

Glucose monitoring during Ramadan

Abdul Jabbar

Abstract

In patients with diabetes who intend to fast during Ramadan, self-monitoring of blood glucose (SMBG) is an important tool. During this month, a long established treatment regimen, including medications, physical activity and diet plan, is changed to achieve concordance with the rules of fasting. Without proper glucose monitoring, it is not possible to achieve good glycaemic control.

Keywords: Ramadan, Diabetes Mellitus, Fasting, SMBG, Insulin, Sulfonylureas.

Blood Glucose Monitoring Tools

The two most widely studied monitoring tools are Glycated Haemoglobin (HbA1c) and self-monitoring of Blood Glucose (SMBG). HbA1c gives an average of the blood glucose over 3 months. In the setting of Ramadan, where one has to optimize blood glucose while fasting for a month or less, it is not helpful as it only reports what went wrong in the preceding months. SMBG is done by pricking the skin to get a drop of blood, putting that blood on a testing strip, and reading the result with a small meter. This can be done at different times of day, before and after meals, or before and after physical activity.

Blood Glucose Checking vs. Monitoring

It is crucial to differentiate between checking blood glucose and SMBG. Unfortunately patients often check their glucose without truly monitoring it. This implies that they must understand how to interpret and act upon their glucose readings. The data from our landmark epidemiological diabetes in Ramadan study, EPIDIAR 2001,¹ has shown that fasting during Ramadan exposes people with diabetes to an increased risk of both hypoglycaemia, and hyperglycaemia. This can be detected and treated in time if SMBG is practiced.

In Ramadan, SMBG is an important tool as it helps patients and physicians decide the necessary changes in drug dosage and other aspects of management. Pre-Ramadan patient education sessions must provide knowledge and skills to stratify the risk for fasting, and to adjust their therapy so as to keep the blood glucose in the desired range.

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The Aga Khan University, Karachi.

Correspondence: Email: haj1960@gmail.com

Evidence Base

In Type 2 diabetes mellitus (T2DM), data regarding usefulness of SMBG in patients who are not on insulin outside of Ramadan is inconsistent.² In a recent systemic review, Clar et al concluded that SMBG does not improve glycaemic control in people with T2DM on oral agents, stating that it is not cost effective. The IDF guidelines on SMBG³ in non-insulin treated T2DM summarize: "SMBG should be used only when patient with diabetes have the knowledge skills and willingness to incorporate SMBG monitoring and therapy adjustment into their diabetes care plan in order to attain agreed treatment goals".

Nevertheless, in some studies, SMBG has demonstrated efficacy in improving outcomes. Evan et al,⁴ reported that increasing the frequency of SMBG was linearly correlated with reductions in HbA1c among Type 1 Diabetes Mellitus (T1DM) patients. Among patients with T2DM, a higher frequency of SMBG was associated with better glycaemic control in those who were on insulin and were able to adjust their regimen.⁵

One of the first published data about Ramadan education, The Ramadan Education and Awareness in Diabetes (READ) programme⁶ provided structured education to one group (including glucose monitoring) and showed significant decrease in the total number of hypoglycaemic events. Similar to pregnancy in diabetes, Ramadan is a month long transient phase where SMBG plays a significant role. Patients are highly motivated to follow SMBG guidance to successfully complete their fast without having to break it due to hypoglycaemia or hyperglycaemia. Hence, Ramadan provides a good opportunity to educate and motivate patients, who are willing to learn SMBG to fulfill their aspirations to fast during this holy month.

Frequency of Monitoring

The ideal frequency of SMBG is not well defined. In the EPIDIAR study,¹ only 67% of T1DM patients and 37% T2DM patients monitored blood glucose. Most experts agree that T1DM patients should monitor their glucose at least four to five times a day, most commonly in fasting state, before each meal and bedtime. Recent insights into the importance of postprandial hyperglycaemia also emphasize the need for post meal glucose monitoring.

For patients with T2DM, frequency of monitoring varies,

depending on the medication, whether patients are adjusting their dose, or have achieved their targets. Those on insulin should perform SMBG at least four times per week, of which at least two should be fasting and two post meal.⁴

Recent IDF guidelines⁷ discuss situations in which short term focused SMBG may be beneficial even to non-insulin treated T2DM patients. Although Ramadan and fasting are not mentioned specifically in the guidelines, this recommendation should be implemented in this setting till evidence is available. Similarly meal based SMBG is also very important in helping patients understand the impact of postprandial hyperglycaemia, often observed after rich Iftar dinners.⁸

A trusted recommendation⁹ makes it essential that patients intending to observe Ramadan should have the means to monitor their blood glucose levels multiple times daily. Although the recommendations are based on expert opinion, most diabetologists managing these patients recognize that SMBG is significantly helpful in decision making about dose adjustments. It is also recommended that SMBG should be an essential component of structured education programme before Ramadan in all clinics managing these patients.

There is little published data about the timings and frequency of SMBG in the context of Ramadan. In general, it is agreed that pre-iftar (before the sunset meal) blood glucose represents fasting blood glucose outside Ramadan. It is important that patients in particular are educated that in religion, pricking and drawing blood for SMBG during the fast does not break or violate the fast. Otherwise due to this misunderstanding, they do not check blood glucose till after breaking their fast (iftar). Azizi et al.¹⁰ suggest that SMBG should be performed just before the sunset meal and 2-3 hours after the Iftar meal. It could also be performed before the suhur meal to adjust the insulin dose in some patients. The recent Ramadan Prospective Diabetes Study¹¹ used a 10 point monitoring schedule, with 2 points on each day for 5 consecutive days.

In our center, we motivate patients to agree to monitor for first three days to get a feel of glucose profile and adjust their dose. They are educated to check their blood glucose on getting up in the morning and around noon time to first assess their risk of hypoglycaemia. If on these points their blood glucose is more than 100 mg/dl, in general the risk of hypoglycaemia is low but still varies with their medication. Then again they should check pre-iftar and should be above 80 as expected for fasting blood glucose outside of Ramadan after an 8-12 hour overnight

fast. If the first 2 points are less than 100 mg/dl, they should be watchful and if less than 80 mg/dl, they should break the fast and adjust their suhur dose for next day. Once this has been taken care of, they should check their post-Iftar (main sunset meal) to assess the risk of hyperglycaemia and adjust the Iftar dose of medications. Pre-suhur SMBG is also useful to assess risk of nocturnal hypoglycaemia and adjust dose at suhur. Patients should be given a Ramadan logbook to keep a record of SMBG, with Ramadan point reference.

Glycosylated Haemoglobin (HbA1C)

HbA1c has become a standard for assessing long term glycaemic control. In the setting of Ramadan, it may be a useful monitoring tool only for retrospective assessment of worsening or improvement in diabetes control.

Clinical trials studying new therapies may still use HbA1c to document improvement or non-worsening of glycaemic control during Ramadan. For day to day care, SMBG still remains the cornerstone for both patients and physicians during Ramadan.

Fructosamine

Fructosamine is a measure of blood glucose control over the past 2-3 weeks, and hence can provide precise information about glycaemic control in the month preceding Ramadan. Although a better tool compared to HbA1c in relation to Ramadan and a useful tool for clinical trials to assess intervention around Ramadan, its value in everyday care is not established.

1,5-Anhydroglucitol (1,5-AG)

1,5-Anhydroglucitol (1,5-AG) is a new glucose monitoring tool to assess glucose peaks, and may be useful to assess glucose control after heavy Iftar meals. Although there are no studies during Ramadan, it has been reported that A1C average glucose levels can vary widely between patients, and fasting and infrequent finger stick glucose checks can often miss glucose peaks and their durations. Nearly 40% of diabetes patients in "good control" have significant glucose variability.¹² The test measures a glucose-like sugar called 1,5-AG found in most foods. When blood glucose is well-controlled, most 1,5-AG is reabsorbed in the renal proximal tubules, so the serum 1,5-AG level stays high. When hyperglycaemia occurs, excess glucose blocks reabsorption of 1,5-AG and it is excreted in the urine. Every time blood glucose spikes above 180 mg/dL, the body loses 1,5-AG. The more frequent the glucose spikes, the lower the 1,5-AG.¹³

Conclusion

SMBG is one of the important milestones in the

management of diabetes and its importance is all the more important in the setting of fasting during Ramadan. The main tool for day to day care and decision making, SMBG should be an essential component of education before Ramadan. Patients and physicians should avail this important spiritual occasion to learn how to monitor their glucose, use the information to better manage their diabetes, and continue this habit well beyond Ramadan, to achieve the target goals.

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