-interventional study of participants taking vildagliptin 50 mg twice daily or a sulphonylurea, each added to metformin (Hassanein et al, 2011). Results showed that the vildagliptin group, unlike the sulphonylurea and metformin combination group, had no hypoglycaemic events. This was a small study and a major limitation was the higher baseline HbA_{1c} level in the vildagliptin group.

An open-label randomised study of people during Ramadan who were being treated with a sulphonylurea found that those randomised to switch to sitagliptin had a lower incidence of hypoglycaemia (Al Sifri et al, 2011). The episodes of hypoglycaemia were not confirmed by a blood glucose reading.

Insulin

While this article focuses on type 2 diabetes, it is of merit to briefly consider type 1 diabetes here. Those with type 1 diabetes are deemed at very high risk and it is not recommended that they fast, particularly those at risk of hypoglycaemia or poor glycaemic control (Al-Arouj et al, 2010; Hui et al, 2010). Those who insist on fasting should regularly monitor their blood glucose levels and it is particularly advantageous if they are on a basal–bolus regimen (Al-Arouj et al, 2010; Hui et al 2010).

As raised by Al-Arouj et al (2010), the problems faced by people with type 2 diabetes who are treated with insulin are similar to those with type 1 diabetes, except that the incidence of hypoglycaemia is less. Those on a long-acting insulin can reduce the dose by approximately 20% depending on blood glucose levels (Bakiner et al, 2009; Hui et al, 2010; Karamat et al, 2010). Hui et al (2010) suggest a 30% reduction of the dawn dose.

Overall, any dose adjustment of insulin should be done with careful supervision from an individual's clinician and should take into consideration the duration of fast, diet, lifestyle and temporal factors. Regular blood glucose monitoring and review may be required in the first few days of fasting.

Practical advice for healthcare professionals

It is advisable that healthcare professionals review their Muslim patients prior to the Ramadan period in the form of a pre-Ramadan assessment. This could coincide with annual reviews and should entail a review of blood pressure, lipids and glycaemic control. The assessment provides the opportunity for the individual to discuss whether they wish to partake in Ramadan. Healthcare professionals can categorise people into risk levels (Al-Arouj et al, 2010; Karamat et al, 2010). The decision to fast should be based not solely on average glycaemic levels but on other risk factors, such as comorbidities, polypharmacy, frailty and past negative experience of fasting. For Muslims participating in Ramadan it is an opportunity to obtain spiritual tranquility and a feeling of closeness to God. Those who cannot fast often feel guilty and that they are missing out. Therefore, if individuals are deemed at high risk then rather than healthcare professionals simply advising them not to fast, a discussion of the risks of choosing to fast may be a more appropriate course of action. This allows individuals to make

an informed choice on a very personal topic. Educational sessions involving the healthcare professional and the local Islamic scholar may be an option. Including religious leaders in education is an approach that may be more successful in conveying key messages to Muslims with diabetes.

The pre-Ramadan assessment should also include adjustments of an individual's medication. The individual could try to fast for 1 or 2 days in the form of a "test run" with their adjusted medication and subsequently have a follow-up appointment with the healthcare professional in the month prior to Ramadan. The risks and signs of hypo and hyperglycaemia should be emphasised. Regular self-monitoring of blood glucose, especially for those at risk, should be advocated. Finger prick testing does not constitute breaking one's fast (Muslim Spiritual Care Provision in the NHS, 2009). Recommendations for breaking a fast are if blood glucose levels are <3.9 mmol/L or >16.7 mmol/L (Al-Arouj et al, 2010). During a fast, if an individual's health deteriorates, he or she must be advised to break the fast. Not doing so goes against the Islamic spirit of fasting and not harming oneself.

As smoking is not permitted during the fasting period then the pre-Ramadan assessment offers a good opportunity to promote smoking cessation. Forced abstinence may not allow successful cessation of smoking and thus a focus on smoking reduction and follow-up post-Ramadan may be a more pragmatic approach (Aveyard et al, 2011).

A healthy diet should be promoted because during the iftar period it is common to over-indulge in carbohydrate-rich foods. Foods to be recommended are those that have a low glycaemic index, complex carbohydrates and fibre-rich food types (Communities in Action, 2007). A healthy diet during Ramadan includes:

- Food that has complex carbohydrates, which release energy slowly (e.g. grains, seeds, oats, beans and lentils).
- Fibre-rich food.
- Food cooked with oils that are high in monounsaturated fats (e.g. olive oil).
- The avoidance of deep-fried food. Healthier alternatives should be emphasised like shallow frying, grilling or baking.
- Food types mentioned in the Quran and Sunnah (prophetic traditions), including milk, dates, oats, olives, lentils and grapes.
- Avoidance of foods with high sugar levels (e.g. mithai [South Asian sweets]).
- Ample fluid intake to maintain hydration during the fasting period.

Light exercise should be advocated during the fasting period. Individuals will be participating in extended prayers, or Taraweeh, which will entail standing, sitting, prostrating oneself and bowing. This can be considered part of an individual's exercise regimen.

A meeting of medical practitioners and Islamic jurists in Morocco in 1997 agreed unanimously a consensus on acceptable drug use, which included noting that the following do not nullify a fast (Islam Science Environment and Technology, 1997).

- Ear and eye drops.
- Injections through the skin, muscle, joints or veins.
- Mouthwashes, gargles or oral sprays, provided none are swallowed into the stomach.
- Any substance absorbed through the skin, such as creams or ointments.

However, it should be borne in mind and respected that some people may follow some valid differences in legal opinion in these matters.

Concluding remarks

Over the next decade Ramadan will fall in the summer months in the UK and the fasts will be of a lengthy period, potentially increasing the risk of side effects. Currently, there is a paucity of studies on Ramadan and confounding factors limit the generalisability of the results of the current data available. Studies have taken place in different countries, where the fasts differ in length, there are differences in ethnicity in trial participants and there are often different diabetes drugs used. The limitations in existing research on Ramadan identify it as an area that requires potential future research (Diabetes UK and the South Asian Health Foundation, 2009).

Structured education programmes used during Ramadan (Bravis et al, 2010a) have been found to have some benefit. There is now a Diabetes Education and Self Management for Ongoing and Newly Diagnosed (DESMOND) Ramadan education programme available for use within the

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UK (available at: http://www.desmond-project.org.uk/342.html). Structured education should be considered for use by healthcare professionals during Ramadan.

As the diabetes and obesity "epidemics" grow and with the increased risk of diabetes among certain South Asian groups, it is imperative that healthcare professionals understand cultural practices within ethnic groups that can impact on disease management. Understanding the religious practice of Ramadan will allow a shared agreement between the healthcare provider and the person with diabetes and help contribute to a safer Ramadan. Working with religious leaders will afford an opportunity to deliver clearer messages of education to the Muslim community on the risks of Ramadan. ■

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