



Dietary Patterns and Glycemic Control and Compliance to Dietary Advice Among Fasting Patients With Diabetes During Ramadan

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Modified eating habits during the month of Ramadan and the significant increase in food intake after breaking the fast can unbalance the metabolism of patients with diabetes (1–3). Evidence-based guidelines for food intake during Ramadan do not exist. A study was planned to observe the association between different dietary patterns and glycemic control and compliance to dietary advice among fasting patients with diabetes.

Observational data were obtained as part of a study conducted at the outpatient department of Baqai Institute of Diabetology and Endocrinology during Ramadan of 2009 (4). An educational session was given to each patient by a dietitian on a one-to-one basis. All patients were advised to keep a record of food intake and blood glucose readings. Individual counseling was provided to encourage 1) adequate intake of energy, 2) consumption of balanced meals, and 3) distribution of carbohydrate intake over various meals of the day. A compliance score was generated on the basis of the above parameters. Cluster analysis was used to explore dietary patterns. A total of 1,950 daily food records was available. Commensurate blood glucose

records were available for 839 of these daily food records. Usable diet records were available from 57 patients. A moderate energy and lower carbohydrate diet pattern was found to have a statistically significant positive association with the occurrence of normoglycemia ($P = 0.014$) (Table 1). Rates of normoglycemia increased and hyperglycemia and hypoglycemia decreased with increasing compliance scores ($P = 0.04$).

For health care providers, the study gives insight into glycemic trends in relation to different dietary patterns. In the study, about one-fourth of the patients were eating two meals a day, against dietary advice. Comparatively, patients who consumed four meals a day had better glycemic control. Higher energy intake was frequent and instances of imbalanced food intake and inappropriate distribution of carbohydrates were even more common. Appropriate or slightly lower energy intake and less than 50% energy from carbohydrates taken in a distributed manner emerged as effective diet pattern for assuring normoglycemia.

The least episodes of hypoglycemia were observed in patients taking in high energy and moderate amount of

carbohydrates. Carbohydrate spacing was inappropriate on more than two-thirds of the days. It seems that reducing intake of carbohydrates, spreading carbohydrate intake over three or four occasions (i.e., Sehri [predawn meal before the start of the fast], Iftar [postdusk meal at the end of the fast], dinner, and bedtime), and maintaining energy requirements from other macronutrients ensures normoglycemia during Ramadan.

In this study, distinctive characteristic of normoglycemia-associated dietary pattern was relatively lower carbohydrate intake and relatively higher fat and protein intake. This observation supports American Diabetes Association recommendations about choosing the best mix of carbohydrate, protein, and fat according to individual circumstances (5).

Our study has some limitations. Data before and after Ramadan were not available for comparison. The sample size was small and there was no control group.

Based on study findings, we suggest that the diet of patients with diabetes should be assessed prior to Ramadan. Structured Ramadan-specific dietary advice should be given to every

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Table 1—Trends of glycemia in relation to dietary patterns

Code	Diet pattern Description	Proportion of various glycemic states		
		Normoglycemia (%)	Hyperglycemia (%)	Hypoglycemia (%)
A (ME,LC)	Moderate energy, low carbohydrate	74.4	24	1.6
B (LE,HP)	Low energy, high protein	72.6	25	2.4
C (LE,HC)	Low energy, high carbohydrate	70.5	27.9	1.6
D (ME,LP)	Moderate energy, low protein	67.6	30.4	2
E (HE,MC)	High energy, moderate carbohydrate	65.9	33.6	0.5
F (ME,HC)	Moderate energy, high carbohydrate	57.4	39.7	2.8

Difference between diet pattern A and other patterns was statistically significant in relation to occurrence of normoglycemia ($P = 0.014$).

individual with diabetes who intends to observe the fast.

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