REVIEW ARTICLE

Management of Diabetes in Ramadan Fasting

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Abstract

Ramadan, the holy month of Muslims, is the ninth month of the Islamic calendar. During fasting, plasma glucose levels and circulating insulin decrease gradually and counter regulatory hormones such as glucagon and catecholamines tend to rise. Diabetic Muslims who insist on fasting should be aware of potential complications and techniques of decreasing the risks. Muslims should be evaluated 2-4 weeks before Ramadan and high risk patients should not fast. Low risk patients should receive adequate education and appropriate medication change to cope with fasting. During Ramadan frequent blood glucose monitoring is an effective method for preventing hypoglycemia. Nutritional change is an essential component for safe fasting. In this article we was review studies that evaluate changes that would affect diabetic patients in Ramadan.

Keywords: Diabetes, Fasting, Nutrition, Ramadan

Introduction

Ramadan, the holy month of Muslims, is the ninth month of the Islamic calendar. During the month of Ramadan, Muslims should abstain from eating, drinking and smoking from pre-dawn to sunset. Fasting of Ramadan is one of five pillars of Muslim faith. Depending on geographical region and season, fasting period varies from 10 to more than 16 hours. More than 1.5 billion Muslims live all over the world (1) and about 43% and 79% of respectively type 1 and type 2 diabetic Muslims fast during Ramadan (2). According to Islamic rules, fasting is not mandatory for these groups: 1) children younger than puberty age 2) mental or physical disabled people 3) the old and frail persons 4) patients with chronic or severe diseases. However, many diabetic Muslims insist on fasting during Ramadan. Based on medical evidence the following patients are exempted from fasting: 1) Type 1 diabetes 2) Type 2 diabetes with stable disease 3) Diabetes with complications 4) Pregnant women with diabetes 5) Elderly patients with diabetes (3).

Complications of fasting

During fasting, plasma glucose levels and circulating insulin decrease gradually and

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counterregulatory hormones such as glucagon and catecholamines tend to rise. In prolonged fasting, liver glycogen stores decrease and lipid breakdown from adipocytes starts. These lead to ketone body formation. Ketone bodies are utilized by skeletal and cardiac muscles, but they can produce poor metabolic consequences and ketoacidosis (4). For diabetic patients, prolonged fasting can produce paradoxical changes in plasma glucose levels. Some of them develop hyperglycemia secondary to decreased food intake or diabetic drugs, especially sulfonylureas or in insulins, and other patients develop hyperglycemia secondary to decreased drug dosage, increased gluconeogenesis or using high calorie meals (5). Overall, glycemic control among diabetic patients who fast during Ramadan, maybe improve or deteriorated (6-10) and the complications occurrence may have no significant change (11-15) although EPIDIAR study group (A population-based study in 13 countries) revealed an increased rate of acute complications during Ramadan fasting (2). Other rarely reported complications of fasting include dehydration and thrombosis (8).

Risk assessment

Diabetic Muslims who insist on fasting should be aware of potential complications and techniques of decreasing therisks (16). Risk of fasting complications is different between patients depending on age, medications, glycemic control, blood pressure, lipid status and diabetic complications. So, it is recommended that all diabetic Muslims who have a desire for fasting during Ramadan, should be evaluated 1-2 months before Ramadan. Assessment should focus on the level of glycemic control, blood pressure, lipid profile, diabetic complications and frequency of hypoglycemic attacks. Patients should receive structured education about nutrition, exercise, medication and potential complications of fasting. Based on these factors, patients can be categorized as, very high risk, high risk, moderate risk and low risk. Low risk patients can fast during Ramadan after receiving appropriate advice. Moderate risk patients should have close supervision if wish to fast and high or very high risk patients should not fast (17,18).

Nutrition

Diet of fasting patients should contain low fat and sugar. Appropriate diet for Ramadan includes eating complex carbohydrate meals at dawn and simple carbohydrate at sunset (18). Dietitians suggest slow energy release foods like grains, wheat and rice before fasting and dividing the meal after breaking the fast to two low calorie meals (19). Patients should be advised to drink water before and after fasting to prevent dehydration during the fasting period.

Exercise

Normal level of physical activity is safe during fasting but excessive exercise may lead to hypoglycemia and dehydration and should be avoided (18, 20).

Breaking the fast

Pre–Ramadan educations should include appropriate advice about breaking the fast in critical situation. Fast should be ended immediately if blood glucose drops to <60 mg/dL or reaches <70 mg/dL in the first few hours of fasting. Also the fast should be ended if blood glucose exceeds 300 mg/dL (21).

Diabetes management during Ramadan

Type 1 diabetes

According to EPIDIAR study about 43% of type 1 diabetic patients fast during Ramadan (2). The preferred treatment method for diabetic patients is Basal-BolusAnalogue insulins. Studies showed that Glargine leads less hypoglycemia (22,23) and two bolus of Lispro insulin before morning and sunset meals lead more favorable glucose control and less hypoglycemia compared to regular insulin (24).

Type 2 diabetic patients

- ***Diet–controlled patients***

This group of patients is low risk and are able to fast during Ramadan without problems. For preventing postprandial hyperglycemia, patients should distribute their calorie to

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smaller meals rather than eating two major meals (18).

➢ ***Patients treated with oral antidiabetic agents (OADs)***

Metformin: Metformin is safe in fasting because of the low risk of hypoglycemia. Patients should receive one third of metformin dose at dawn and two–thirds at sunset (25). Thiazolidinediones (TZDs): Considering its blood glucose decreasing mechanism and low risk of hypoglycemia, TZD sare also safe in fasting without the need for changing the dose. Sulfonylureas (SUs): SUs with increasing insulin secretion from pancreatic beta cells are associated with higher risk of hypoglycemia. Older generations such as Chlorpropamide are relatively contraindicated during fasting of Ramadan (26,27). Newer medicationsare tolerated in prolonged fasting (Glipizide, Glimepiride and Gliclazide) and risk of hypoglycemia is lower than Glyburide (Glibenclamide) (28,29). Some experts suggest that one fourth of SUs dose should be decreased during fasting, for example, morning dose be halved and total evening dose be continued (3). Prandial regulators: This group of antidiabetic agents (Repaglinide and Nateglinide) leads to increase insulin secretion, however, because of the short duration of action are used for postprandial controlling. Repaglinide during the fasting of Ramadan has been studied and showed less hypoglycemia compared with Glibenclamide (30). So, this group could be used twice a day before the sunset and pre-dawn meals. Dipeptidyl peptidase-4 inhibitors (DPP-4 inhibitors): This group of agents is not independently associated with hypoglycemia, but can increase hypoglycemic effects of other drugs (e.g. SUs). In a study, switching SU to Sitagliptin (a DPP-4 inhibitor) Caused less hypoglycemia during fasting compared with remaining on SUs (31). In another Study, Vildagliptin (a DPP-4 inhibitor) was associated with less hypoglycemia compared to Glimepiride (32). So, it seems that this group may be used in fasting of Ramadan with no change in dose. Glucagon–like peptide-1 receptor agonists (GLP-1 RAs) are similar to DPP-4 inhibitors. This group also has low hypoglycemia risk. GLP-1 RAs cause glucose-dependent insulin secretion and control postprandial glycemia but has a substantial effect on fasting glucose. A meta-analysis of Exenatide (a GLP-1 RA) showed that severe hypoglycemia is rare (28). These agents maybe safe during fasting but we need more studies for firm conclusion. One of limiting factors for this group is nausea that can complicate fasting of Ramadan. α-Glucosidase inhibitors: These agents slow down carbohydrate absorption in gut and control postprandial glycemia. They do not have a significant effect on fasting glucose. Hypoglycemia risk in this group is low and these agents are useful for patients who fast in Ramadan (33). Insulin; the preferred method of insulin injection is basal–bolus and the preferred insulins areanalogue insulins.

Management of diabetic patients should be individualized during Ramadan. Nowadays there are different methods and different insulins and each patient use one of these methods. Unfortunately, there isn't enough evidence for managing insulin treated patients during Ramadan and some of the suggestions are expert opinions for patients on basal insulin once daily, it is recommended that they decrease 20% of the dose and inject with Iftar. Patients with basal-bolus human insulin should inject one half of the usual NPH dose at Sehri and all of usual dose at Iftar. They should inject a full dose of morning Regular insulin at Iftar and transfer one half of evening regular insulin at Sehri (29). If a patient is on Premix insulin, it is suggested that transfer one half of usual evening insulin to dawn and all of the usual morning dose to sunset (3).

Conclusion

Blood Glucose monitoring during Ramadan patients should check their blood glucose during fasting frequently. The preferred points are 2 hours after Sehri, 30 minutes before Iftar and 2 hours after Iftar. Patients should consult with their physician at three-day intervals for

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adjusting insulin dose conclusion. Fasting of Ramadan for diabetic patients can have deleterious effects. Hence, Muslims should be evaluated 2-4 weeks before Ramadan and high risk patients should not fast. Low risk patients should receive adequate education and appropriate medication change to cope with fasting. During Ramadan frequent blood glucose monitoring is an effective method for preventing hypoglycemia. Nutritional change is an essential componentfor safe fasting.

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