[1] The Hashemite University, Zarqa, Jordan
[2] Royal Medical Services, Amman, Jordan
[3] Nuffield Department of Obstetrics and Gynaecology, University of Oxford, Oxford, UK

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EVALUATION OF DIABETIC DIETS IN JORDANIAN HOSPITALS

Huda M. Al Hourani[1], Manar Atoum[1], Omar Alboqai[2], Leila I Cheikh Ismail[3]

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SUMMARY

Medical nutrition therapy plays an important role in the management of diabetes. The purpose of this study was to estimate the nutrient contents of diabetic diet in Jordanian hospitals. Seven-day diabetic menus of ten Jordanian hospitals were weighed in two different periods (summer and winter). Results on six nutrients were determined: energy, protein, fat, carbohydrate, cholesterol and dietary fiber. The intake of each of the above nutrients on each day was calculated using the WinDiets diet analysis software. Results showed the mean energy content of the meals to be 2155 kcal (9008 kJ). The percentage of carbohydrates, protein and fat in the prescribed diet programs was 42%, 20% and 38%, respectively. Cholesterol and dietary fiber contents were 399 mg and 17 g, respectively. Our results also suggested the need to better sensitize the dietitians to the international standards in order to reduce the burden of diabetes attributed to poor nutritional management.

Corresponding author: Huda M. Al Hourani, PhD, Department of Clinical Nutrition & Dietetics, Faculty of Allied Health Sciences, The Hashemite University, P.O. Box 150459, 13115 Zarqa, Jordan;
E-mail: hhourani@hu.edu.jo

INTRODUCTION

Diabetes mellitus (DM) is one of the most common chronic disorders. Classified as a "chronic disease epidemic" by the Centers for Disease Control and Prevention, the prevalence of DM has increased dramatically over the past forty years (1). It is estimated that there are 246 million (7.3%) people with DM in the adult population. Type 2 DM constitutes about 85% to 95% of all diabetes cases in developed countries and accounts for an even higher percentage in developing countries (2). The overall prevalence of DM in Jordan is 13.4% (3). Hyperglycemia is associated with adverse outcomes and an increased risk of in-hospital mortality (4). Improved blood glucose control in the hospital setting appears to reduce the length of hospital stay and hospital costs (5). The upper limits for blood glucose targets for hospitalized patients are as follows: preprandial <110 mg/dL, peak postprandial <180 mg/dL, and 110 mg/dL for critically ill patients (4).

Individualization of medical nutrition therapy (MNT) during hospitalization, along with strict medical management, is required to help individuals with diabetes achieve blood glucose targets (6-9).

Medical nutrition therapy is an essential component of the management of diabetes and has an important role in helping achieve and maintain optimal glycemic control. Randomized controlled trials and observational studies of MNT for diabetes have demonstrated improved glycemic outcomes by approximately 1%-2% unit decrease in HbA1c (10,11). Implementing MNT, however, can be challenging when the person with diabetes is hospitalized, must address special challenges related to the disease, changes in medications, and erratic schedules for diagnostic tests or treatment procedures changeable meal schedules.

Standardized calorie-level meal patterns based on exchange lists have traditionally been used to plan meals for hospitalized patients. Many alternative meal-planning systems are available. Among these is a new system termed the "consistent-carbohydrate diabetes meal plan" (12,13). It has been developed to provide a practical way of serving food to diabetes patients in hospital setting while improving metabolic control. This system uses meal plans without a specific calorie level; it incorporates consistent carbohydrate content, the carbohydrate content would be comparable from day to day at breakfast, each day at lunch, and each day at dinner (as well as snacks). These meal plans also incorporate appropriate fat modifications and consistent timing of meals and snacks. An average hospital consistent carbohydrate menu provides between 1800 and 2000 kcal, with approximately 12 to 15 carbohydrate servings divided between meals and snacks (8). The aim of this study was to review and assess the diets given to diabetic patients in Jordanian hospitals.

METHODS AND STUDY DESIGN

Background

This study was conducted in The Hashemite Kingdom of Jordan; there are 63 hospitals distributed throughout the Kingdom. These hospitals were classified into four categories as governmental, private, royal medical services, and training hospitals. Ten hospitals were selected to participate in the study; the selection criteria included the number of beds, availability of diabetic patients, geographical location of the hospital, and the willingness to participate in the study.

Collection of sample menu

A sample was collected of the main meals and snacks, usually offered to diabetic patients admitted to the hospital, with exclusion of the meals offered in liquid or soft forms; including liquid meals could change the calculated nutritional composition of the diet, since these are usually used for a short period of time. The collection was performed over two different weeks taking into account seasonal variation. Food and beverages offered on either meal or snack on seven consecutive days were weighed using an electronic scale (Kern 440-51; Kern and Sohn GmbH, Germany). The amount of each food item was entered into a dietary analysis computer program. Results on six nutrients were determined: carbohydrates, protein, fat, energy, fiber and cholesterol. Nutrient components for each day were calculated using WinDiet software (The Robert Gordon University, Aberdeen, Scotland, UK). In addition, the Arabic and traditional foods were analyzed using the food-composition tables for use in the Middle East, published by the American University of Beirut in 1970 (14). The mean of seven-day nutrient contents of meals was calculated and the percentage of carbohydrates, protein and fat was estimated.

Statistical analysis

Statistical analysis was performed using the statistical package for social sciences (SPSS) version 10.0 (Chicago, IL, USA). Results were expressed as mean and standard deviation (SD). Student's paired t-test and one-sample T test were used on data analysis. Statistical significance was set at $P<0.05$.

RESULTS

The mean energy, carbohydrate, protein and fat content of the meals was 2155 kcal (9008 kJ), 229 g, 112 g and 93 g, respectively (Table 1). The percentage of carbohydrates, protein and fat in the prescribed diet

Table 1. **Mean energy and nutrient contents of the meals**

Nutrient	Summer Mean ± SD	Winter Mean ± SD	P value	Mean ± SD	Range
Energy (kcal)	2142±284	2169±260	0.261	2155±265	1665-2556
Energy (kJ)	8954±1187	9067±1085	0.261	9008±1110	6960-10684
Carbohydrates (g)	220±31	238±32	0.130	229±32	174-292
Protein (g)	112±11	112±13	0.393	112±12	92-139
Fat (g)	95±19	91±13	0.461	93±17	60-120

Table 2. **Mean percentage of carbohydrate, protein and fat in the diet**

Nutrient	Summer Mean ± SD	Winter Mean ± SD	P value	Mean ± SD	Range
Carbohydrates	41±3	43±2	0.100	42±3	35-47
Protein	20±2	20±2	0.863	20±2	17-25
Fat	39±4	37±2	0.236	38±4	32-44

Table 3. **Mean dietary fiber and cholesterol contents of the meals**

Nutrient	Summer Mean ± SD	Winter Mean ± SD	P value	Mean ± SD	Range
Dietary fiber (g)	16±3	17±5	0.374	17±4	8.7-25
Cholesterol (mg)	399±97	397±74	0.912	399±82	262-516

Table 4. **Mean energy, carbohydrate, protein and fat contents of the meals compared with reference values (kJ/day)**

Nutrient	Mean	Reference values	P value
Energy (kcal)	2155	1900	0.001
Energy (kJ)	9008	7924	0.000
Carbohydrates (%)	42	50	0.000
Protein (%)	20	20	0.05
Fat (%)	38	30	0.000

programs was 42%, 20% and 38%, respectively (Table 2). Cholesterol and dietary fiber contents of the meals were 399 mg and 17 g, respectively (Table 3).

Study results showed that there was no significant difference between the two time periods (summer and winter) concerning the percentage of carbohydrates, protein, fat and energy. The mean energy and fat offered were significantly higher ($P<0.01$ and $P<0.001$, respectively) than the recommended amounts, whereas the mean carbohydrate offered was significantly lower ($P<0.001$) compared to the recommendations (Table 4).

DISCUSSION

Good control of hyperglycemia is the first priority in hospitalized patients with diabetes; hyperglycemia represents an important marker of poor clinical outcome and mortality in both patients with and without diabetes. Optimizing glucose control in these patients is associated with better outcomes (15). An interdisciplinary team is needed to integrate MNT into the overall management plan (16,17).

The results of this study did not comply with current American Diabetes Association (ADA) diabetic guidelines, with a lower carbohydrate and fiber, and higher fat, protein and cholesterol intake than advised. This is one of the first detailed studies specifically examining dietary composition in hospitalized diabetic patients. The results of this study showed the practice of ordering "diabetic diet" to be still present in Jordanian hospitals, although ADA does not support a single nutrition prescription or percentages of macronutrients anymore, as it used to do in the past (18).

Caloric requirement for most hospitalized patients is 25-35 kcal/kg body weight (19,20). The caloric content of the meals offered to diabetic patients in Jordanian hospitals was 2155 kcal, which is higher than the recommended consistent carbohydrate meal plan, which ranges between 1500 and 2000 kcal (21).

The recommended dietary allowance (RDA) for carbohydrate (130 g/day) is the average minimum requirement (22,23). The amount of carbohydrate offered to diabetic Jordanian patients was 229 g, which meets the recommendations.

The consistent carbohydrate diabetes meal planning system is based on the amount of carbohydrate offered at each meal rather than the source. This study showed an average of 15 carbohydrate servings, with a range of 3-5 carbohydrate servings for meals and 1-2 carbohydrate servings for snacks. These results were consistent with the recommendations by Campbell and Braithwaite (6). The results of this study revealed the meal plan for hospitalized Jordanian diabetic patients to be free from sucrose and sucrose containing foods, which is not in agreement with the new recommendations (23).

People with diabetes are encouraged to choose a variety of fiber containing foods such as fruits, vegetable, cereals and legumes. The amount of fiber offered to diabetic patients in this study was 17 g, which was lower than the amount taken by the general population of 14 g/1000 kcal, i.e. 25-35 g *per* day (22,23).

The primary goal with respect to dietary fat in individuals with diabetes is to limit saturated fats to less than 7% of total calories, minimal intake of trans fatty acids, and cholesterol intake of less than 200 mg/day. The results of this study revealed the meals contents of fat and cholesterol to exceed the recommendations (24).

For individuals with diabetes and normal renal function, there is insufficient evidence to suggest that the usual protein intake (15%-20% of energy) should be modified. The Dietary Reference Intakes acceptable macronutrient distribution range for protein is 10%-35% of energy intake (25). The dietary intake of protein for individuals with diabetes is similar to that of the general public and usually does not exceed 20% of energy intake. A number of studies in healthy individuals and in individuals with type 2 diabetes have demonstrated that glucose produced from ingested protein does not increase plasma glucose concentration but does produce increases in serum insulin responses (26). The percentage of protein in this study was 20%, which was at the upper recommended limit; furthermore, the range was 17%-25%, which means that some hospitals exceeded the upper limits.

In conclusion, the MNT used in the Jordanian hospitals was similar for all patients regardless of their type of DM. The dietary management of diabetes in Jordan fell short of international guidelines. Our results also suggested the need to better sensitize the dietitians to the international standards in order to reduce the burden of diabetes attributed to poor nutritional management.

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