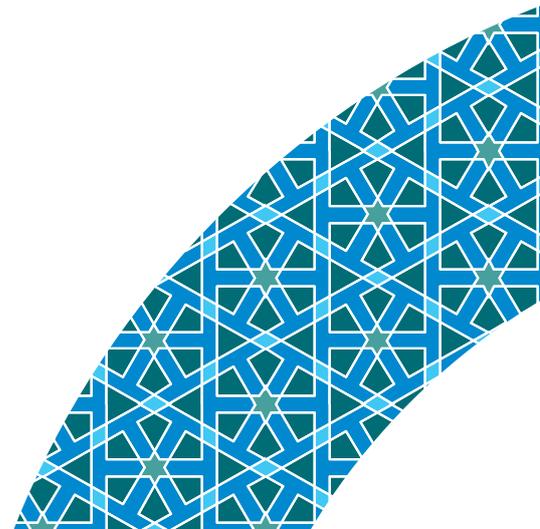


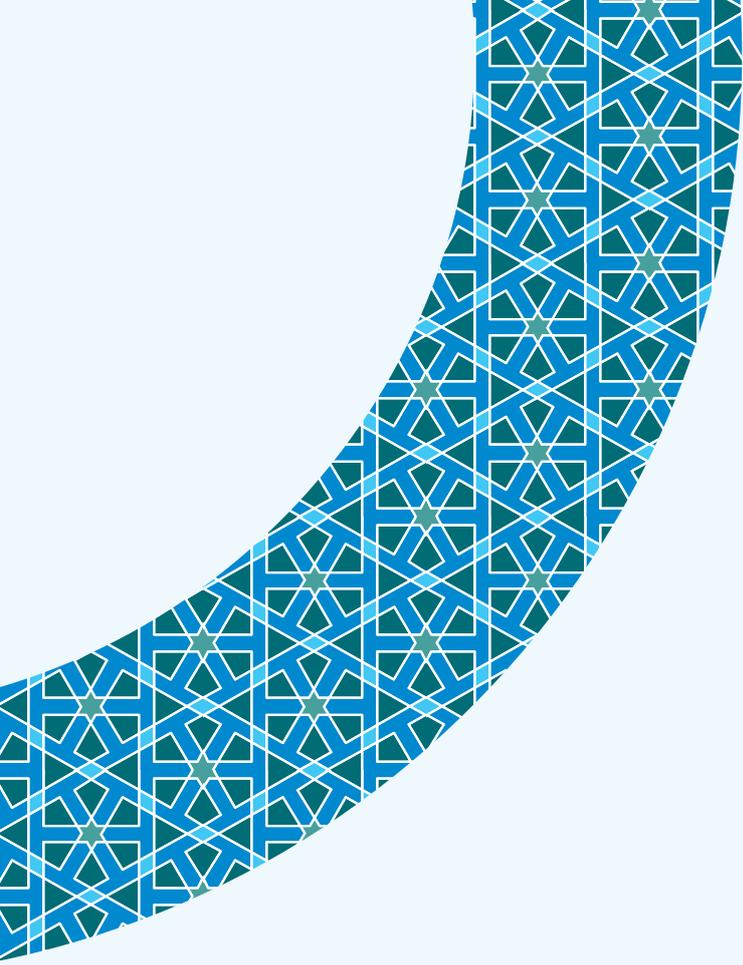
CHAPTER 7

Pre-Ramadan Assessment and Education

Chapter lead:
Muhammad Yakoob Ahmedani

Authors:
Sueziani Binte Zainudin
Ebaa AIOzairi







CHAPTER 7

INDEX

1. THE PRE-RAMADAN ASSESSMENT	121
2. EDUCATION AS A CORNERSTONE FOR DIABETES MANAGEMENT DURING RAMADAN	123
3. TARGETS OF RAMADAN-FOCUSED DIABETES EDUCATION	123
3.1 The general public	124
3.2 Healthcare professionals	125
3.3 People with diabetes	125
4. KEY AREAS OF PRE-RAMADAN DIABETES EDUCATION	125
4.1 Risk quantification	126
4.2 Self-monitoring of Blood Glucose (SMBG)	126
4.3 Fluids and dietary advice	128
4.4 Exercise	129
4.5 Medication adjustments during fasting	129
4.6 When to break the fast	130
4.7 Role of education through technology	130
4.8 Role of educators in pre-Ramadan diabetes education	131
5. EVIDENCE OF THE BENEFITS OF RAMADAN-FOCUSED DIABETES EDUCATION	132
5.1 Prospective research studies from 2010 onwards	132
5.2 Other research studies from 2010 onwards	134
SUMMARY	136
REFERENCES	137



WHAT IS KNOWN?

- Pre-Ramadan education is crucial for safe fasting during Ramadan.
- Education programmes should target people with diabetes, Healthcare Professionals (HCPs), and the general public.
- Education on fasting and diabetes management is helpful beyond Ramadan.

WHAT IS NEW?

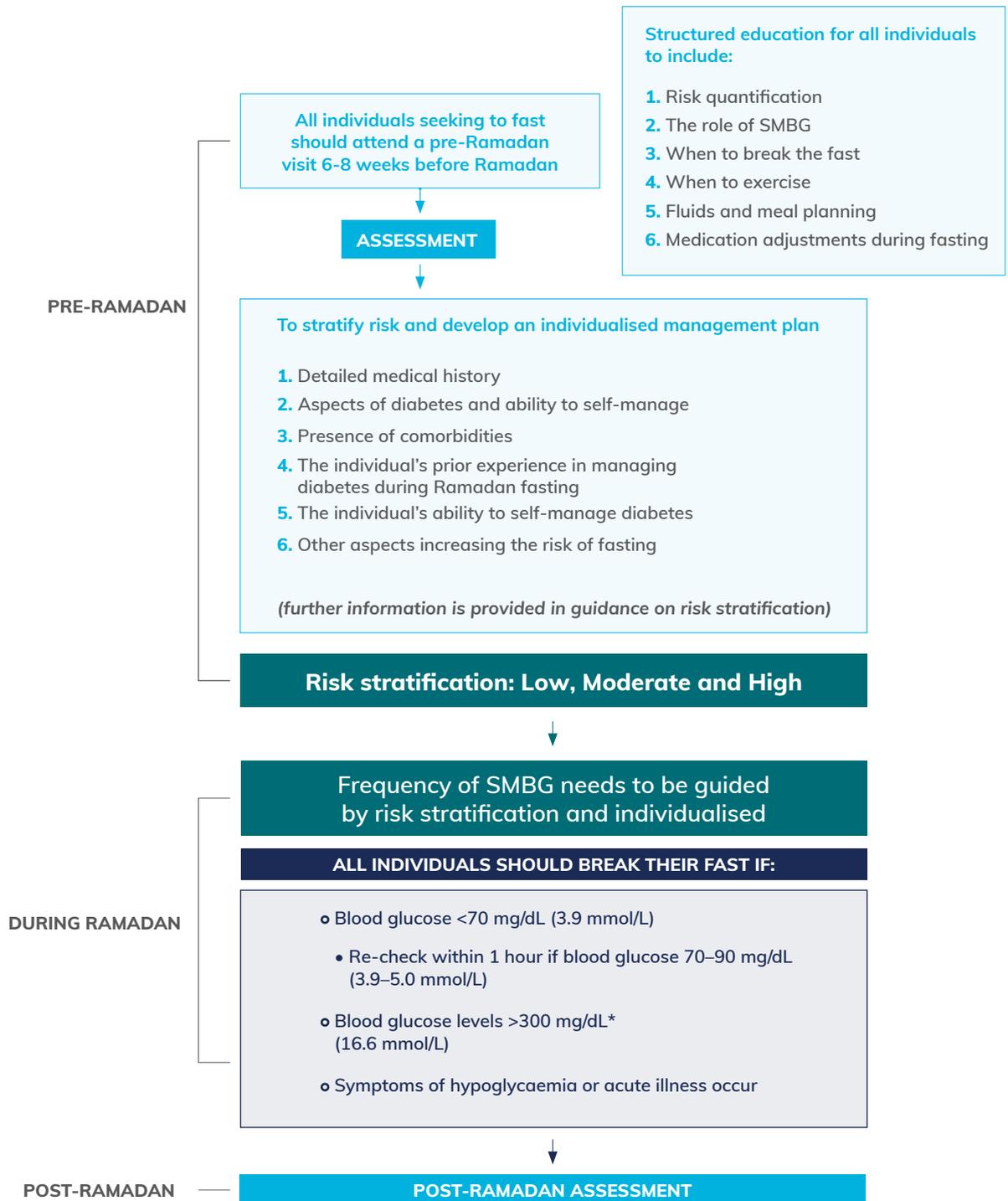
- More evidence has emerged supporting the use of pre-Ramadan education to achieve safe fasting during Ramadan.
 - This allows for better understanding for the requirements in pre-Ramadan educational programmes and their specific benefits.
- Pre-Ramadan education helps people with diabetes recognise the symptoms of mild or more severe complications when fasting to allow them to break their fast if necessary.
- The use of telehealth technology is beneficial when physical contact is limited and provides a model for future education.

WHAT IS MISSING?

- Further research on education in high-risk populations and how programmes can be tailored to specifically meet their needs.
- Further research on educational programmes aimed at adolescents and children with diabetes and how these can help improve outcomes during Ramadan.
- Further research on the use of online educational content and their benefits.

1. THE PRE-RAMADAN ASSESSMENT

A pre-Ramadan assessment needs to take place, ideally, 6–8 weeks before the start of Ramadan. Here, HCPs will be able to obtain a detailed medical history and perform a risk assessment. This risk assessment will form the basis on all recommendations thereafter; these include advice on whether fasting is safe (low or moderate risk scores) or not (high risk score), strategies for dose modifications and treatment regimen adjustments, the provision of Ramadan focused education and nutrition advice. Following this, individuals that decide to fast will need to adhere to guidance on the management of their diabetes during RF including changes to glycaemia monitoring schedules and dosing adjustments of medication. Finally, after Ramadan ends it is advised that a post-Ramadan follow up is performed. A follow up after Ramadan will help HCPs obtain crucial information about the individual's successes and challenges during RF and will ensure that RF the following year can be more successful. This process must be undertaken each Ramadan as successful fasting one year does not guarantee success the next year.



SMBG, self-monitoring blood glucose

*This applies for those with sudden rise in blood glucose level, individualisation of care is advisable

FIGURE 1
Assessment flowchart

2. EDUCATION AS A CORNERSTONE FOR DIABETES MANAGEMENT DURING RAMADAN

Structured diabetes education is about giving people the knowledge to make informed decisions regarding their behaviour and enabling them to effectively self-manage their condition [1]. Ramadan-specific diabetes education is an extension of this and provides additional knowledge on the necessary adjustments needed for the month of Ramadan [2-6].

The pivotal Epidemiology of Diabetes and Ramadan (EPIDIAR) study demonstrated that approximately only two-thirds of people with diabetes have received recommendations from their healthcare professionals (HCPs) regarding the management of their condition during Ramadan. Thus, more widespread targeted education is necessary prior to fasting [2]. In the subsequent CREED study, 96% of physicians provided advice to fasting individuals although only 63% based their advice on guidelines or recommendations [7]. Despite this, previous studies have revealed that only 30%–67% of physicians used a Ramadan-focused educational programmes [3, 8], and only 47.5% of patients attended such programmes [9].

The objective of Ramadan-focused education is to raise awareness of the risks associated with diabetes and fasting and to provide strategies to minimise them [9, 10]. Education should be simple, engaging, and delivered in a culturally sensitive manner by well-informed individuals [10, 11]. Individuals who have received Ramadan-focused education were reported to be better at following Ramadan diabetes management recommendations [9].

Ramadan-focused educational programmes have been successful in enabling people with diabetes to maintain and improve glycaemic control during and after fasting [10, 12-14] and to experience fewer hypoglycaemia episodes [15, 16]. Recent studies have also found evidence of improved glycaemic control in high and very high-risk individuals with the implementation of these educational programmes [17-20]. Moreover, the pairing of structured education and advanced glucose monitoring can allow for safe fasting during Ramadan [21].

3. TARGETS OF RAMADAN-FOCUSED DIABETES EDUCATION

Ramadan-focused diabetes education should primarily be targeted at people with diabetes, and the Healthcare Professionals (HCPs). Additionally, educational campaigns must target the wider public who serve as the support network for people with diabetes. An all-encompassing approach must be used [22] (Figure 2).



FIGURE 2

Targets of Ramadan-focused diabetes education

3.1 The general public

Educational campaigns targeting the general public should aim to raise the awareness of issues and misconceptions surrounding diabetes and Ramadan. An emphasis should be placed on the importance of maintaining good glycaemic control during fasting. In addition to medical advice, religious regulations should be included in these educational efforts.

For example, it should be made clear that individuals may be exempt from fasting during Ramadan if they are ill, and they can either make up for missed fasting days when they are better or donate food or money to the poor as an alternative (*fidya*).

In particular, campaigns should be aimed at religious and community leaders as they are valued and trusted members within the target community and may be turned to for advice in place of or in addition to HCPs [23, 24]. It is important, therefore, that these individuals are themselves well-informed. Providing clear advice that aligns with both medical and religious perspectives can improve and encourage communication between healthcare services and the Muslim community.

In circumstances where physical distancing is necessary or in areas in which access and contact is limited, the use of other methods such as video technology and social media should be considered.

3.2 Healthcare professionals

A lack of knowledge and awareness about fasting and diabetes could mean that advice and guidance provided by HCPs may be inappropriate or lacking, particularly in Muslim-minority countries.

For example, in a survey of HCPs in the US, only one-third of physicians actively enquired whether their Muslim patients intended to fast during Ramadan, and many did not feel comfortable managing these patients [25]. Similarly, in France, a lack of medical knowledge surrounding Ramadan fasting and diabetes led to inappropriate advice being given to patients, together with inadequate patient education [26]. Ensuring HCPs are knowledgeable and adequately trained is therefore vital for the provision of appropriate advice and optimal diabetes care [10, 21]. Cultural competency is essential for effective education and patient care, impacting how both are given and received [27, 28].

HCPs should be trained to recognise and understand the different cultural and religious aspects of fasting and how these may impact on the management of diabetes [28]. Understanding these impacts enables HCPs to appreciate the spiritual significance of fasting during Ramadan for people with diabetes who insist on fasting despite having an illness that could potentially exempt them.

Among people with type 2 diabetes (T2DM), culturally appropriate health education has proven more effective than 'usual' health education in improving glycaemic control and knowledge about diabetes and its management in the short-to-medium term [29]. This is particularly relevant in the context of recommendations for Ramadan practice for Muslim-minority countries [10]. HCPs should have the skills and confidence to deliver advice in a culturally sensitive manner in order to encourage communication, improve the patient-doctor relationship, and provide better overall care [30-32].

3.3 People with diabetes

Pre-Ramadan education can greatly benefit people with diabetes in terms of maintaining glycaemic control and preventing weight gain [12, 13].

Education programmes can provide the knowledge and tools for individuals to effectively manage their condition during Ramadan by making key changes to their behaviour and lifestyle in order to minimise the risks [12, 13].

Educational programmes can be provided as group sessions [10, 13] or as one-on-one consultations [13, 33], given in a medical or community setting by physicians, dieticians and/or community link workers. The support of religious leaders is vital, particularly in Muslim-minority countries where culturally sensitive workers are not always available.

4. KEY AREAS OF PRE-RAMADAN DIABETES EDUCATION

Pre-Ramadan-focused education is of paramount importance to effectively manage diabetes during the holy month. Education on the timing of blood glucose monitoring in order to



minimise the risk of severe hypoglycaemia events and to improve quality of life for people with diabetes is essential [18, 33, 34]. Recent studies have reported that attending adapted structured small-group education programmes can improve confidence in diabetes management and also psychosocial factors when fasting [34, 35].

The main areas of diabetes education that should be provided prior to Ramadan are discussed below (Figure 3).

- ✓ Risk quantification and exemptions, and removing misconceptions
- ✓ Blood glucose monitoring
- ✓ Fluids and dietary advice
- ✓ Physical activity and exercise advice
- ✓ Medication adjustment and test fasting
- ✓ When to break the fast
- ✓ Recognition of hypoglycaemia and hyperglycaemia symptoms

FIGURE 3

Key Components of a Ramadan-focused Educational Programme

4.1 Risk quantification

All people with diabetes should attend a pre-Ramadan assessment with their HCP 6–8 weeks before the start of Ramadan. In the assessment, the risks to people with diabetes who intend to fast should be quantified [36]. Factors that contribute to the risk include the type of diabetes, current diabetes medication, individual social and work circumstances, individual hypoglycaemic risk, self-management capabilities and the presence of any complications and/or comorbidities. Individuals can then be stratified according to their potential risk and an individualised approach to disease management provided to ensure optimal care is delivered (see **chapter 4: The effects of fasting during Ramadan on physical and mental wellbeing**). Although existing recommendations advise that individuals who fall in the high risk category do not fast, it should be acknowledged that many Muslims will still wish to do so and these individuals should be provided with the appropriate knowledge and support to minimise the risks they face [16, 37, 38].

4.2 Self-monitoring of Blood Glucose (SMBG)

There is a misconception held by some Muslim communities that pricking the skin for blood glucose testing invalidates the Ramadan fast [39]. It should be strongly emphasised in educational programmes that this is not the case. Indeed, checking blood glucose levels is

an essential component of diabetes care, and individuals should be provided with the tools and knowledge to carry out self-monitoring of blood glucose (SMBG) [40]. Having these skills can empower people to effectively self-manage their disease and better identify and prevent episodes of hypoglycaemia [14, 21, 41] and hyperglycaemia during Ramadan. This is particularly important during Ramadan when changes in diet and lifestyle can increase the incidence of these events. Also, by regularly measuring blood glucose, people with diabetes may become more conscious of their eating habits and the impact on their blood glucose levels, potentially curbing damaging behaviours.

Having the skills to self-monitor blood glucose levels can empower people with diabetes with diabetes to effectively self-manage their disease

The frequency of SMBG depends on many factors including the type of diabetes and current medications but should be carried out regularly by all. For those at moderate or low risk, this may be once or twice a day. Those at high or very high risk should check their blood glucose levels several times a day (see **chapter 8: The Ramadan Nutrition Plan (RNP) for people with diabetes**). There is evidence that optimal monitoring of blood glucose along with pre-Ramadan-focused education could be a vital factor for reducing complications in those deemed to be high-risk [17]. Similarly, individuals on insulin and/or sulphonylureas may choose to monitor their blood glucose levels more frequently because of the increased risk of hypoglycaemia associated with these medications. The data generated are also useful for guiding dose titration (see **chapter 8: The Ramadan Nutrition Plan (RNP) for people with diabetes**) [42]. It is important for all people with diabetes to measure blood glucose levels after iftar to detect postprandial hyperglycaemia [40, 43, 44]. Furthermore, individuals should check their blood glucose levels whenever they experience symptoms of hypoglycaemia, hyperglycaemia, or feel unwell, and understand when they should immediately break the fast (see **Figure 5**). Monitoring blood sugar levels several times a day while fasting has become a vital component of successful educational programmes implemented in the studies described in **section 5 [12, 13]**. An example SMBG guide is shown below.

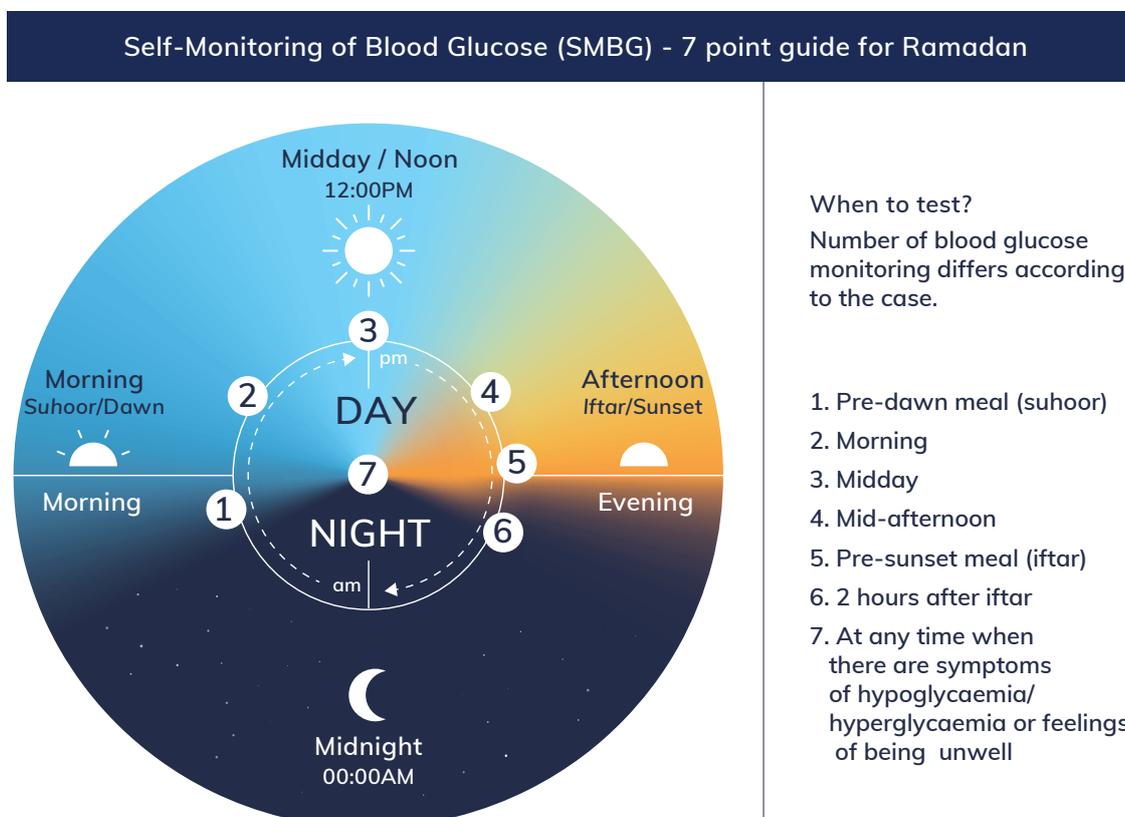


FIGURE 4

A seven point blood glucose monitoring guide for people with diabetes fasting during Ramadan

4.3 Fluids and dietary advice

The fasting and feasting nature of Ramadan can encourage the consumption of large, carbohydrate-heavy meals, and sugary drinks and treats that can impact blood glucose levels potentially increasing the risk of complications in people with diabetes [45].

Complex carbohydrates are recommended for the Suhoor meal while simple carbohydrates are recommended for the Iftar meal.

Providing dietary advice and meal planning can help people with diabetes to follow a healthy balanced diet during Ramadan, reducing the likelihood of these complications. It may also lead to lifestyle changes that favour weight loss that may continue once fasting has stopped. Key dietary advice that should be followed during Ramadan is shown in **Table 1**.

TABLE 1: DIETARY ADVICE FOR PEOPLE WITH DIABETES FASTING DURING RAMADAN

Divide the daily calories between <i>Suhoor</i> and <i>Iftar</i> , plus one to two snacks if necessary.	
Ensure meals are well balanced	<ul style="list-style-type: none"> • 45% - 50% complex carbohydrates E.g., barley, wheat, oats, millet, semolina, beans, lentils • 20% - 30% protein • <35% fat (preferably mono- and polyunsaturated)
Include low glycaemic index, high-fibre foods that release energy slowly before and after fasting	<ul style="list-style-type: none"> • E.g., granary bread, beans, rice
Include plenty of fruit, vegetables and salads	
Minimise foods that are high in saturated fats	<ul style="list-style-type: none"> • E.g. ghee, samosas, pakoras
Avoid sugary desserts	
Use small amounts of oil when cooking	<ul style="list-style-type: none"> • E.g., olive, canola oil, rapeseed
Keep hydrated between sunset and sunrise by drinking water or other non-sweetened beverages	
Avoid caffeinated and sweetened drinks	

4.4 Exercise

Rigorous exercise should be avoided, particularly during the last hours of fasting (before sunset) because it may lead to an increased risk of hypoglycaemia and/or dehydration [46]. People with diabetes should be encouraged to maintain their normal physical activity during Ramadan; they should be reminded that the physical exertions involved in *Taraweeh* prayers, such as bowing, kneeling, and rising, should be considered part of their daily exercise activities. Individuals are more likely to achieve HbA1c targets and reduce body weight when more nightly prayers are performed [11].

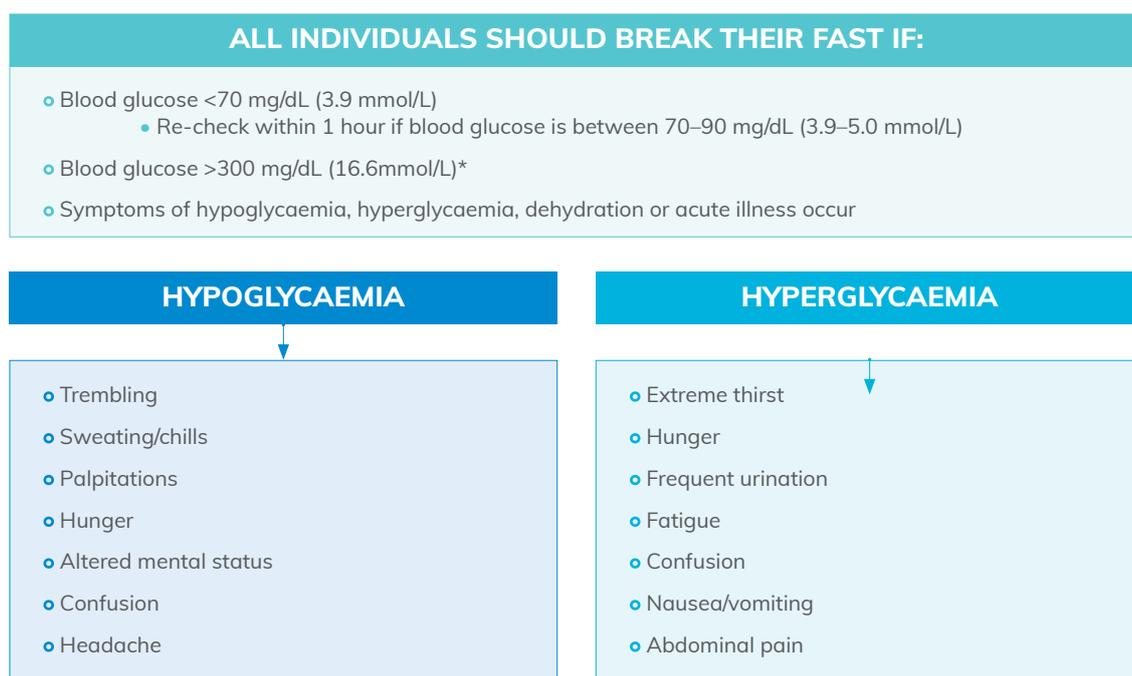
4.5 Medication adjustments during fasting

The change in lifestyle and eating patterns during Ramadan places people with diabetes at an increased risk of hypoglycaemia during the daytime and hyperglycaemia at night. The type of diabetes medication may also impact this risk; therefore, proper education on self-adjusting drug dosage and timing has become an essential guideline for diabetes management in people with diabetes during Ramadan [47]. The type of diabetes medication can also impact this risk. In the pre-Ramadan assessment, the HCP may adjust the dose, timing or the type of medication to minimise the risk to the patient. Recommendations on treatment modifications are discussed in detail in **chapter 8: The Ramadan Nutrition Plan (RNP) for people with diabetes**.



4.6 When to break the fast

Individuals should be educated to recognise the symptoms of hypoglycaemia and hyperglycaemia [48] and be advised to test their blood sugar regularly whenever any of these complications (or an acute illness) occur; they must also be prepared to break the fast if necessary (Figure 5). When breaking the fast because of hypoglycaemia, individuals should consume a small amount of a fast-acting carbohydrate e.g. a small carton of juice, and retest their blood glucose levels after 15–20 minutes [49].



*Consider individualisation of care

FIGURE 5

When to break the fast

4.7 Role of education through technology

The post COVID-19 world presents new challenges for HCPs in arranging face-to-face interactions for clinical follow-ups. Telephones and mobile phones are convenient modes of communication and may become a standard method for future consultations [50]. Teleconsultation, telemedicine, and telemonitoring have all been identified as effective modes of managing the needs of people with diabetes [51-53] and have been shown to enhance education and SMBG [10].

Recent studies have demonstrated that delivering online educational courses via smartphone applications (apps) and short messaging service (SMS) texts could be a preferred mode of educating individuals about their diabetes and interacting directly with HCPs; these can also help reduce the need for making multiple visits to clinics. Moreover, the ability to obtain the latest diabetes education, by certified diabetes educators, more conveniently is a huge benefit [54-57].

A combination of continuous glucose monitoring (CGM) technology with education before Ramadan could result in better glycaemic control during Ramadan [21], even in individuals deemed to be high-risk [17]. This technology has the ability to track glucose fluctuations at any time throughout the day and night. This helps to reinforce the decision to fulfil the spiritual fast through safer behaviours.

4.8 Role of educators in pre-Ramadan diabetes education

At times, it might seem overwhelming for people with diabetes to manage their disease. Diabetes education specialists play an increasingly important role in delivering personalised care to develop a management plan that fits the lifestyle behaviours, culture, and beliefs of their patients [58-60].

During Ramadan, the role of the diabetes educator is to assist people living with diabetes that are seeking to fast by providing Ramadan-focused guidance on:

- how often to monitor their blood glucose during the day
- the importance of looking out for signs of low blood sugar
- how to alter drug dosage and timing
- diet and fluid intake
- the importance of avoiding strenuous physical activity

If people with diabetes understand the risks and know how to manage them accordingly, they may be able to fast safely without any complications [61].

Ramadan-focused diabetes education should provide information on how to use certain types of devices such as insulin pens, meters, continuous glucose monitoring devices, and pumps. The use of devices allows educators to monitor individuals, close to real-time, via smartphone applications and can provide valuable data on previous activity. Interestingly, studies have also demonstrated that the use of glucose sensors together with daily phone helpline follow-ups with diabetes educators reduces the risk of hypoglycaemia during Ramadan [62-64]. In these studies, the helpline service provided regular treatment advice, alerts and reminders to achieve good glycaemic control during Ramadan. It is clear that increasing awareness of the symptoms of hypoglycaemia and hyperglycaemia can help people with diabetes in deciding whether to break or continue their fast. Overall, better results of clinical and metabolic parameters were observed in patients who were compliant with Ramadan-focused education recommendations [65]. Working closely with their HCP or diabetes educator is important to minimise the risk of complications [66].

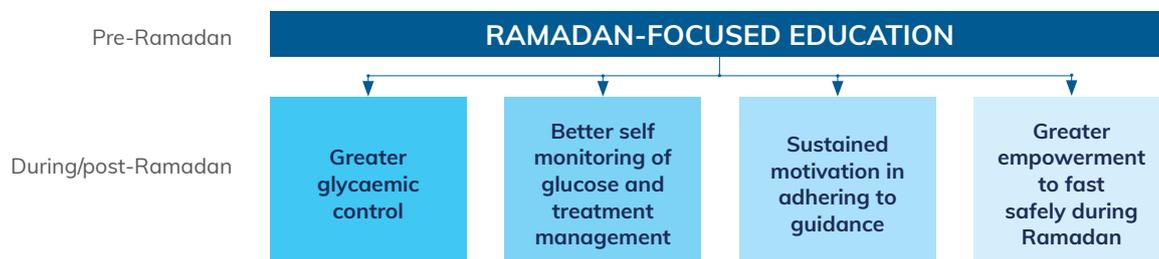


FIGURE 6

The positive impacts of Ramadan-focused education

5. EVIDENCE OF THE BENEFITS OF RAMADAN-FOCUSED DIABETES EDUCATION

5.1 Prospective research studies from 2010 onwards

The Ramadan Education and Awareness in Diabetes (READ) study was conducted in the UK; general practitioners based in London attended an educational Ramadan and diabetes workshop to gain understanding of the issues surrounding diabetes and fasting. Participants then provided a 2-hour pre-Ramadan educational programme to patients with T2DM (n=57). Patients attended group sessions (led by a specialist dietician and a diabetes specialist nurse practitioner) which included both general and Ramadan-specific diabetes information on dietary advice and meal planning, physical activity, blood glucose monitoring, recognising and managing complications, and dosing and timing of medications [12].

Patient weight and the incidence of hypoglycaemic events before and after Ramadan were compared with that of a control group of 54 patients with T2DM who did not attend the educational programme. One month after Ramadan, those who attended the programme demonstrated a significant loss in weight compared with before Ramadan (mean -0.7 kg, $p < 0.001$) whereas there was a significant weight gain in the control group (mean +0.6 kg, $p < 0.001$). There was also a significant decrease in the number of hypoglycaemic events in the group that received diabetes education (from nine events pre-Ramadan to five during Ramadan), compared with an increase (from nine to 36 events) in the control group. The study also demonstrated sustained glycaemic control in patients one year after attending the programme which was not evident in the control group [12].

In 2012, the Ramadan Diabetes Prospective Study investigated people with type 1 diabetes and T2DM (N=110). Participants were recruited to attend two educational sessions held on a one-to-one basis at the outpatient department of the Baqai Institute of Diabetology and Endocrinology in Pakistan. In one session, given by a doctor, the physical well-being and glycaemic control of the patient was evaluated and any necessary adjustments to drug dosing and timing were made. Patients were advised to record their blood glucose readings twice a day for at least 15 days during Ramadan and were educated about the warning signs of complications. In the other session, the diet and lifestyle of the patient was assessed by a dietician and adjusted for optimal energy consumption during Ramadan. The impact of this programme on the occurrence of diabetes complications during Ramadan was assessed [13].

The study demonstrated a downward trend in symptomatic hypoglycaemic episodes from week 1 to week 4 of Ramadan with only one patient experiencing a severe hypoglycaemic event. No individuals developed diabetic ketoacidosis or hyperglycaemic hyperosmolar state. The authors concluded that altering drug dosage, dietary counselling and patient education, together with regular blood glucose monitoring enabled patients to fast without major complications [13].

In 2015, McEwen *et al* performed a multicentre study in 772 people with T2DM in Egypt, Iran, Jordan and the Kingdom of Saudi Arabia. Pre-Ramadan education was given to 515 participants and usual care to 259. The educational intervention took place 2 months prior to Ramadan. On average each participant in the intervention group received 2 individualised 30 minute – 1-hour educational sessions delivered by appropriately trained dietitians, diabetes specialist nurses or community link workers. Those who received the educational programme were statistically more likely to modify their treatment plans, perform SMBG, know the signs and symptoms of hypoglycaemia, and have better clinical outcomes, compared to those who received usual care. The participants that received the education programme were also more likely to report mild and moderate hypoglycaemic events, but fewer reported severe hypoglycaemic events during Ramadan compared with those who received usual care [24].

In 2018, El Toony *et al*, conducted a prospective interventional study involving 320 Muslim people with T2DM in Egypt. A total of 120 people in the intervention group received focused individualised education sessions before Ramadan and 200 people in control group received usual care. Those in the intervention group received individual education sessions lasting 20–30 minutes, 6–8 weeks prior to Ramadan. This study found that, irrespective of group, fasting blood glucose levels during and after Ramadan decreased significantly. Importantly, the incidence of hypoglycaemia was reduced, and a greater number of individuals achieved HbA1c levels below 7% (53 mmol/mol) in those receiving education compared to those with usual care. Moreover, those receiving education prior to Ramadan also displayed improvements in HDL and LDL levels. The authors concluded that dietary modifications, drug dose adjustments and regular blood glucose monitoring were key to successful safe fasting during Ramadan [14].

In 2019, Al-Ozairi *et al*, studied people with T1DM who received multiple daily injections or continuous subcutaneous insulin infusions in a prospective observational study in Kuwait. Structured education training in the form of Dose Adjustment for Normal Eating (DAFNE) was given to the study participants, and basal insulin adjustments were administered with the use of an advanced monitoring device. The DAFNE education programme has been described elsewhere [67]. The authors were able to show that the incidence of hypoglycaemia was significantly reduced during Ramadan compared with before Ramadan. No episodes of severe hypoglycaemia, DKA, acute kidney injury, or hospitalisation occurred during Ramadan. There was also no evidence of glucose variability during Ramadan. Taken together, it was concluded that the pairing of pre-Ramadan education and advanced monitoring systems can help people with uncomplicated T1DM safely fast during Ramadan [21].

In 2019, M Hassanein *et al*, performed a prospective interventional study in 169 high-risk individuals including people with T1DM or T2DM receiving insulin, gestational diabetes, patients with stage 3 CKD, and patients with ischemic heart disease at the Dubai Health



Authority. All were given optimal care, which included Ramadan-focused education, a continuous glucose monitoring device, and medication dose adjustments. The education took place 4-6 weeks prior to Ramadan and each individual received 90 minutes of focused Ramadan education. The authors were able to show an improvement in glycaemic control during fasting with no significant changes in biometric and biochemical measurements. There was evidence of an increase in non-severe hypoglycaemia during fasting. It was concluded that optimal care could be the key for reducing the complications of fasting in high-risk people with diabetes [17].

A two-arm prospective observational study conducted in 2020 investigated people with T2DM in Egypt. A total of 1008 people T2DM were offered a culturally adapted Pre-Ramadan Education Program (PREP) in addition to usual care two months before Ramadan. The educational sessions lasted 2 hours. Retrospective interviews were conducted one month after Ramadan to compare the fasting experiences of the PREP attendees (470 patients) to those receiving usual care (538 patients). Together, fasting was found to be beneficial for people with T2DM, where the number of fasting days was associated with reduced HbA1c levels. Those that received PREP had lower HbA1c levels and also showed reductions in weight when compared with those receiving usual care, even after accounting for the number of fasting days. Furthermore, those receiving PREP performed more *Taraweeh* night prayers and more night prayers were associated with greater declines in HbA1c levels and weight. Crucially, PREP improved perception and response to hypoglycaemia e the provision of low doses of antidiabetic medications, particularly insulin [11].

5.2 Other research studies from 2010 onwards

Ahmedani *et al*, conducted a multicentred, multinational retrospective observational study in 2014 conducted across seven countries: Pakistan, Bangladesh, Afghanistan, the Kingdom of Saudi Arabia, Oman, Egypt and Sri-Lanka. A total of 6610 fasting people with diabetes participated, of whom 3142 (47.5%) received Ramadan-specific diabetes education, 4371 (66.1%) received medication adjustments, and 4636 (70.1%) received dietary advice before Ramadan. Those that received Ramadan specific diabetes education received it through one of three modes, i.e., one-to-one (1994; 18.1%), group (581; 8.8%) or written sessions (8.6%). The people with diabetes who received pre-Ramadan education (through any mode) reported greater levels SMBG and broke their fast upon developing symptoms of hypoglycaemia or hyperglycaemia and had less serious complications. Compliance to management recommendations in people who received education was significantly better than that in people who did not receive any form of education. It was also shown that one-to-one education was better than group education in terms of SMBG and recognising hypoglycaemia symptoms [9].

A recent systemic review and meta-analysis looking into studies conducted from 1990—2019 in people with T1DM and T2DM that fasted during Ramadan. Meta analyses showed that Ramadan-focused diabetes education led to a decrease in HbA1c levels (see **Figure 7**) and LDL but an increase in TG and weight during Ramadan. The authors noted that there was a risk of reporting bias but there was evidence that can be beneficial to people with Diabetes that fast during Ramadan [65].

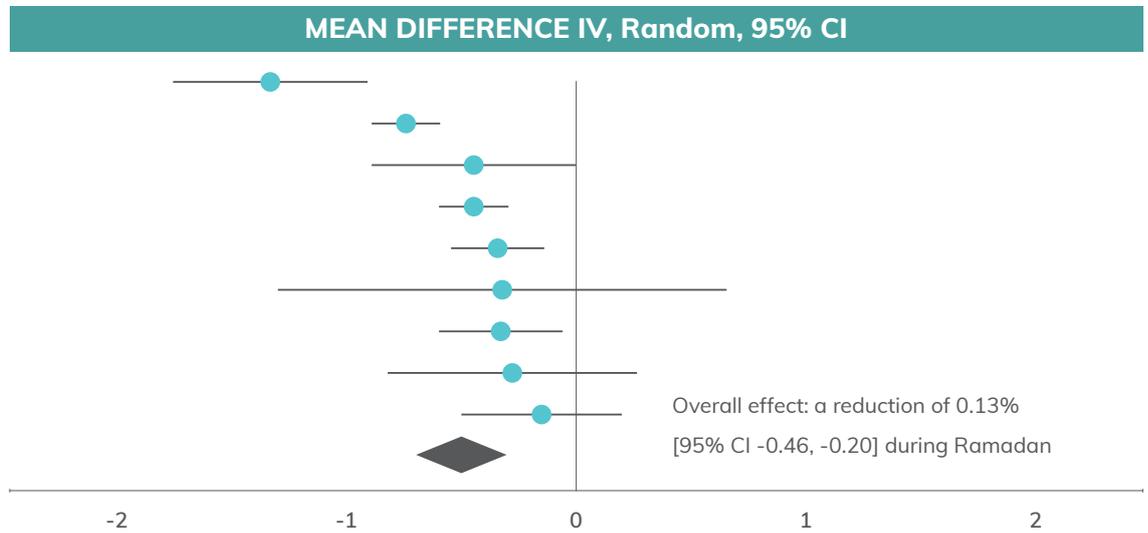


FIGURE 7

A Forest plot showing the effect of pre-Ramadan education on HbA1c levels during Ramadan from 9 studies, adapted from Gad et al. (2020) [65]



SUMMARY

- Pre-Ramadan education is a key component of safe fasting during Ramadan for people living with diabetes.
- Pre-Ramadan educational programmes should target people with diabetes, HCPs, and the general public that serves as the support network.
- Pre-Ramadan educational programmes should be carefully planned to be culturally sensitive and include community and religious leaders to align the medical and religious messages.
- Structured education programmes should include information on risk quantification, removing misconceptions, SMBG, diet, exercise and physical activity, medication adjustments and dose testing, recognition of the symptoms of complications, and when to break the fast to avoid harm.
- The beneficial effects of pre-Ramadan education on adequate nutrition and meal intake, adjustments medication dosages, and healthy lifestyle behaviours can guide individuals to fast in a safe and healthy manner.
- Glucose monitoring technology played a key role in managing diabetes, predicting severe hypoglycaemia, and achieving HbA1c targets.
- Studies have demonstrated clear benefits of Ramadan-focused educational programmes on glycaemic control, weight loss, and improving the risk of hypoglycaemia, potentially even in higher risk individuals.
- The positive outcomes of these programmes may also extend beyond the month of Ramadan fasting.

REFERENCES

1. Association, A.D., 4. *Foundations of care: education, nutrition, physical activity, smoking cessation, psychosocial care, and immunization*. *Diabetes care*, 2015. **38**(Supplement 1): p. S20-S30.
2. Salti, I., et al., *A population-based study of diabetes and its characteristics during the fasting month of Ramadan in 13 countries: results of the epidemiology of diabetes and Ramadan 1422/2001 (EPIDIAR) study*. *Diabetes Care*, 2004. **27**(10): p. 2306-11.
3. Alghamdi, A.S., et al., *Impact of Ramadan on Physical Activity and Sleeping Patterns in Individuals with Type 2 Diabetes: The First Study Using Fitbit Device*. *Diabetes Therapy*, 2020: p. 1-16.
4. Bener, A., et al., *Effect of ramadan fasting on glycemic control and other essential variables in diabetic patients*. *Annals of African medicine*, 2018. **17**(4): p. 196.
5. Siaw, M.Y.L., et al., *Evaluating the effect of Ramadan fasting on muslim patients with diabetes in relation to use of medication and lifestyle patterns: a prospective study*. *International journal of endocrinology*, 2014. **2014**.
6. Yeoh, E., et al., *Fasting during Ramadan and associated changes in glycaemia, caloric intake and body composition with gender differences in Singapore*. *Ann Acad Med Singapore*, 2015. **44**(6): p. 202-6.
7. Babineaux, S.M., et al., *Multi-country retrospective observational study of the management and outcomes of patients with Type 2 diabetes during Ramadan in 2010 (CREED)*. *Diabet Med*, 2015. **32**(6): p. 819-28.
8. Al-Musally, R.M., et al., *Health education to diabetic patients before the start of Ramadan: Experience from a teaching hospital in Dammam*. *Journal of family & community medicine*, 2017. **24**(2): p. 111.
9. Ahmedani, M. and S. Alvi, *Characteristics and Ramadan-specific diabetes education trends of patients with diabetes (CARE): a multinational survey (2014)*. *International journal of clinical practice*, 2016. **70**(8): p. 668-675.
10. Zainudin, S.B., et al., *Diabetes education and medication adjustment in Ramadan (DEAR) program prepares for self-management during fasting with tele-health support from pre-Ramadan to post-Ramadan*. *Therapeutic advances in endocrinology and metabolism*, 2018. **9**(8): p. 231-240.
11. Shaltout, I., et al., *Culturally based pre-Ramadan education increased benefits and reduced hazards of Ramadan fasting for type 2 diabetic patients*. *Journal of Diabetes & Metabolic Disorders*, 2020: p. 1-8.
12. Bravis, V., et al., *Ramadan Education and Awareness in Diabetes (READ) programme for Muslims with Type 2 diabetes who fast during Ramadan*. *Diabetic Medicine*, 2010. **27**(3): p. 327-331.
13. Ahmedani, M., et al., *Ramadan Prospective Diabetes Study: the role of drug dosage and timing alteration, active glucose monitoring and patient education*. *Diabetic Medicine*, 2012. **29**(6): p. 709-715.
14. El Toony, L.F., D.A. Hamad, and O.M. Omar, *Outcome of focused pre-Ramadan education on metabolic and glycaemic parameters in patients with type 2 diabetes mellitus*. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 2018. **12**(5): p. 761-767.



REFERENCES

15. Tourkmani, A.M., et al., *Impact of Ramadan focused education program on hypoglycemic risk and metabolic control for patients with type 2 diabetes*. Patient preference and adherence, 2016. **10**: p. 1709.
16. Mohamed, O.M.I., et al., *Impact of Pre-Ramadan Intervention Program on Diabetic Patients (PRINTED 1): A Randomised Controlled Trial in a Family Medicine Clinic-Abu Dhabi*. World Family Medicine, 2019. **17**(1): p. 10-22.
17. Hassanein, M., et al., *The role of optimum diabetes care in form of Ramadan focused diabetes education, flash glucose monitoring system and pre-Ramadan dose adjustments in the safety of Ramadan fasting in high risk patients with diabetes*. Diabetes research and clinical practice, 2019. **150**: p. 288-295.
18. Eid, Y.M., et al., *Empowerment-based diabetes self-management education to maintain glycemic targets during Ramadan fasting in people with diabetes who are on conventional insulin: a feasibility study*. Diabetes Spectrum, 2017. **30**(1): p. 36-42.
19. Bashier, A.M., et al., *Impact of optimum diabetes care on the safety of fasting in Ramadan in adult patients with type 2 diabetes mellitus on insulin therapy*. Diabetes research and clinical practice, 2019. **150**: p. 301-307.
20. Chowdhury, A., et al., *Fasting outcomes in people with diabetes and chronic kidney disease in East London during Ramadan 2018: the East London diabetes in Ramadan survey*. Diabetes research and clinical practice, 2019. **152**: p. 166-170.
21. Al-Ozairi, E., et al., *Intermittent Fasting Could Be Safely Achieved in People With Type 1 Diabetes Undergoing Structured Education and Advanced Glucose Monitoring*. Frontiers in Endocrinology, 2019. **10**.
22. Daly, H., et al., *'A Safer Ramadan': developing an integrated approach to support safer fasting and feasting for people with type 2 diabetes*. Practical Diabetes, 2014. **31**(7): p. 292-297.
23. Hui, E., et al., *Fasting among pregnant women with diabetes during Ramadan*. International journal of clinical practice, 2012. **66**(9): p. 910-1; author reply 910.
24. McEwen, L.N., et al., *Impact of an individualized type 2 diabetes education program on clinical outcomes during Ramadan*. BMJ Open Diabetes Research and Care, 2015. **3**(1).
25. Ali, M., et al., *Primary care providers' knowledge and practices of diabetes management during Ramadan*. Journal of primary care & community health, 2016. **7**(1): p. 33-37.
26. Gaborit, B., et al., *Ramadan fasting with diabetes: an interview study of inpatients' and general practitioners' attitudes in the South of France*. Diabetes & metabolism, 2011. **37**(5): p. 395-402.
27. Hollinger-Smith, L., *Diversity & cultural competency in health care settings*. 2016.
28. Tripp-Reimer, T., et al., *Cultural barriers to care: inverting the problem*. Diabetes Spectrum, 2001. **14**(1): p. 13-22.
29. Hawthorne, K., et al., *Culturally appropriate health education for Type 2 diabetes in ethnic minority groups: a systematic and narrative review of randomised controlled trials*. Diabetic Medicine, 2009: p. no-no.
30. Zainudin, S.B. and A.B. Hussain, *The current state of knowledge, perception and practice in diabetes management during fasting in Ramadan by healthcare professionals*. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 2018. **12**(3): p. 337-342.

REFERENCES

31. Khanna, S.K., M. Cheyney, and M. Engle, *Cultural competency in health care: evaluating the outcomes of a cultural competency training among health care professionals*. Journal of the National Medical Association, 2009. **101**(9): p. 886-892.
32. Majumdar, B., et al., *Effects of cultural sensitivity training on health care provider attitudes and patient outcomes*. Journal of Nursing Scholarship, 2004. **36**(2): p. 161-166.
33. Ahmedani, M.Y., S. Ahsan, and M.S. ul Haque, *Role of Ramadan specific diabetes education (RSDE); A prospective study*. Pakistan journal of medical sciences, 2017. **33**(3): p. 586.
34. Alsaeed, D., J. Al-Kandari, and E. Al-Ozairi, *Fasting in Ramadan with type 1 diabetes: A dose adjustment for normal eating workshop in Kuwait*. Health & social care in the community, 2019. **27**(6): p. 1421-1429.
35. Taha, N., et al., *Piloting a Culturally Adapted Arabic Structured Small-Group Education Program for Adolescents with Type 1 Diabetes*. Medical Principles and Practice, 2020. **29**(2): p. 142-149.
36. Rashid, F. and E. Abdelgadir, *A systematic review on efficacy and safety of the current hypoglycemic agents in patients with diabetes during Ramadan fasting*. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 2019. **13**(2): p. 1413-1429.
37. Beshyah, S.A., *Fasting during the month of Ramadan for people with diabetes: medicine and Fiqh united at last*. Ibmossina J Med Biomed Sci, 2009. **1**(2): p. 58-60.
38. Al-Arouj, M., et al., *Recommendations for management of diabetes during Ramadan: update 2010*. Diabetes care, 2010. **33**(8): p. 1895-1902.
39. Masood, S.N., et al., *Beliefs of people with diabetes about skin prick during Ramadan fasting*. Diabetes Care, 2014. **37**(4): p. e68-e69.
40. Mansouri, D., et al., *Self-Monitoring of Blood Glucose and Hypoglycemia Association During Fasting in Ramadan Among Patients with Diabetes*. Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy, 2020. **13**: p. 1035.
41. Alamoudi, R., et al., *Attitudes and habits of patients with type 1 diabetes during fasting Ramadan*. Journal of clinical & translational endocrinology, 2018. **14**: p. 1-4.
42. Hassanein, M., et al., *Management of type 2 diabetes in Ramadan: low-ratio premix insulin working group practical advice*. Indian journal of endocrinology and metabolism, 2014. **18**(6): p. 794.
43. Alabbood, M.H., K.W. Ho, and M.R. Simons, *The effect of Ramadan fasting on glycaemic control in insulin dependent diabetic patients: A literature review*. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 2017. **11**(1): p. 83-87.
44. Alfadhli, E.M., *Higher rate of hyperglycemia than hypoglycemia during Ramadan fasting in patients with uncontrolled type 1 diabetes: Insight from continuous glucose monitoring system*. Saudi Pharmaceutical Journal, 2018. **26**(7): p. 965-969.
45. Benaji, B., et al., *Diabetes and Ramadan: review of the literature*. Diabetes research and clinical practice, 2006. **73**(2): p. 117-125.
46. Trabelsi, K. and H. Chtourou, *Teaching physical education during ramadan observance: Practical recommendations*. Int. J. Sport Stud. Health, 2019: p. 2019.
47. Tourkmani, A.M., et al., *Impact of Ramadan Focused Education Program on medications adjustment for patients with type 2 diabetes in a primary health care institution in Saudi Arabia*. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 2019. **13**(1): p. 161-165.



REFERENCES

48. WA, M., *Recognizing & Treating Hypoglycemia, Hyperglycemia & Other Diabetes-related Health Problems*. JEMS, 2013: p. 38:44-7.
49. UK, D., *Hypos and hypers*. 2017.
50. Stoian, A.P., et al., *Diabetes and the COVID-19 pandemic: how insights from recent experience might guide future management*. Metabolic Syndrome and Related Disorders, 2020. **18**(4): p. 173-175.
51. Ahmed, W.N., et al., *Management of diabetes during fasting and COVID-19—Challenges and solutions*. Journal of family medicine and primary care, 2020. **9**(8): p. 3797.
52. Lee, J., et al., *Diabetes telemonitoring reduces the risk of hypoglycaemia during Ramadan: a pilot randomized controlled study*. Diabetic Medicine, 2015. **32**(12): p. 1658-1661.
53. Lee, J.Y., et al., *Telemonitoring in fasting individuals with Type 2 Diabetes Mellitus during Ramadan: A prospective, randomised controlled study*. Scientific reports, 2017. **7**(1): p. 1-9.
54. Staite, E., et al., *A Wearable Technology Delivering a Web-Based Diabetes Prevention Program to People at High Risk of Type 2 Diabetes: Randomized Controlled Trial*. JMIR mHealth and uHealth, 2020. **8**(7): p. e15448.
55. Nanditha, A., et al., *A pragmatic and scalable strategy using mobile technology to promote sustained lifestyle changes to prevent type 2 diabetes in India and the UK: a randomised controlled trial*. Diabetologia, 2020. **63**(3): p. 486-496.
56. Abaza, H. and M. Marschollek, *SMS education for the promotion of diabetes self-management in low & middle income countries: a pilot randomized controlled trial in Egypt*. BMC public health, 2017. **17**(1): p. 962.
57. Kumar, S., et al., *A diabetes mobile app with in-app coaching from a certified diabetes educator reduces A1C for individuals with type 2 diabetes*. The Diabetes Educator, 2018. **44**(3): p. 226-236.
58. Afandi, B.O., et al., *The individualization of care for people with diabetes during Ramadan fasting: a narrative review*. Ibnosina Journal of Medicine and Biomedical Sciences, 2020. **12**(2): p. 98.
59. Rinker, J., et al., *The 2017 diabetes educator and the diabetes self-management education national practice survey*. The Diabetes Educator, 2018. **44**(3): p. 260-268.
60. Pearson, T.L., et al., *Population health: the diabetes educator's evolving role*. The Diabetes Educator, 2019. **45**(4): p. 333-348.
61. Bajaj, H.S., et al., *Diabetes Canada position statement for people with types 1 and 2 diabetes who fast during Ramadan*. Canadian journal of diabetes, 2019. **43**(1): p. 3-12.
62. Mourad, S., *The Role of Diabetes Educators in Reduction the Risk of Hypoglycemia in Type 1 Patients during Fasting Ramadan*. 2018, Am Diabetes Assoc.
63. Ulhaque, M.S., et al., *Role of 24-hour Helpline Service in the Management of Diabetes During the Holy Month of Ramadan*. Cureus, 2020. **12**(3).
64. Ahmed, F., et al., *Impact of 24-hour helpline service for people with diabetes*. Pakistan journal of medical sciences, 2017. **33**(3): p. 747.
65. Gad, H., et al., *The effect of Ramadan focused education on patients with Type 2 diabetes: a systematic review and meta-analysis*. Diabetes Research and Clinical Practice, 2020: p. 108122.

REFERENCES

66. Al Awadi, F.F., et al., *Patterns of Diabetes Care Among People with Type 1 Diabetes During Ramadan: An International Prospective Study (DAR-MENA T1DM)*. *Advances in therapy*, 2020: p. 1-14.
67. DAFNE, S.G., *DAFNE (Dose Adjustment For Normal Eating): Methodology and Quality Assurance for Exploratory trial*. . *Diabetic Medicine*, 2001. **Vol. 18, No. 2**: p. p. 130.