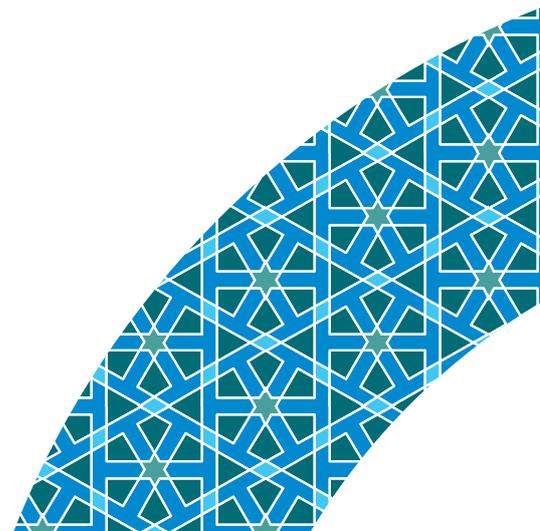


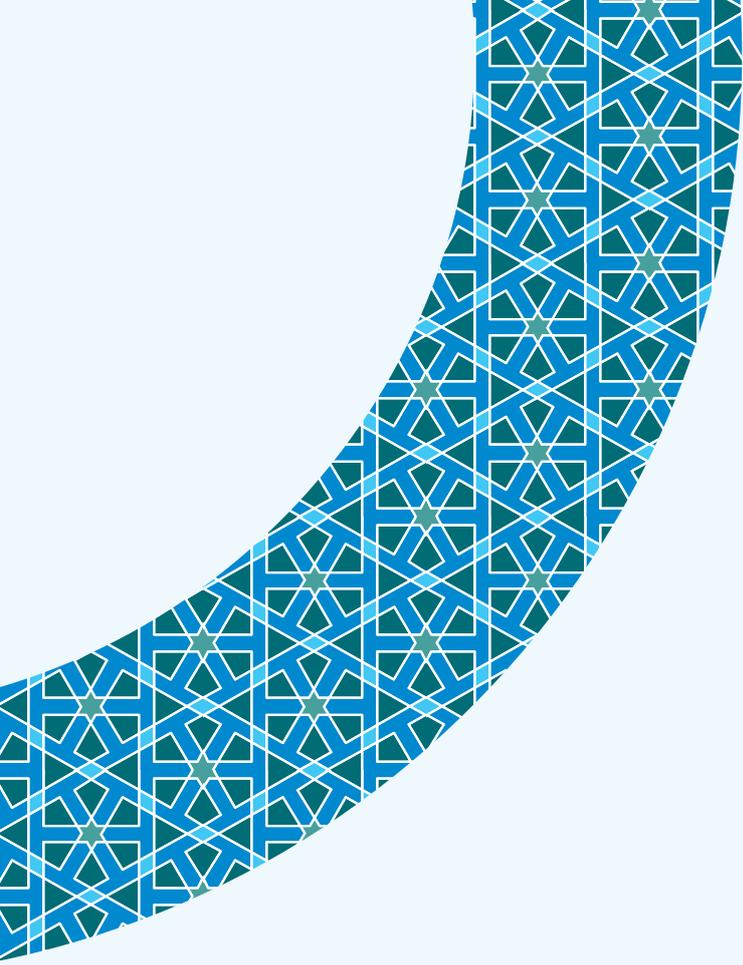
CHAPTER 11

Management of hyperglycaemia in pregnancy when fasting during Ramadan

Chapter lead:
Bachar Afandi

Authors:
Mohamed Hassanein
Bashir Taha Salih
Sarah Abdo







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WHAT IS KNOWN?

- Ramadan fasting in healthy pregnant women is associated with biochemical changes somewhat similar to the effects of prolonged fasting with an increase in triglycerides (TG), free fatty acids (FFA) and Ketones and a decrease in glucose and insulin.
- Healthy pregnant women that fast during Ramadan can safely do so with no significant effects to the mother or the fetus.
- Pregnant women with hyperglycaemia need to achieve tight glycaemic targets, for both fasting and postprandial blood glucose levels, to avoid adverse pregnancy outcomes.
- There is a lack of comprehensive data demonstrating physiological changes, as well as mother and fetal outcomes in pregnant women who fasted Ramadan with different types of hyperglycaemia.

WHAT IS NEW?

- Several recent studies in the management of Gestational Diabetes Mellitus (GDM) during Ramadan were conducted over the last 5 years.
- Some of these studies used continuous glucose monitoring (CGM) or flash glucose monitoring (FGM) which can provide comprehensive information about glucose changes when fasting during Ramadan.
- Overall targets for blood glucose (BG) levels during Ramadan show improvements, however, postprandial blood glucose levels were frequently high.
- Episodes of hypoglycaemia were remarkably longer in duration during fasting hours. Most of these episodes were asymptomatic and many of them occurred during the last few hours of fasting.

WHAT IS MISSING?

- Large, multi-country, epidemiological studies on hyperglycaemia in pregnancy (HIP) during Ramadan need to be conducted.

1. INTRODUCTION

Islamic regulations provide all pregnant women with the option to not fast if they feel worried about their own health, fetal wellbeing, or if they feel burdened with fasting and pregnancy. Nevertheless, many pregnant Muslim women partake in the daily fast during the daylight hours in the month of Ramadan [1, 2]. Indeed, it was previously estimated that 70–90% of healthy pregnant women observe the fast [3], although other survey studies have suggested that they may not manage the full month [4, 5]. In some communities, the social urge to fast during the Holy month is so strong that many will not listen to medical advice. In the absence of robust evidence, both for or against fasting, the general advice has been to err on the side of caution and advise pregnant women against fasting. However, for those who insist, adequate support is offered to make this journey safe for both the mother and fetus.

2. PREGNANCY AND FASTING

The literature on the impact of fasting on healthy pregnant women is conflicting. Some studies in healthy pregnant women, with no diabetes, have shown no harmful effects of fasting on the baby or to the mother [6-8]. In contrast, one study found that low birth weight was 1.5-times more likely in women who fasted in the first trimester compared with non-fasting mothers [9]. Decreased placental weight was observed in women who fasted in the second and third trimesters, however, birth weight was unaffected [10]. This might have an effect on fetal programming with potential long-term health implications [11].

3. DIABETES IN PREGNANCY AND FASTING

Diabetes in pregnancy is associated with an increased risk of both hyperglycaemia and hypoglycaemia, with an increased risk for both the mother and the baby [12]. In recent times, a small number of studies have been conducted on women with Gestational Diabetes Mellitus (GDM), where the majority of women were treated through diet alone or diet with metformin and some those treated with insulin. These studies showed, that while there was an overall improvement in hyperglycaemia, there was an associated increase in the risk of asymptomatic hypoglycaemia [13-15]. In a consensus the authors concluded that, despite some encouraging results, there was not enough evidence to change the high-risk status of fasting during Ramadan for women with GDM. Importantly, these studies were conducted on motivated volunteers in centres with a high level of skill and support, including the use of CGM and FGM alongside good patient education.

Consequently, fasting for women with pre-existing T1DM or T2DM would be even more challenging and accordingly experts consider these individuals as a high-risk group for fasting. Women with T1DM or T2DM should be advised not to fast until further research is available to support any changes in their risk categorisation [15].

Nevertheless, fasting during pregnancy is an important personal decision and a practical approach is needed to clearly explain the potential risks of fasting to the mother and the fetus. Moreover, a structured education is needed to empower pregnant women with hyperglycaemia



with the knowledge and self-management skills for good pregnancy outcomes regardless of their fasting decision.

4. MANAGEMENT OF HIP

4.1 Pre-Ramadan Assessment

Many pregnant women are not clear on what to do during Ramadan fasting. Indeed, some studies indicate that many women get advice from family members or the Imam instead of healthcare professionals [16]. Hence, it is prudent that routine pre-pregnancy counselling, for Muslim women, include a discussion on fasting during Ramadan.

Pregnant women with pre-existing diabetes who intend to fast during Ramadan should be identified several months prior to Ramadan. A complete assessment should be conducted, and a proper fasting risk evaluation should be performed.

4.2 Education and Blood Glucose Monitoring

All pregnant Muslim women with hyperglycaemia should receive formal training on target blood glucose levels and their impacts to the mother and baby; actions of insulin; injection techniques; the management of acute complications; and the behind the breaking of a fast. This need is evident when considering the literature, wherein a recent study showed that a sizeable proportion of women with GDM who initially opted to fast had changed their mind once they developed hypoglycaemia or hyperglycaemia [17].

All pregnant women with diabetes should also be made aware that testing blood glucose levels with a fingerpick test DOES NOT break their fast. Pregnant women with diabetes should check blood glucose levels as indicated. Self-Monitoring of Blood Glucose (SMBG) has been the gold standard of care for evaluating blood glucose levels in pregnant women with hyperglycaemia. However, relying on SMBG during Ramadan fasting might be misleading as it is dependent on the timing and the frequency of the test and data suggest that many episodes of hypoglycaemia and hyperglycaemia could be missed [14]. CGM or FGM provide a more comprehensive glucose profile and a better opportunity for intervention [18-21], yet the accuracy of such devices during hypoglycaemia need to be established.

4.3 Physical Activity

Women are advised to maintain normal physical activity while fasting. The *Taraweeh* prayer is considered as exercise and should be taken into consideration when insulin dosage adjustments are made.

4.4 Nutritional care and meal planning

Pregnant women with diabetes should seek dietary advice before Ramadan wherever possible. The importance of healthy eating during Ramadan is emphasised regardless of fasting status. Abstaining from high calorie meals is essential. Fruit juices and sugary drinks should be avoided. Salty foods should also be avoided, and caffeine intake should be limited. Pregnant women should also be encouraged to eat foods rich in fiber and to drink 2-3 litres of water a day. Pregnant women with diabetes must take *Suhoor* as late as possible.

4.5 Recommendations for the management of hyperglycaemia in pregnancy during Ramadan fasting

During pregnancy, the vast majority of women with hyperglycaemia would be treated with insulin, metformin, or glibenclamide. While the last two agents are not approved by the US Food and Drug Administration, many authorities do not oppose their fair use in pregnancy. However, use of glibenclamide during Ramadan fasting should be discouraged [22, 23].

Pregnant women must understand that regardless of their fasting status, they need to sustain the standard blood glucose targets during pregnancy of:

- **Fasting between 70-95 mg/dL (3.9 – 5.3 mmol/L).**
- **Post-prandial < 120 mg/dL (6.7 mmol/L).**

Pregnant women must also understand that during pregnancy they should break their fast if any of the following occur:

- **BG levels < 70 mg/dL (3.9 mmol/L) during fasting hours.**
- **Feeling unwell.**
- **Reduced fetal movement.**

4.6 T2DM or GDM controlled by diet alone or with Metformin

It is recommended that pregnant women with T2DM or GDM take precautionary measures, these include:

1. Regular SMBG to ensure that they are within the recommended targets. At the very least they should test:
 - Before the sunset meal.
 - 1-2 hours after meals (depending on the individual patient's routine of 2 or 3 meals during Ramadan).
 - Once during the day while fasting, particularly in the afternoon.
 - Anytime they feel unwell.



2. There is also the additional risk of post-prandial hyperglycaemia if the meal portions are too large or too rich in carbohydrates. Indeed, a review from a dietitian would be advisable.
3. Exercise should still be encouraged but the schedule may need altering in its intensity and timing, for example 2h after the sunset meal. As mentioned previously, if patients are in the habit of performing the Taraweeh prayer, it can be taken as part of an exercise routine. Otherwise, it is suggested all other exercise continue as usual.

4.7 Insulin treated pregnant women

Pregnant women that are treated with insulin should adhere to the following:

1. Glucose monitoring - this should be performed as already mentioned, with an emphasis on testing at any time during the day where the patient may be feeling unwell or displaying signs of hypoglycaemia or hyperglycaemia.
2. For recommendations on insulin dose adjustments please see **Table 1**.

TABLE 1: INSULIN DOSE ADJUSTMENT RECOMMENDATIONS

Type of Insulin Regimen	Adjustment during Ramadan fasting	Monitoring during Ramadan fasting
CSII / Insulin Pump	<p><u>Basal rate adjustment</u></p> <ul style="list-style-type: none"> 20-40% decrease for the final 3-4 hours of fast 10-30% increase for the initial few hours of <i>iftar</i> <p><u>Bolus doses</u></p> <ul style="list-style-type: none"> Same principles as prior to Ramadan, and reducing the dose post-Suhoor by 20% 	CGM
MDI (basal bolus) with analogue insulins	<p><u>Basal insulin</u></p> <ul style="list-style-type: none"> 30-40% reduction in dose and to be taken at <i>Iftar</i> <p><u>RAI</u></p> <ul style="list-style-type: none"> Dose at <i>Suhoor</i> to be reduced 30-50% Pre-lunch dose to be skipped Dose at <i>Iftar</i> to be adjusted based on the 2hr post <i>iftar</i> glucose reading 	5-7 point glucose monitoring
MDI (basal bolus) with conventional insulins	<p><u>NPH insulin</u></p> <ul style="list-style-type: none"> Morning pre-Ramadan dose to be taken at <i>iftar</i> 50% of the pre-Ramadan dose to be taken at <i>Suhoor</i> <p><u>Regular insulin</u></p> <ul style="list-style-type: none"> Dose at <i>Iftar</i> to be adjusted based on the 2hr post <i>iftar</i> glucose reading <i>Suhoor</i> dose 50% of the pre-Ramadan evening dose Afternoon dose to be skipped 	5-7 point blood glucose monitoring
Premixed (analogue or conventional)	<ul style="list-style-type: none"> Shift the morning pre-Ramadan dose to the <i>Iftar</i> Inject 50% of the pre-Ramadan evening dose at <i>Suhoor</i> 	5-7 point blood glucose monitoring

SUMMARY

- Many pregnant women with pre-existing diabetes or GDM are considered as high-risk group for fasting during Ramadan.
- Multiple factors influence the risk assessment of a pregnant women with hyperglycaemia and these should be carefully reviewed prior to Ramadan.
- Patient education prior to Ramadan is essential to ensure mother and fetus safety regardless of fasting decision.
- Regular SMBG should be conducted and at the very least once before the sunset meal; 1-2 hours after meals; once while fasting; anytime feeling unwell.
- Pregnant women must break their fast if they feel unwell; BG levels drop below 70 mg/dL (3.9 mmol/L); or identify a reduction in fetal movement.
- Patients treated with insulin should have doses adjusted according to their insulin regimen.



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