



Ramadan and your Diabetic patient: A resource pack for Healthcare Professionals

2: 185 Ramadhan is the (month) in which was sent down the Qur'an, as a guide to mankind, also clear (Signs) for guidance and judgment (Between right and wrong). So every one of you who is present (at his home) during that month should spend it in fasting, but if any one is ill, or on a journey, the prescribed period (Should be made up) by days later. Allah intends every facility for you; He does not want to put to difficulties. (He wants you) to complete the prescribed period, and to glorify Him in that He has guided you; and perchance ye shall be grateful.

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1. RAMADAN

Islam which is the faith followed by Muslims is the second largest religion in the world. Islam means submission in Arabic and entails the practice of submission of Allah's (the name of God) commands. The Quran is the holy book which is followed by Muslims. There are approximately 1.6 million Muslims in the UK and 325,000 have diabetes.^{1,2} The fundamental aspects of Islam are the five pillars of Islam which entail:

- Shahadah – The declaration of faith
- Salah – Five compulsory daily prayers
- Zakat – Annual alms tax to the poor and needy
- Sawm – Fasting during the month of Ramadan
- Hajj – Pilgrimage to Mecca

When do Muslims fast?

Fasting occurs in the ninth month of the Islamic calendar (Hijra) which is lunar based. The Islamic calendar is 354 days thus precedes every year by 10-11 days. The period of fasting lasts from dawn to dusk and will vary in length depending on the geographical location and season. Between dusk and dawn the restrictions on abstinence are removed. Ramadan will last for 28-30 days. In the UK a fast can last from between 10 and 19 hours. The meal consumed at dawn and dusk is known in Arabic as *Sahur* and *Iftar* respectively.

What does fasting entail?

Fasting is known in the Arabic language as *sawm* and literally means "abstention from". During the period of fasting an individual must refrain from smoking, eating, drinking, sexual activity, consuming oral medications and using intravenous fluids.

Who partakes in fasting?

Ramadan should be practiced by all healthy and responsible Muslims.

Who is considered exempt from fasting?

Fasting does not apply to all Muslims. If it is considered to be detrimental to an individual's health then the Quran states fasting should be avoided.

"....Allah intends every facility for you; He does not want to put you to difficulties. (He wants you) to complete the prescribed period and to glorify Him in that. He had guided you; and perchance you shall be grateful." (2:185).

Those who are considered Islamically exempt from fasting are:

- The frail and elderly
- Children
- Those who have a chronic condition whereby participating in fasting would be detrimental to their health
- Those who cannot understand the purpose of fasting i.e. those who have learning difficulties or those who suffer from severe mental health problems
- Travellers (those travelling greater than 50 miles)*
- Those acutely unwell*
- Pregnant and breast feeding women*

*Considered to be temporarily exempt. Fasts must be made up at a later date but if unable to do so then *fidyah* must be given. *Fidyah* is when those who are considered exempt and do not fast can compensate by giving alms to the poor.

Often many Muslim individuals will still participate in fasting due to obligations towards their faith and feelings of "guilt" if fasting is missed. Those who are diabetic and have no symptoms do not classify themselves as unwell and will partake in Ramadan. Studies have found that the majority of diabetics will fast. The largest study conducted on diabetics fasting – the EPIDIAR study which involved 13 countries and 12,243 individuals, showed 79% of type 2 and 43% of type 1 diabetics fasted for at least 15 days during the month of Ramadan.³

To mark the end of Ramadan the festival of *Eid ul-fitr* follows it.

2. Impact of Ramadan on individuals

2a) Psychological changes when fasting

Fasting is a practice for individuals to participate in self sacrifice and appreciate what one has. Charitable donations are given during this month. Ramadan gives individuals time to self reflect, better their character and remove their faults. Feelings of anger during this holy month may nullify the benefit of fasting. Participating in fasting allows individuals to attain spiritual peace. Thus Ramadan is simply not about just giving up food. There is an increased participation in prayers and Quaranic recitation with god consciousness (*Taqwa*).

2b) Physiological changes when fasting

Fasting causes changes in the body eight hours after the last meal.

- Insulin secretion is reduced
- There is glycogenolysis which is glycogen breakdown and there is gluconeogenesis which is the production of glucose. (Figure one)⁴
- During fasting there is an increase in the levels of the counter regulatory hormones glucagon and catecholamine.
- There is an increase in fatty acid production and ketones

In Type 1 diabetics and those with insulin deficiency who fast it may result in excessive glycogenolysis, gluconeogenesis and ketogenesis. This may lead to hyperglycaemia and ketoacidosis. (Figure two)⁴

Figure 1⁴

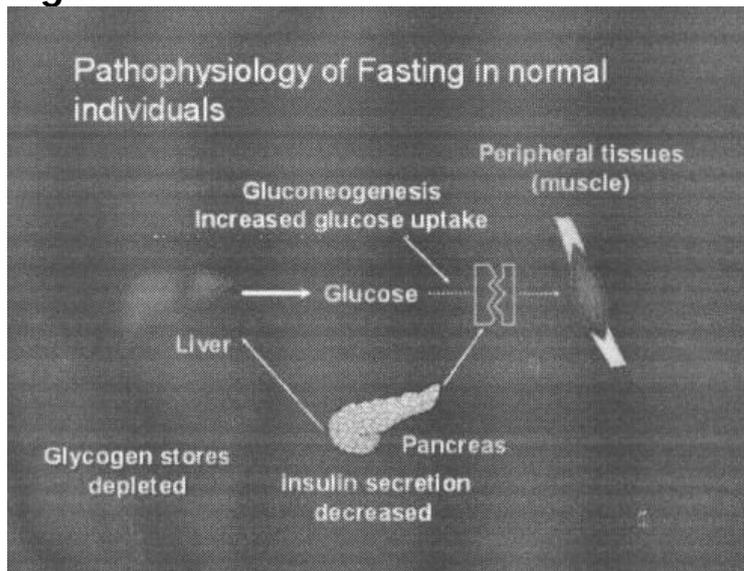
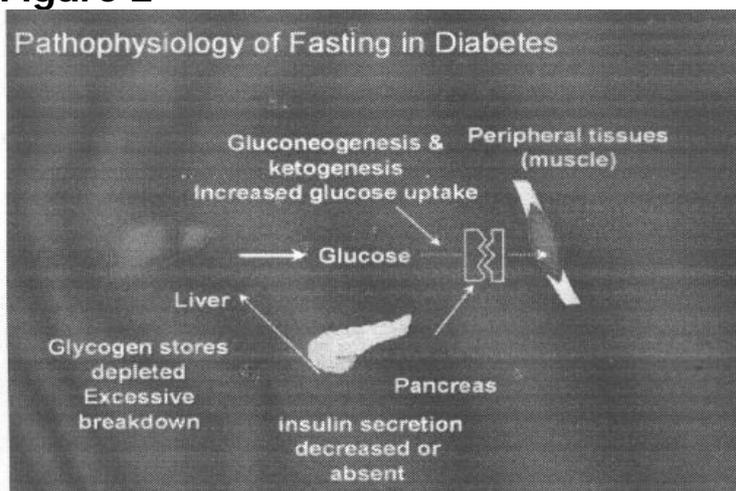


Figure 2⁴



2c) Biochemical changes during fasting

- *Effects on body weight:* In the EPIDIAR study 50-60% of individuals had no change in their weight during Ramadan and 20-25% gained or lost weight.³ Other studies show no change or a reduction in weight whilst fasting.^{5,6,7}
- *Effects on glycaemic control:* There has been no significant change in glucose levels in some studies.^{5,6} The EPIDIAR study which was the largest study done on Ramadan and involved 12,243 people in 13 countries did not assess

average glycaemic levels but results showed an increase in the risk of hypoglycaemia and hyperglycaemia:

	Increased risk of hypoglycaemia*	Increased risk of hyperglycaemia *
Type 1 diabetes	4.7 fold	5 fold
Type 2 diabetes	7.5 fold	3 fold

*Severe events which required hospitalisation ³

The results are thought to be underestimates as only individuals who had severe episodes which required hospitalisations were recorded. There are conflicting outcomes found in studies with some showing evidence of hypoglycaemia with oral diabetic agents and insulin during fasting and other studies showing no increased risk. ^{8,9,10}

- *Effects on lipid metabolism:* Studies have shown no change or a decrease in cholesterol and triglyceride levels and an increase in HDL levels which supports a favourable cardiovascular risk profile. ^{11,12} However this increased HDL level reduces after Ramadan. ¹³

2d) Calorific Intake

There are varying results from studies which show either a decrease or increase in total daily calorific intake. ^{6,14-15}

2e) Pregnancy

Women without diabetes and who had an uncomplicated pregnancy had no adverse effects on intrauterine development when they partaked in fasting. ¹⁶ It is not recommended that diabetic pregnant women fast during Ramadan. ¹⁷ This is because of the evidence of fetal and maternal risk for pregnant women with poor glycaemic control. ¹⁸

2f) Cardiovascular risk

During the month of Ramadan there were no increase in the number of hospital admissions due to stroke as found on a review of a stroke database during a 13 year review.¹⁹ A study in an Islamic country where the majority of the population fast, showed on analysis during the month of Ramadan there were no increases in the number of hospital admissions for acute coronary syndrome.²⁰ Individuals with stable cardiac disease were found to have minimal adverse effects when fasting.²¹⁻²²

2g) Renal effect

Studies have found that patients who have stable chronic kidney disease (CKD) can fast safely and there has been found to be an improvement in eGFR levels post fasting.²³ Other studies have found that fasting results in a decrease in eGFR but there is no change in electrolyte balance.²⁴ Ramadan may have a detrimental effect on the renal tubules.²⁵ In summary those with CKD should only fast if their condition is stable and if they will have medical supervision including close monitoring of their renal function whilst they are fasting.

2h) Lungs

During fasting because of a lack of fluid intake this can lead to dehydration and dryness of the respiratory tract mucosa which may exacerbate bronchoconstriction in asthmatics.²⁶ Healthy individuals had no affect on their spirometry values and pulmonary volume functions.²⁷

3. Ramadan and Medication

3a) Metformin

This class of drug can cause hypoglycaemia even when taken without fasting.²⁸ There is no evidence available for those on metformin who partake in fasting with respect to the incidence of hypoglycaemia. It is recommended that two thirds of the dose of metformin should be taken at the sunset meal and one third of the dose should be taken at the predawn meal.¹⁷ The lunchtime dose should be omitted. Generally speaking metformin is safe to take whilst fasting. If the individual is on a twice a day dosage then the dose can remain unchanged but if they experience any adverse effects then the dose should be reduced.

3b) Thiozolidinediones

There is no need for any dose adjustment with this class of drugs. Pioglitazone versus placebo was studied in a randomised controlled trial during Ramadan and it was found there was no incidence of hypoglycaemia.²⁹

3C) Sulphonylureas

A prospective study looked at Glimepiride once a day showed no difference in the incidence of hypoglycaemia compared to the pre or post Ramadan period. There was also no change in glycaemic control levels when the dose was switched from the morning to evening.³⁰ Similarly fasting glucose levels were maintained when Glicazide MR 60mg was switched from the morning to an evening dose.³¹ There are a number of studies looking at sulphonylureas and prandial regulators.^{32,33} An observational study of Muslim patients in five different countries showed a 20% incidence of hypoglycaemia in those who partaked in Ramadan and were on a sulphonylurea. The incidence rate varied depending on the country and sulphonylurea agent used.³⁴

Use of sulphonylureas during fasting should be used with caution due to their propensity to cause hypoglycaemia. It is more prudent to use short acting agents. A once a day dose which is normally taken in the morning should be taken in the evening (iftar) instead

when the meal will be heavier. Those who are on twice a day should have the dose halved in the morning (sahur) e.g. a 160mg twice a day dose should be reduced to 80mg in the morning and 160mg at night.³⁵

3d) Incretin-based therapies

This newer class of drugs includes DPP 4 inhibitors and GLP 1 analogues. There has been a couple of studies carried out during Ramadan of the DPP4 inhibitor vildagliptin. One was a retrospective study looking at vildagliptin added to metformin. The vildagliptin group had a lower incidence of hypoglycaemia and improved glucose control compared to patients on gliclazide and metformin.³⁶ Another study of this drug was a prospective, non-interventional, two cohort study of patients taking Vildagliptin 50mg twice a day or a sulphonylurea added to metformin. Results showed Vildagliptin caused no hypoglycaemia compared to the sulphonylurea and metformin combination.³⁷ This was a small study.

A study of Type 2 diabetics who were given Exenatide combined with metformin resulted in less hypoglycaemia compared to a comparator group of metformin and gliclazide.³⁸

This newer class of drugs have been found in studies to cause less hypoglycaemia compared to conventional treatments. When used in combination therapy the dose of other agents like sulphonylureas may need to be adjusted.³⁸ Although DPP4 inhibitors and GLP-1 analogues are relatively new agents and there is limited experience of use of these drugs during Ramadan, they generally pose less risk of hypoglycaemia to patients with their glucose dependent action compared to some of the conventional treatments. Patients should be cautioned on side effects like nausea with the injectable GLP-1 analogues which may pose a problem during fasting.

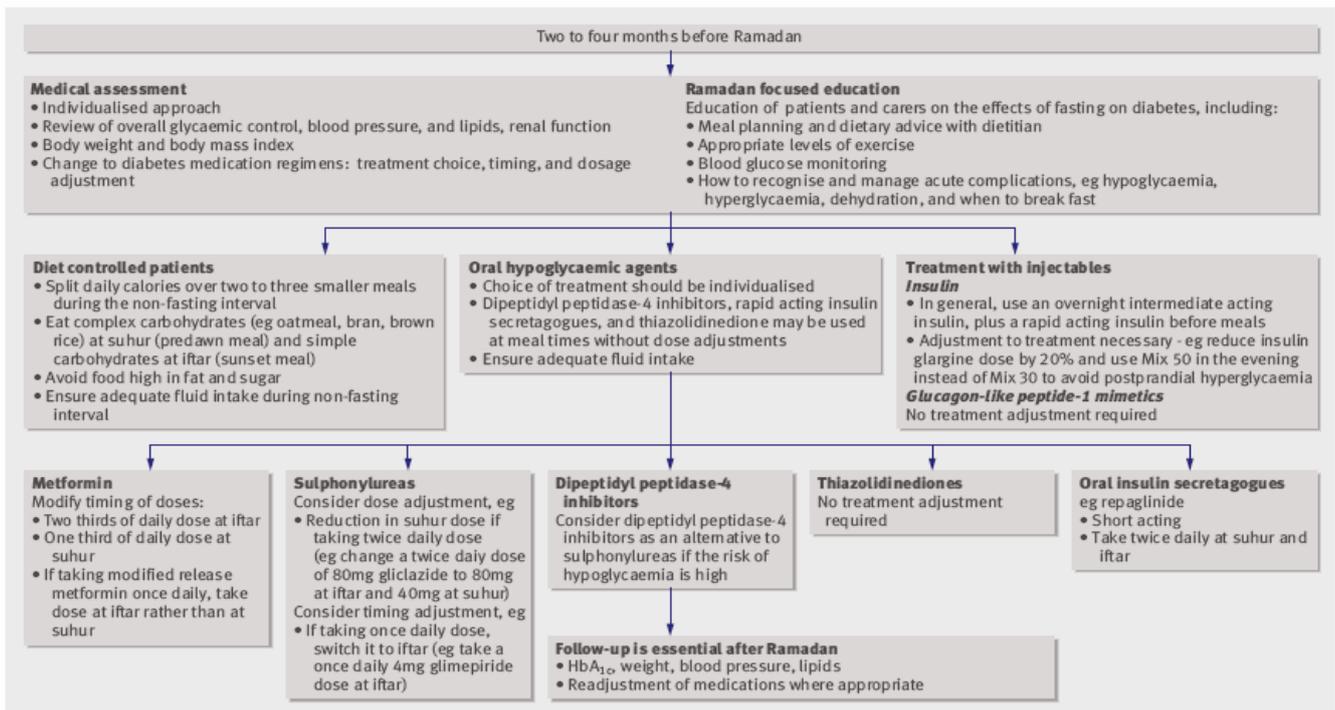
3e) Insulin

Advice given to individuals on insulin who wish to fast should be tailored to each individual. The following recommendations are based on small studies which have been conducted and expert's opinions. Each patient should be reviewed individually to assess

the affect after adjusting the insulin dose by closely monitoring blood sugars and adjusting accordingly.

- Type 1 Diabetics –Those on a basal bolus regime should be discouraged to fast. If an individual insists on fasting it is recommended they omit the midday rapid acting dose and reduce the background dose by 20% if blood glucose levels are below 7.0 mmol/l. If levels are greater than 7.0 mmol/l then advice from diabetic specialists should be sought about dose adjustment.³⁵ Studies for this cohort of patients are small. It is recommended that those with Type 1 diabetes and particularly those who are poorly controlled do not fast.¹⁷
- Single basal insulin – This includes Glargine and Detemir. The dose should be reduced by 20% to prevent hypoglycaemia.³⁵ The dose should be administered in the evening.
- Pre-mixed insulins – The morning insulin dose should be taken in the evening and the evening dose should be halved and taken in the morning.³⁹ An observational study found that Humalog Mix50 is better at reducing post prandial glucose peaks and episodes of hypoglycaemia compared to Human insulin Mix30.⁴⁰ A randomised study, open labelled crossover study found that Humalog Mix25 resulted in better post prandial glucose levels and less hypoglycaemia after Iftar compared to Humulin M3.⁴¹
- Short acting insulin – There is some evidence of less post prandial peaks and hypoglycaemia in Type 2 diabetics after using Human Lispro before each of the two meals during Ramadan.⁴² The affects of short acting analogues may last up to 6 hours after meals.⁴³

The table below can be used as a guide to drug dosage adjustment during Ramadan.³⁵



An approach to oral treatment of type 2 diabetes during Ramadan for patients planning to fast

3f) Use of drugs during Ramadan

The use of drugs during the fasting periods can be an area of contention and uncertainty. A meeting of medical practitioners and Islamic jurists in Morocco (June, 1997) agreed *unanimously* a consensus as to acceptable drug use during Ramadan which will not nullify a fast:⁴⁴

- Eye and ear drops
- Use of vaginal pessaries and washes.
- Injections through the skin, muscle, joints or veins, with the exception of intravenous feeding
- Oxygen and anaesthetic gases
- Nitroglycerin tablets taken sublingually
- Mouthwashes, gargle or oral sprays provided none are swallowed into the stomach
- Any substance absorbed through the skin e.g. creams, ointments, medicated plasters.

A *majority* of the group agreed the following do not nullify a fast:

- Nose drops, nose sprays and inhalers
- Anal injections

3g) Dosage schedule

Individuals who have to take tablets during Ramadan may have to have their dosage schedule adjusted after discussion with a healthcare professional.

This will depend on the normal timing of administration, length of the fast and indication of the drug. Certain drugs will have circadian variation in pharmacokinetics and pharmacodynamics.⁴⁵ Studies on anti-hypertensive drugs have shown no difference in efficacy during Ramadan when administration times have changed.⁴⁶ Drugs which are available as modified release may be a suitable option to use in Ramadan.

4. Ramadan Education for the diabetic patient

4a) Breaking the fast:

Individuals wishing to fast should know that it is imperative they break the fast if blood glucose levels are less than 3.9 mmol/l in the morning particularly if they are on insulin or sulphonylureas. If they have hyperglycaemia i.e. if blood glucose levels are above 16.7 mmol/l then it is also recommended to break the fast.¹⁷ Many Muslim individuals may be reluctant to break their fast even if they feel unwell. This topic should be handled sensitively when counselling patients before Ramadan.

4b) Blood monitoring whilst fasting:

- When blood monitoring is carried out whilst fasting it is not considered breaking ones fast.⁴⁷
- Patients should be aware of the symptoms of hyperglycaemia and hypoglycaemia. If the symptoms appear they should check their blood glucose levels. It is also recommended for individuals to monitor their blood glucose levels if they feel unwell and to assess the effect of any insulin dose titration and after changes are made to their diabetes drug dosages.³⁵
- Those on insulin should be advised to check blood glucose levels before sahur, iftar and during the day when required.

4c) Exercise:

- Light/moderate exercise is considered safe in Ramadan for type 2 diabetics.⁴⁸
- Excessive or strenuous exercise should be avoided as may lead to hypoglycaemia especially if they are taking insulin or sulphonylureas.
- Taraweeh (night prayer) is considered to be part of an individuals exercise regime as it entails sitting, bowing, prostrating and standing.³⁵

4d) Diet:

- There can be a tendency to eat more high fat and high sugar foods during the fasting period.
- Excessive indulgence in food is not advocated as it is considered harmful for the body and the benefit of the fast is not gained. "Eat of the good and wholesome things that We have provided for your sustenance, but indulge in no excess therein" (Quran 20:81) ⁴⁷
- Food type should be thought about before being consumed.
- A healthy balanced diet should be advocated during Ramadan.
- Food which has complex carbohydrates which release energy slowly should be advocated e.g. grains, seeds, oats, beans and lentils. ⁴⁷
- Fibre rich food is also advised. ⁴⁷
- Oils with monounsaturated fats are recommended e.g. olive oil. Deep fried food should be avoided and healthier alternatives should be emphasised like shallow frying, grilling or baking. ⁴⁷
- Food types mentioned in the Quran and Sunnah (Prophetic traditions) should be encouraged. These include: milk, dates, oats, olives, lentils and grapes. ⁴⁹
- Foods with high sugar levels should be avoided e.g. mithai (indian sweets).
- Individuals should ensure they have ample fluid intake out to maintain hydration during the fasting period. Caffeine drinks promote fluid excretion as can act as diuretics.

4e) To fast or not to fast.....

If a patient wishes to fast then a healthcare professional has a duty to explore the impact of fasting for the patient in terms of risk. Deciding that it is not suitable for the patient to fast must be handled sensitively as many Muslims feel obligated to fast as it is considered an important part of their faith.

It is important to bear in mind most diabetics will partake in fasting even if they are at high risk as found in the EPIDIAR study.³

Healthcare professionals deciding whether to fast can use the table below (see Box 1)¹⁷ to classify individuals into different risk categories.

Individuals falling into the low risk category can fast without seeking advice from healthcare professional. Those in the moderate risk category can reduce their risk by seeking appropriate advice from a healthcare professional before fasting commences. Those at high risk are recommended not to fast due to the risk of hypoglycaemia and worsening diabetic control.³⁵

Box 1 | Expert recommendations for risk stratification in patients with type 1 or type 2 diabetes who fast during Ramadan⁸

Patients at high risk

- Those with severe and recurrent episodes of hypoglycaemia and unawareness
- Those with poor glycaemic control
- Those with ketoacidosis in the three months before Ramadan
- Those who experience hyperosmolar hyperglycaemic coma within the three months before Ramadan
- Those with acute illness
- Those who perform intense physical labour
- Pregnant women
- Those with comorbidities such as advanced macrovascular complications, renal disease on dialysis, cognitive dysfunction, uncontrolled epilepsy (particularly precipitated by hypoglycaemia)

Moderate risk

- Well controlled patients treated with short acting insulin secretagogue, sulphonylurea, insulin, or taking combination oral or oral plus insulin treatment

Low risk

- Well controlled patients treated with diet alone, monotherapy with metformin, dipeptidyl peptidase-4 inhibitors, or thiazolidinediones who are otherwise healthy

4f) Pre-Ramadan Assessment:

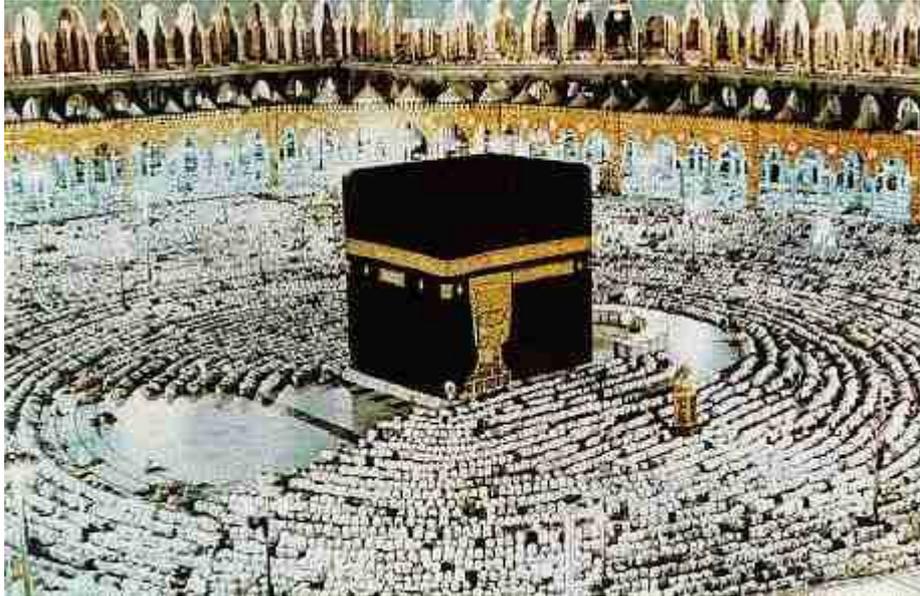
A medical assessment should be carried out 1-2 months before Ramadan commences. This should entail:

- Sections 4(a-e) should be covered during the pre-Ramadan assessment.
- A full annual review should be carried out including measurement of lipids, blood pressure, glycaemic levels and

detection of complications. An assessment of the risks of fasting should follow.

- To cover the symptoms of hyper and hypo glycaemia and ensure those at high risk have the appropriate blood monitoring equipment and know how often they should check their sugar levels and how to respond appropriately to cut off points considered high and low levels of blood glucose.
- The pre-Ramadan education session is a good opportunity to discuss smoking cessation if applicable. Studies have shown a favourable response to stopping smoking during Ramadan.⁵⁰
- Structured education interventions have found to be beneficial in terms of reducing the risk of hypoglycaemia and preventing weigh gain.⁵¹ There is a BME Desmond education programme available in the UK to educate both patients and healthcare professionals on the impact of Ramadan and how to safely fast which is being to be rolled out in parts of the UK. This may be made available in all parts of the UK in the near future.
- Educational counselling will be re-enforced and be more effective if it includes family members so if this is possible the healthcare professional should include them.

5. Hajj



A picture of the Kaaba in Masjid Al-Haram, Mecca. The sacred site Muslims do pilgrimage.

Hajj is the pilgrimage to Mecca in Saudi Arabia, and is the fifth pillar of Islam. It occurs in the twelfth month of the Islamic calendar. It is the largest pilgrimage in the world of around 2 million people and lasts five days. Hajj is associated with the life of the Islamic Prophet Muhammad (PBUH) from the 7th century. But the ritual of pilgrimage to Mecca is considered by Muslims to stretch back thousands of years. It demonstrates solidarity of Muslims and submission to Allah. For Muslims this spiritual journey is considered a once in a lifetime obligation. Hajj is physically demanding and entails a significant degree of walking and entails wearing certain clothes, prayers and many rituals. Thus diabetic patients should be counselled by healthcare professionals before they undertake this journey. An ideal time for counselling is when they visit healthcare professionals to receive their necessary immunisations which are a requirement for them to have before entering Saudi Arabia for Hajj. The Muslim festival of Eid Ul-Adha signifies the end of the pilgrimage period.

Healthcare professionals should advise patients before Hajj:

- That they take enough medication with them to cover the period of Hajj.

- To store their insulin in cool packs and to keep them in their hand luggage whilst travelling.
- Ensure they have appropriate equipment for blood monitoring with them. The physical demands of Hajj may render patients susceptible to hypoglycaemic attacks. Insulin doses may have to be reduced and food intake increased. It should be emphasised that individuals should carry sweets to counteract hypoglycaemic attacks. Healthcare professionals should provide appropriate counselling before the Hajj journey.
- As temperatures are above 30 degrees celsius and the journey entails many miles of walking individuals can get dehydrated so adequate fluid intake should be taken.
- It is advisable for individuals to make a note of all the medication they are on plus their medical conditions in case of emergencies.
- Diabetics must be extra careful to protect their feet. Hajj entails a lot of walking often bare feet which renders diabetic individuals susceptible to foot problems. Individuals should ensure they have appropriate foot wear.

6. Summary

Migration patterns show that diversity in our society is set to increase in the UK. Healthcare professionals should be well informed about the religious practices of individuals practicing a faith which can affect their chronic condition.

Ramadan falls in different seasons which can have a bearing on study results due to the differing length of time fasting. Other variables affecting study results include differences in study design, sample size, dietary habits in different countries where the studies are conducted, ethnicity and demographics of study participants. Recommendations are often based on expert opinion. Different confounding variables in studies have made it difficult to make a definitive conclusion about the safety of fasting for patients.

The safe use of diabetic drugs during Ramadan has been identified as one of the priority areas of research required in South Asians.⁵² Healthcare professionals should refer to this resource pack as a guide for pre-Ramadan counselling for their patients. This pack can also be used for non diabetic individuals who have other chronic conditions. However, each patient's treatment plan should be individualised and reviewed on an annual basis whereby their health status may have differed from the previous year. Factors that should be taken into account before recommending patients can fast safely are: length of fast, medication taken, those at increased risk e.g. frail, elderly, those with co-morbidities and a deteriorating health status. Healthcare professionals should use Islamic leaders in the community as a source of support to convey key health messages pertaining to fasting safely.

This resource pack has been put together to support healthcare professionals to understand the implications of fasting in diabetics, the advice they can offer their patients in a culturally sensitive manner and where to refer to for help and information.

7. Useful Links

This Ramadan resource pack can be accessed via:

http://library.nhsggc.org.uk/mediaAssets/My%20HSD/2011-05-31-RAMADAN_RESOURCE_PACK.pdf

- www.sahf.org.uk
- www.diabetes.org.uk
- www.salaam.org.uk (Information on local mosques)
- www.mcb.org.uk (Muslim Council of Great Britain)
- www.leicestershirediabetes.org.uk
- www.communitiesinaction.org/Ramadan
- www.islamset.com
- www.apneesehat.net (A social enterprise programme which focuses on the health of South Asians)
- www.ukramadandiabetes.net

8. Calendar

A calendar with Ramadan start dates up to 2015 can be found here:

<http://www.bbc.co.uk/religion/tools/calendar/faith.shtml?muslim>

Sources

This resource pack has been produced as an updated version of the August 2010 version. A search of databases from 2009- April 2011 using Medline, embase and the Cochrane library using the search terms "Ramadan" and "fasting" was conducted.

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