

Fasting and Diabetes: An experience with safety of fasting in peoples with type II diabetes

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Abstract

The objective the study is to determine the safety of fasting in patients with type II diabetes mellitus. This is a observational prospective study. A convenient sampling method is used to select the study population. All patients with well-controlled Type 2 Diabetes Mellitus treated with Insulin, sulfonylureas, lifestyle modification, metformin, or a thiazolidinedione, who are otherwise healthy were included. The study included a total Of 30 subjects, of which 14(46.7%) were male and 16(53.3%) were female. 25(83.3%) had no hypoglycemia, 4(13.3%) had 1 episode of hypoglycemia and 1(3.3%) had 2 episodes of hypoglycemia. 24(80.0%) never needed to break a fast, 5(16.7%) had 1 event of breaking the fast and 1(3.3%) had 2 events of breaking the fast. There was 1 event of missing the fast in 2(6.7%) patients. 8 (26.7%) patients were on insulin alone, 8(26.7%) were on insulin and oral hypoglycemics combination, 4(13.4%) were on single oral hypoglycemics , 7(23.3%) were on combination oral hypoglycemic and 3(10%) were on lifestyle modification. Of 8 patients on insulin therapy, only 1 had 1 event of hyperglycemia, 1 had 2 events of hyperglycemia, 2 had 3 events of hyperglycemia and 1 had 4 events of hyperglycemia. Of 4 patients on single oral hypoglycemia, no one had any event of hyperglycemia. Of 8 patients on insulin and oral hypoglycemics combination, only 2 had 1 episode of hyperglycemia and 1 had 3 episodes of hyperglycemia. Only 1 drug related hypoglycemia in sulfonylurea group. The drug was stopped and patient switched over to metformin next day. Of 4 patients on single oral hypoglycemia, no one had any event of hyperglycemia. Of 7 patients on oral hypoglycemics combination 2 had 1 and 1 had 3 episodes of hyperglycemia. 3 patients on lifestyle modification and none had any hyperglycemia. P-Value of chi square test applied was 0.820 which is insignificant showing no relation between drug regimens and hypoglycemias. Fasting in type 2 diabetes mellitus patients is usually safe if proper cautions are observed.

Key Words: Fasting, Diabetes Mellitis, hypoglycemia, hyperglycemia

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Introduction

During the sacred month of Ramadan, people who fast neither eat nor drink from dawn to sunset. Many people with diabetes still prefer to fast, without medical guidance, exposing themselves to certain health risks as a direct consequence of fasting or because of a change in food and frequency of medication intake [1]. It is estimated that around 40 to 50 million individuals with diabetes worldwide fast during Ramadan [2]. In non-diabetic individuals, fasting is associated with improvement in several haemostatic risk markers for cardiovascular disease, including reduction in plasma triglyceride and plasma LDL-cholesterol level, as well as improvement in insulin sensitivity, leptin, adiponectin and HDL cholesterol [3-6]. Ramadan fasting in non-diabetic individuals is also associated with reduction in plasma homocysteine, D-dimer level, C-reactive protein (CRP) and IL-6 and fibrinogen. [7-8]. Similar beneficial effects of fasting have been reported in diabetic individuals. In a cohort of 276 obese women with type 2 diabetes, fasting during Ramadan was associated with decreased total calorie intake, weight reduction [9] and improvement in glucose homeostasis [10]. Recommendations for the management of diabetes during Ramadan were last published in 2005 by the American Diabetes Association. Several studies in this field have since been published, some addressing the use of new pharmacological agents in managing diabetes during Ramadan. The incretin mimetics are potentially safe during Ramadan; the DPP4 inhibitors vildagliptin and sitagliptin provide an effective and safe therapeutic option, administered either alone or in combination with metformin or sulfonylureas. There are no published studies on the use of GLP-1 receptor agonists during Ramadan. Among the sulfonylureas, gliclazide MR (modified release) and glimepiride can be safely used during Ramadan, but glibenclamide should be avoided due to the associated risk of hypoglycemia. In selected patients with type 1 and type 2 diabetes, the long-acting insulin analogues glargine and detemir, as well as the premixed insulin analogues, can be used with minimal risk of metabolic derangement or hypoglycemia; the risk is higher in type 1 diabetes. Insulin pumps can potentially empower patients with diabetes and enable safe fasting during the month of Ramadan [11]. When we take food insulin is released from beta-cells of pancreas to utilize fuel taken for instant energy production and subsequently to promote storage of fuel as glycogen and fat in muscle, liver, and adipose tissue. During the fasting state due to glucagon and other counter-regulatory hormones and low insulin secretion, there is release of glucose by increased hepatic glucose output and release of fatty acids from adipose tissue to supply

vital organs. Considering these metabolic changes we have to adjust the management of diabetes during Ramadan. In our daily practice we come across both type 1 and type 2 DM and we have to manage them during the Ramadan period. Planning should be important to decide, whether they can fast and if they can fast how their diabetes can be managed while performing all the rituals of Ramadan [12-13].

Materials and Methods

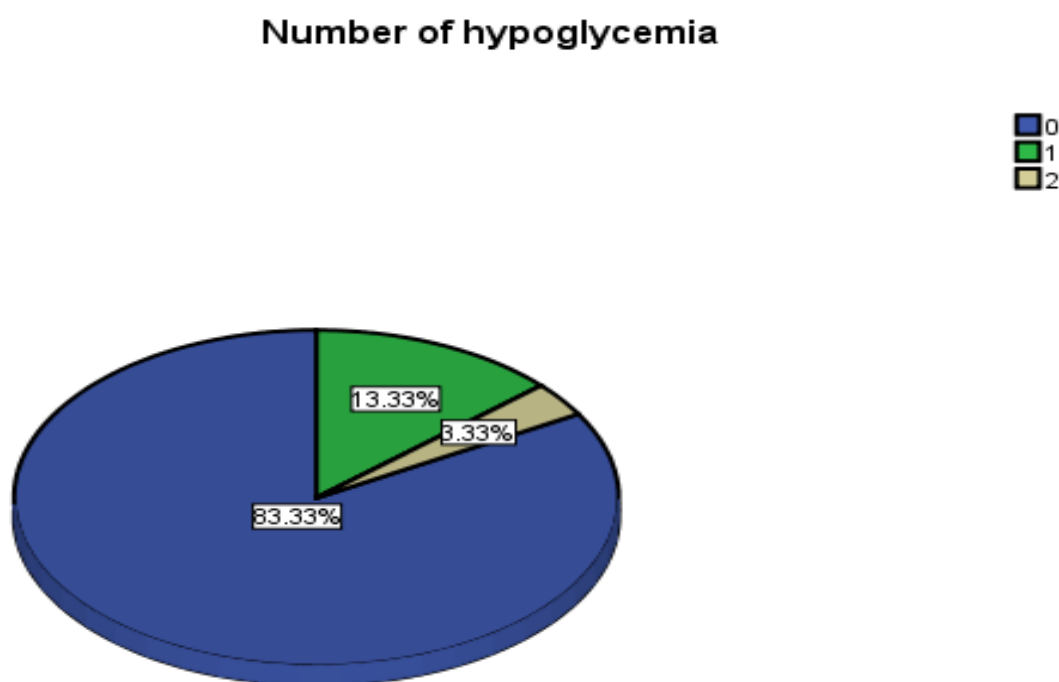
This is a observational prospective study. A convenient sampling method is used to select the study population. Hospital ethical review committee approval has taken after explaining to them in detail the protocols and purposes of the research. All patients with well-controlled Type 2 Diabetes Mellitus treated with Insulin, sulfonylureas, lifestyle modification, metformin, or a thiazolidinedione, who are otherwise healthy were included and all patients with severe hypoglycemia (requiring hospitalization) within the last 3 months prior to Ramadan , with a history of recurrent hypoglycemia, lack of hypoglycemia awareness , sustained poor glycemic control , ketoacidosis within the last 3 months prior to Ramadan , Type 1 diabetes , acute illness , hyperosmolar hyperglycemic coma within the previous 3 months , patients who perform intense physical labor, pregnancy , patients on chronic dialysis , people living alone who are treated with insulin or patients living alone with comorbid conditions that present significant risk of hypoglycemia , Old age with ill health , drugs that may affect cognitive state were excluded from the study. A standardized questionnaire-based interview was conducted by the investigator to collect detailed information. All patients intensively monitored their blood sugars by self monitoring at home. This included blood sugar levels before sehri, 2 hours after sehri, at 12' O clock, 2'O clock, 4'O clock, 6'O clock, before iftar, before 1st meal, before 2nd meal and before 3rd meal and in some patients before 4th meal. All patients were given an individually tailored diet plan well suited to their condition. Meal after iftar was divided into 3 or 4 meals to decrease blood sugar fluctuations. Exercise and activity was advised after iftar with each meal. They were provided a direct telephonic contact with their physician during whole fast in case of any emergency. Data collected included number of hypoglycemia, number of hyperglycemia, number of breaking the fast, number of missed fasts, reason for hypoglycemia and reason for hyperglycemia. Patients were kept on the same drug regimen, they were on before Ramadan. Only their dosages were changed according to the Ramadan Guidelines provided by Diabetes and

Ramadan Advisory Board. As our sample size is small so only meaningful test that could be applied is chi square test.

Results

The study included a total of 30 subjects, of which 14(46.7%) were male and 16(53.3%) were female. Out of 30(100%) subjects, 25(83.3%) had no hypoglycemia, 4(13.3%) had 1 episode of hypoglycemia and 1(3.3%) had 2 episodes of hypoglycemia. (Figure 1).

Figure 1. Number of Hypoglycemia



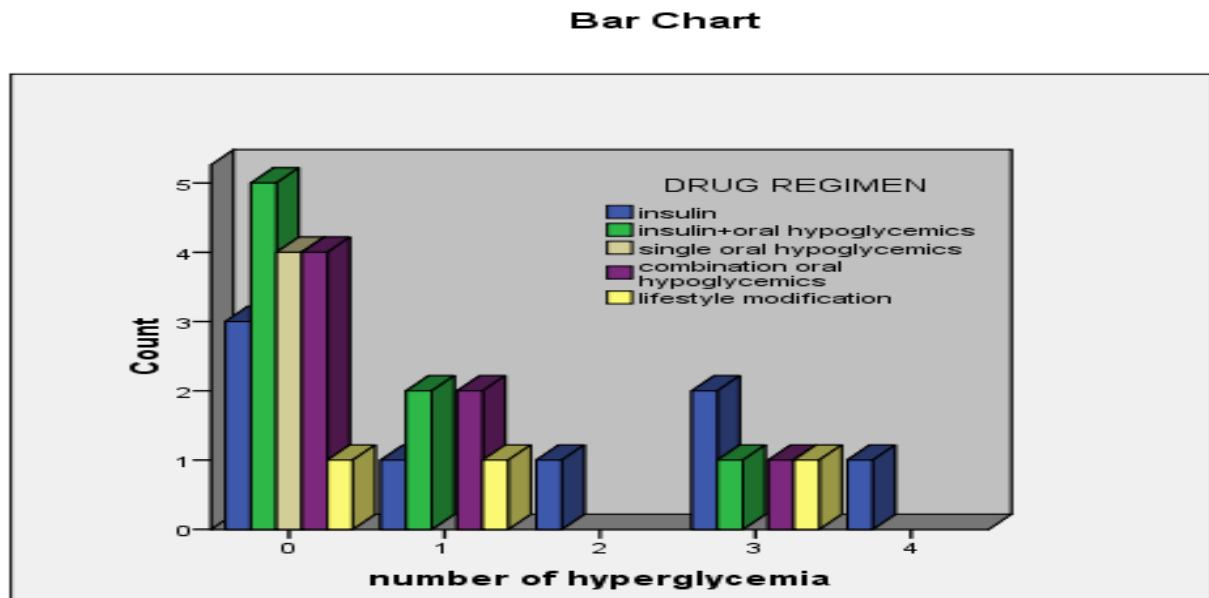
Out of 30(100%) subjects, 24(80.0%) never needed to break a fast, 5(16.7%) had 1 event of breaking the fast and 1(3.3%) had 2 events of breaking the fast. There was 1 event of missing the fast in 2(6.7%) patients. Out of 30(100%) subjects, 8 (26.7%) patients were on insulin alone, 8(26.7%) were on insulin and oral hypoglycemics combination, 4(13.4%) were on single oral hypoglycemics, 7(23.3%) were on combination oral hypoglycemic and 3(10%) were on lifestyle modification (Table 1).

Tabel 1. Drug Regimen

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	insulin	8	26.7	26.7	26.7
	insulin+oral hypoglycemics	8	26.7	26.7	53.3
	single oral hypoglycemics	4	13.3	13.3	66.7
	combination oral hypoglycemics	7	23.3	23.3	90.0
	lifestyle modification	3	10.0	10.0	100.0
	Total	30	100.0	100.0	

Of 8 patients on insulin therapy, only 1 had 1 event of hyperglycemia, 1 had 2 events of hyperglycemia, 2 had 3 events of hyperglycemia and 1 had 4 events of hyperglycemia. Of 4 patients on single oral hypoglycemia, no one had any event of hyperglycemia. Of 8 patients on insulin and oral hypoglycemics combination, only 2 had 1 episode of hyperglycemia and 1 had 3 episodes of hyperglycemia. Only 1 drug related hypoglycemia in sulfonylurea group. The drug was stopped and patient switched over to metformin next day. Of 4 patients on single oral hypoglycemia, no one had any event of hyperglycemia. Of 7 patients on oral hypoglycemics combination 2 had 1 and 1 had 3 episodes of hyperglycemia. 3 patients on lifestyle modification and none had any hyperglycemia. P-Value of chi square test applied was 0.820 which is insignificant showing no relation between drug regimens and hypoglycemias (Figure 2).

Figure 2. Drug Regimen and Hypoglycemic Attacks



Discussion

Salti I conducted a descriptive, multi-centre, prospective study, insulin-naïve ($n = 100$) or previously insulin-treated ($n = 249$) patients with Type 2 diabetes received insulin glargine [titrated from 10 U daily according to fasting blood glucose (FBG)] and glimepride (4 mg daily). The number and type of hypoglycemic episodes and glycemic control were assessed before, during and after Ramadan. Bivariate logistic regression analyses were used to identify factors which predicted hypoglycemia during Ramadan. Only one episode of severe hypoglycemia occurred in each time period before, during and after Ramadan. Mild hypoglycemic episodes increased from 156 pre-Ramadan to 346 during Ramadan ($P < 0.001$) and decreased to 153 post-Ramadan ($P = 0.0002$). The increase during Ramadan was mainly attributed to increased symptomatic hypoglycemic episodes. FBG and glycated haemoglobin improved during the titration period and did not change during the rest of the study. Risk of hypoglycemic events during Ramadan was higher in countries where fasting is strict [odds ratio (OR) 3.69 (2.06-6.63), $P < 0.0001$]. Lower weight [< 70.0 kg; OR 2.56 (1.46-4.48), $P = 0.001$] and waist circumference [< 90 cm; OR 3.06 (1.62-5.78), $P = 0.001$] increased the risk of hypoglycemia during Ramadan whilst $\text{FBG} > 6.7$ mmol/l [OR 0.3 (0.17-0.54), $P < 0.0001$]

had a protective effect. Combination of insulin glargine and glimepride may be used during Ramadan in patients with Type 2 diabetes who wish to fast, provided glimepride is given at the time of breaking the fast and insulin glargine titrated to provide FBG > 6.7 mmol/l. [14] Use of a rapid acting insulin analog instead of regular human insulin before meals in patients with type 2 diabetes who fast during Ramadan is associated with less hypoglycemia and smaller postprandial glucose excursions. It is recommended that insulin analogs be used in Ramadan in view of their safety and tolerability. Hypoglycemia, though less frequent, is still a risk, especially in elderly patients or who have required insulin therapy for a number of years. This can be reduced by using basal insulin analogs such as insulin detemir or glargine, or rapid acting insulin analogs such as aspart, lispro, or glulisine [12].

Conclusion and Recommendations

Fasting in type 2 diabetes mellitus patients is usually safe if proper cautions are observed. Muslims with diabetes willing to fast should be educated about individually tailored diet plan before Ramadan and also the possible hazards. They should be in contact with their attending physician. During the fast for appropriate advice in the event of any complication (like hypo/hyperglycemia). Any possible contraindications should be identified before the start of Ramadan and they should be forbidden to fast if necessary. All commonly used antidiabetic drugs are safe if used wisely and under intensive monitoring. Drug regimens and dosages should be adjusted according to Ramadhan guidelines so as to decrease the incidence of hypoglycemia and hyperglycemia.

As our sample size is small so we recommend for concrete conclusion; we recommend further studies with larger sample size.

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