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Examining sex differences in glycemic index knowledge and intake among individuals with type 2 diabetes

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ABSTRACT

Aim: We examined self-reported dietary behaviours and actual food intakes among adult men and women with type 2 diabetes participating in Alberta's Caring for Diabetes (ABCD) Study.

Methods: Participants completed 3-day food records and questions about glycemic index (GI) concept knowledge and dietary behaviours. Daily average GI and glycemic load (GL) were calculated for all carbohydrates consumed. Dietary intake was analyzed using ESHA FoodPro (version 10.13.1). Sex differences in nutrient intakes were explored across categories of GI knowledge and dietary practices.

Results: Participants (N = 170) mean (SD) age 65.8 (9.6) years were 46.5% women, 90.6% Caucasian with a mean BMI of 31.3 (7.0) kg/m^2 and diabetes duration of 13.4 (8.6) years. Overall, 60% of men versus 40% of women consumed carbohydrates in quantities below Acceptable Macronutrient Distribution Ranges (AMDR). About 80% of men versus 90% of women consumed proteins above AMDR whereas 60% versus 65% of women consumed fats above AMDR. Fibre intake among men was lower than recommended ($p < 0.01$). Men who reported having knowledge of the GI-concept also reported lower GI intake versus men who did not ($p = 0.03$).

Conclusion: Sex differences exist in low-GI diabetes self-care dietary behaviours among adults with type 2 diabetes participating in this study. Gender-sensitive approaches for enhancing diabetes self-care low-GI dietary behaviour should be explored.

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1. Introduction

Effective strategies for achieving metabolic control continue to be sought in the wake of the burgeoning diabetes epidemic and associated human and economic costs globally. Healthy eating plays a pivotal role in diabetes self-management for preventing and managing long-term complications. Dietary advice and education to include low glycemic index (GI) foods in daily meal planning as a viable self-care dietary strategy for improving glycemic control and health outcomes among individuals with diabetes therefore need evaluation [1–3].

The GI concept emphasizes carbohydrate quality as part of an overall healthy eating behaviour and is recommended by the Canadian Diabetes Association Clinical Practice Guidelines for guiding food selection among people living with diabetes [3–6]. Briefly, the GI concept ranks dietary carbohydrates based on their immediate impact on postprandial glycemia (glycemic response). On a scale of 0–100, foods that cause the most rapid rise in blood sugar within two hours receive higher values and pure glucose, with a GI of 100, serves as the reference. For practical application of the GI concept, glycemic load (GL) has been developed to measure the degree of glycemic response and insulin demand produced by a specific amount of a specific food [7]. GL therefore reflects quality and quantity of dietary carbohydrate foods. Adoption of the low-GI dietary pattern as part of an overall healthy eating lifestyle has been shown to significantly improve glycemic control, cardiovascular risk factors (e.g. total cholesterol, HDL), beta cell function and decreased need for anti-hyperglycemic agents among individuals with diabetes [1–3,7–15].

Food choices and adherence to nutritional recommendations differ significantly between men and women [16–18]. Similarly, sex differences in diabetes self-management, known to influence essential daily living activities such as coping with dietary self-care, physical activity, and blood glucose monitoring, also exist [19–23]. For example, women show greater adaptability to diabetes and are generally more likely to seek knowledge for diabetes management, use socially interactive resources like education classes and support groups [21], be concerned about heart disease, and be non-smokers [20]. Compared to men, women tend to have better dietary practices including consuming significantly more legumes, vegetables, fruits, eggs, milk, and vegetable oils [19] and avoid high fats or high calorie foods [20]. To date however, very little evidence exists regarding differences in adherence to low-GI dietary behaviour between men and women with type 2 diabetes. Consequently, the adequacy of nutrition knowledge and influence of sex differences on the awareness and application of the GI concept in daily dietary self-care practices of people with type 2 diabetes remains unknown. Therefore, we examined the following questions: (1) Does GI concept knowledge among people with type 2 diabetes in Alberta, Canada translate into corresponding dietary behaviour and intakes? (2) Are low-GI choices and intakes among adults with diabetes associated with their current GI-related stage of change? (3) Are there sex differences in GI-knowledge, GI-related stage of change, and dietary behaviour? We hypothesized that those individuals who reported having GI concept knowledge would report dietary behaviour and intakes consistent with their knowledge and stage of GI behaviour change. We also hypothesized males would have less GI concept knowledge and higher GI intake.

2. Methods

2.1. Study population and setting

Adults (≤18 years) with type 2 diabetes, enrolled in the ABCD Cohort study [24], provided data for this study. All ABCD cohort participants completing year three assessment (N = 1942) received an invitation to participate and from these, 1313 (68%) responded to the survey invitation, 780 declined and 533 accepted. From these, a sample of roughly 50% (n = 248) was drawn, using quota sampling to reflect distribution across five provincial health zones (North, Central, Edmonton, Calgary and South) in an effort to reflect diabetes prevalence across these regions (i.e., greater prevalence in Urban locations). The 248 participants were mailed a study package that included postage-paid return envelope. The Health Research Ethics Board at the University of Alberta granted study approval and all participants provided written informed consent.

2.2. Socio-demographic characteristics

A paper-based questionnaire was used to determine age, marital status, ethnicity, education, income, occupation, smoking status, and time since diabetes diagnosis. Participants were also asked to report their current height and weight, from which a body mass index (BMI) was calculated in kg/m^2.

2.3. Dietary assessment

All participants completed a 3-day food record (i.e. two week days and one weekend day) and were asked to provide in as much detail as possible, descriptions of foods and beverages consumed [25]. Participants had access to an online video, which was developed to give further instructions on how to fill in the 3-day food records [26]. Coloured photographs were included in the 3-day food record to assist with estimating and recording appropriate portion sizes of foods and beverages consumed. Photographs included common household items such as spoons, a drinking glass and a measuring jug. Pictures showing sample portions sizes of foods measured against items including a finger, palm of a hand and a hockey puck were included and participants were encouraged to choose the photograph that best represented their portion size or indicate if they consumed more or less [27]. Dietary intake data were entered and analyzed using the Food Processor Diet Analysis and Fitness Software version 10.13.1 (ESHA Research, Salem, USA) to yield estimates of mean daily food consumption and nutrient intakes based on the Canadian nutrient file [28].

2.4. Glycemic index and glycemic load estimation

All carbohydrate-containing foods identified from the 3-day food record were assigned GI values corresponding to the best geographic and botanical matches in published Inter-

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