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Adherence to Diabetes Dietary Guidelines Assessed Using a Validated Questionnaire Predicts Glucose Control in Individuals with Type 2 Diabetes

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ABSTRACT

Objectives: The purpose of this study was to determine predominant deviations from Canadian Diabetes Association (CDA) nutrition therapy guidelines for Canadians with type 2 diabetes as a prelude to developing relevant interventions. We hypothesized that lack of adherence to these guidelines would be associated with higher glycated hemoglobin (A1C) levels.
Methods: A cross-sectional trial was conducted to evaluate associations between dietary adherence to CDA and Health Canada guidelines and blood glucose control. Diet was assessed using 3-day diet records and a diabetes-specific validated questionnaire, the Perceived Dietary Adherence Questionnaire (PDAQ). A total of 80 adult participants with type 2 diabetes volunteered. The main outcome measures were A1C levels, adherence to dietary guidelines and food sources of nutrients. Simple and multiple linear regressions that tested the effects of adherence to dietary guidelines concerning A1C levels were conducted; $p<0.05$ was considered significant.
Results: Participants: average age, 61.2±10.4 (standard deviation) years; 48 females and 32 males had A1C levels of 7.3%±1.3% (56±6.3 mmol/mol). Participants' reported mean daily intakes of sodium and saturated fat exceeded CDA nutrition therapy guidelines. Cured meats, fast foods and snack foods were all major contributors to intake of sodium and saturated fat. Saturated fat ($r=0.341$) and sodium intakes ($r=0.296$) and total PDAQ scores ($r=-0.417$) were correlated with A1C levels ($p<0.05$).
Conclusions: This study population had overall good adherence to several CDA nutrition therapy guidelines; however, sodium and saturated fat intakes exceeded these guidelines and should receive particular attention in interventions with patients who have type 2 diabetes. Adherence to diabetes dietary guidelines as assessed by PDAQ is associated with lower A1C levels.

Mots clés :
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diabète de type 2

RÉSUMÉ

Objectifs : Le but de la présente étude était de déterminer les principaux écarts des lignes directrices sur la thérapie nutritionnelle à l'intention des Canadiens atteints du diabète de type 2 de l'Association canadienne du diabète (ACD) avant l'élaboration d'interventions appropriées. Nous avons posé l'hypothèse que le non-respect des lignes directrices était associé à des concentrations d'hémoglobine glyquée (A1c) plus élevées.
Méthodes : Une étude transversale a été menée pour évaluer les associations entre le respect des lignes directrices en matière d'alimentation de l'ACD et de Santé Canada, et la régulation de la glycémie. Les relevés alimentaires de 3 jours et le questionnaire validé sur le diabète, le Perceived Dietary Adherence Questionnaire (PDAQ) ont servi à évaluer le régime. Un total de 80 participants adultes atteints du diabète de type 2 se sont portés volontaires. Les principaux critères d'évaluation étaient les concentrations de l'A1c, le respect des lignes directrices en matière d'alimentation et les sources d'éléments nutritifs. Des

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régressions linéaires simples et multiples pour évaluer les effets du respect des lignes directrices en matière d'alimentation sur les concentrations de l'A1c ont été réalisées ; le seuil de signification a été fixé à p<0,05.
Résultats : Les participants, soit 48 femmes et 32 hommes dont l'âge moyen était de 61,2±10,4 (écart type) ans, ont montré des concentrations d'A1c de 7,3 %±1,3 % (56±6,3 mmol/mol). Les apports quotidiens moyens en sodium et en gras saturés que rapportaient les participants ont excédé ceux des lignes directrices sur la thérapie nutritionnelle de l'ACD. Les viandes saumurées, les repas minute et les grignotines ont tous contribué de manière importante aux apports en sodium et en gras saturés. Les apports en gras saturés (r=0,341) et en sodium (r=0,296), ainsi que les scores totaux au PDAQ (r=–0,417) ont corrélé avec les concentrations de l'A1c (p<0,05).
Conclusions : La population qui faisait l'objet de cette étude a dans l'ensemble montré un bon respect des diverses lignes directrices sur la thérapie nutritionnelle de l'ACD. Toutefois, les apports en sodium et en gras saturés, qui ont excédé ceux de ces lignes directrices, devront faire l'objet d'une attention particulière lors d'interventions auprès des patients atteints du diabète de type 2. Selon le PDAQ, le respect des lignes directrices en matière d'alimentation à l'intention des personnes diabétiques est associé à des concentrations plus faibles de l'A1c.

Introduction

The combination of increasing incidence, mortality and morbidity rates associated with diabetes presents a significant challenge to the health-care system and lowers the quality of life of those afflicted (1). Achieving optimal glycemic control helps to minimize long-term complications (2,3), but for this to happen, patients with diabetes need to integrate multiple treatment strategies, including adherence to prescriptions for medications, diet and physical activity.

Dietary management is 1 of the essential treatment components to be followed over the long term (2) and can lower glycated hemoglobin (A1C) levels by 1% to 2% (4–6), thereby preventing or delaying micro- and macrovascular morbidities (7,8). Despite the development of comprehensive guidelines for achieving optimal diabetes management (9–12), evidence suggests that translation of nutrition guidelines into daily routine is a challenge for the majority of patients with diabetes (3,13–15).

A barrier for both patients and health-care providers in understanding adherence to guidelines is the lack of a simple, routine assessment of dietary intakes (16). The standard, currently available options, such as multiday diet records, recall questionnaires and food-frequency instruments, have well-known strengths and weaknesses, but all place a significant burden on both the client and the health-care team with respect to data collection and analysis (16–18). Yet it is likely that self-management of diabetes through nutritional changes could be facilitated if a simple, rapid instrument were available to provide information about the dietary patterns of clients. An instrument called the Perceived Dietary Adherence Questionnaire (PDAQ), designed to align the Canadian Diabetes Association (CDA) nutrition therapy guidelines, was recently validated against repeated 24-hour recalls (19). However, it is not yet known how PDAQ reflects appropriate diet patterns that are related to glycemic control or how it might be used as an adjunct to other methods of dietary assessment.

As a first step to moving toward developing interventions that would yield higher adherence, the dietary intakes of people with type 2 diabetes relative to the CDA 2008 nutrition therapy guidelines was assessed in this study. We hypothesized that patients with better dietary adherence would possess better glycemic control and that, similar to previous studies (20–24), Canadians with diabetes would be least adherent to guidelines for fat, sodium and fibre. A second objective of this research was to assess the utility of the PDAQ questionnaire relative to 3-day diet records.

Methods

Design

The study was cross-sectional in design and was approved by Health Research Ethics Board, University of Alberta.

Participants and recruitment

Participants with type 2 diabetes were recruited through various media communications, including posters on public bulletin boards around the city, newspaper advertisements, a newspaper article in the local daily newsletter and a television interview, that invited participants to contact the research study. Interested individuals contacted the study coordinators by phone or e-mail. This initial contact included a brief description of the study and confirmation that the participants met the inclusion criteria, which were as follows: being older than 18 years of age; having been diagnosed with type 2 diabetes (self-identified); and being able to read and write English. Participants were excluded if they had any digestive conditions that could confound dietary intakes. The expected time commitment was explained, after which interested participants were scheduled to attend a data-collection session on a day and time of their convenience. Parking costs related to the study visit were reimbursed, but participants received no other incentives. Written informed consent was obtained from all participants. All recruited participants (N=80) attended a single small-group information and data-collection session lasting 2.5 hours to complete the questionnaires and have anthropometric measurements taken. Each participant was given a study identification number and provided with a package containing questionnaires, 3-day diet record sheets and an aid for determining serving sizes. They received instructions, in the form of a 20-minute interactive presentation, for completing the 3-day diet record, and all questions from participants were addressed. Participants were asked to complete a 3-day diet record 2 weeks later and return it by mail using the stamped and addressed envelope supplied with the study materials. Each diet record was reviewed by the study coordinator, who telephoned participants to collect missing details and clarify data entries that were difficult to interpret.

Questionnaires

The sociodemographic, general health and diabetes-related data were collected using a questionnaire based on the Canadian Community Health Survey (25). Self-care activities (types of dietary and exercise recommendations received from the healthcare team) and diabetes-specific aspects were assessed as outlined (26).

Participants' perceptions of their dietary adherence were assessed using a validated questionnaire (PDAQ) (19) adapted from Toobert and Glasgow (26) and modified according to the 2008 CDA Nutrition Therapy Guidelines (12), which were in effect at the time of this study and continue to be relevant in the context of the 2013 guidelines (9). Questions were structured so as to assess how well participants adhered to the guidelines of the Eating Well with Canada's Food Guide, specifically, whether they were consuming foods with low glycemic index (GI) and high fibre content, foods high in