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Original Research

## Food and Physical Activity Behaviours of Adults Attending a Prediabetes Education Class



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## ABSTRACT

**Objectives:** The primary objective of this study was to examine food and physical activity behaviours of adults with prediabetes.

**Methods:** For this cross-sectional study, adults (aged >17 years) with prediabetes (n=1228) who attended a prediabetes education class were recruited. Participants self-administered an assessment of food and physical activity behaviours using the Food Behaviour Checklist and the Godin Leisure Time Exercise Questionnaire. Linear regression models were performed to identify significant relationships between food, physical activity, age, body mass index and food access variables.

**Results:** Participants were 35.8% men with a mean age of 57.7 years (SD 11.6) and 64.2% women with a mean age of 55.2 years (13.9). Neither group was consuming adequate fruits and vegetables (17.1% for men and 29.2% for women eating 5 or more servings a day) or meeting physical activity guidelines of 150 minutes (29.5% for men and 26.2% for women). Approximately 29.0% of the entire sample “always” consumed milk or soy products. Men reported higher saturated fat intakes than women. For the entire sample, 83.4% rated their diet quality as needing improvement, and most consumed sweetened beverages (71.1% of men and 50.9% of women). Many participants (88.5%) used nutrition facts panels to choose foods. Food behaviour subscales and physical activity were significantly associated with each other and with age, body mass index and food access (p<0.05).

**Conclusions:** Overall, adults with prediabetes reported less than optimal food and physical activity behaviours. Evaluation of lifestyle behaviours using simple tools like the Food Behaviour Checklist and Godin Leisure Time Exercise Questionnaire can be helpful for program design, evaluation and delivery.

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## R É S U M É

**Objectifs :** L'objectif principal de cette étude était d'examiner les comportements alimentaires et les habitudes d'activité physique des adultes souffrant de prédiabète.

**Méthodes :** Dans cette étude transversale, les adultes (âgés > 17 ans) souffrant de prédiabète (n=1228) qui suivaient un cours sur le prédiabète ont été recrutés. Les participants ont rempli un questionnaire d'autoévaluation portant sur leurs comportements alimentaires et leurs habitudes d'activité physique au moyen de la Food Behaviour Checklist et du Godin Leisure-Time Exercise Questionnaire. Les modèles de régression linéaire ont été réalisés pour établir des liens significatifs entre les variables liées à l'alimentation, à l'activité physique, à l'âge, à l'indice de masse corporelle et à l'accès aux aliments.

**Résultats :** Les participants comptaient 35,8 % d'hommes dont l'âge moyen était de 57,7 ans (ÉT 11,6) et 64,2 % de femmes dont l'âge moyen était de 55,2 ans (13,9). Aucun groupe ne consommait des portions adéquates de fruits et de légumes (17,1 % des hommes et 29,2 % des femmes prenaient 5 portions ou plus par jour) ou ne répondait aux recommandations des lignes directrices suggérant 150 minutes d'activité physique (29,5 % des hommes et 26,2 % des femmes). Environnement 29,0 % de l'ensemble de l'échantillon consommaient « toujours » des produits laitiers ou de soya. Les hommes rapportaient des apports plus élevés en graisses saturées que les femmes. Pour l'ensemble de l'échantillon, 83,4 % considéraient que la qualité de leur régime alimentaire devait être améliorée, et la plupart consommaient des boissons sucrées (71,1 % des hommes et 50,9 % des femmes). Plusieurs participants (88,5 %) utilisaient

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le tableau de la valeur nutritive pour choisir les aliments. Les sous-échelles sur le comportement alimentaire et l'activité physique étaient significativement associées entre elles, et à l'âge, à l'indice de masse corporelle et à l'accès aux aliments ( $p < 0,05$ ).

**Conclusions :** Dans l'ensemble, les adultes souffrant de prédiabète rapportaient moins de comportements alimentaires et d'habitudes d'activité physique optimaux. L'évaluation des comportements liés au mode de vie au moyen d'outils simples comme la Food Behaviour Checklist et le Godin Leisure-Time Exercise Questionnaire peut être utile à la conception, à l'évaluation et à la prestation des programmes.

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## Introduction

Prediabetes is defined as impaired fasting glucose diagnosed by a fasting plasma glucose between 6.1 mmol/L and 6.9 mmol/L, impaired glucose tolerance diagnosed by an oral glucose tolerance test between 7.8 mmol/L and 11.0 mmol/L or glycated hemoglobin (A1C) of 6.0% to 6.4% (1). The prevalence of prediabetes in Canada has been estimated to range from 13% to 17% (2,3). Adults with prediabetes are at significantly higher risk for the development of type 2 diabetes and associated complications, including nephropathy, chronic kidney disease, retinopathy and cardiovascular disease, than those with normoglycemia (1,4).

Strong evidence from controlled trials has shown lifestyle intervention targeting weight loss through diet and physical activity (PA) reduces the risk of type 2 diabetes development by nearly 60% (5,6). From these controlled trials, specific recommendations have been derived and are used as principles for best practice (1). In particular, lifestyle changes should include 1) a reduction in weight of at least 5% and an increase in moderate intensity PA to at least 150 minutes per week, and 2) a reduction in fat and saturated fat calories accompanied by an increase in fibre similar to dietary reference intakes for the general population (1,7).

Few studies have documented food and PA behaviours of adults with prediabetes. A study in the United States of 1402 adults with prediabetes found 52.2% of them were attempting to control or lose weight, 54.7% reported reducing fat or calories and 48.5% reported trying to increase their PA (8). We previously reported that 38% of adults with prediabetes were meeting current public health PA guidelines (9), but no large Canadian studies have reported lifestyle behaviours (in particular, food and PA behaviours) among men and women who have prediabetes. Information on specific food and PA behaviours in this population is needed to inform interventions targeted toward this group, and to identify whether food and PA behaviours are different for adults with prediabetes than for the general Canadian population.

The primary objective of this cross-sectional study was to describe food and PA behaviours of adults with prediabetes attending a prediabetes education class. The secondary objective was to identify significant relationships between food and PA behaviours, and age, body mass index (BMI) and food access variables.

## Methods

### Participants

Adult participants ( $n=1228$ ) attending a 2-hour prediabetes education class in Edmonton, Alberta, between 2009 and 2011 completed a self-administered survey of their food and PA behaviours in English at the beginning of the class. Most participants attending the prediabetes education class are referred by a healthcare provider after they have been diagnosed with prediabetes. Participants may also self-refer after being told by a healthcare provider they have prediabetes, impaired glucose tolerance or impaired fasting glucose if they are English speaking and more than 17 years old. Each participant was asked by the facilitator, a

registered dietitian, to complete the survey. Data on the total number of people who attended the sessions were not available; however, facilitators reported that most participants completed the survey. Ethical approval was obtained from the University of Alberta Health Research Ethics Board retrospectively, and owing to the anonymous nature of the survey, consent was implied by completion.

### Measures

Demographic items were modified from the Canadian Community Health Survey into a written format (10) and included age, sex, height and weight.

Food behaviour was measured using the Food Behaviour Checklist (FBC) (11). The FBC asks 20 questions about food behaviours and is scored into 5 subscales including fruit and vegetables, milk and soy, fat, overall diet quality and access to food. Higher subscale scores represent higher intakes, better diet quality or lower saturated fat intake. The reading level of the FBC is below the fourth grade, has been tested in a low-income, low-literacy population, has a low respondent burden and demonstrates validity, reliability and sensitivity to change (11). For example, the fruit and vegetable subscale has an internal consistency rating of  $\alpha=0.80$  and shows significant correlations with serum carotenoids, vitamins A and C, beta-carotene, folate, dietary fibre and servings of fruit and vegetables ( $r=0.44, 0.29, 0.32, 0.25, 0.26, 0.31, 0.36$  and  $0.33$ , respectively). The milk and soy subscale has an internal consistency  $r=0.47$  and shows positive correlations with vitamin A, riboflavin, calcium and milk product servings ( $r=0.27, 0.27, 0.30$  and  $0.33$ , respectively). The fat subscale does not demonstrate strong internal consistency but is negatively correlated with percent energy from saturated fat ( $r=-0.25$ ). The diet quality subscale has an internal consistency of  $\alpha=0.61$  and shows positive correlations with serum carotenoids, vitamin and mineral intake, servings of fruit and vegetables and the Healthy Eating Index ( $r=0.32, 0.23$  to  $0.34, 0.35, 0.28$  and  $0.31$ ). The access to food question asks, "Do you run out of food before the end of the month?"

Physical activity was measured using a modified Godin Leisure Time Exercise Questionnaire (GLTEQ) (12). The GLTEQ measures mild, moderate and vigorous intensity leisure time PA during an average week over the past month. For each intensity category, appropriate examples of PA were given. The GLTEQ was modified to include not only the frequency but also the average duration of each PA session reported. The total minutes of moderate and vigorous PA were each multiplied by the frequency and duration for each intensity and summed to compare to Canadian PA guidelines. The validity of the GLTEQ is well established (13), and data suggests self-report PA estimates function as a predictor of future behaviour (14).

### Analysis

Data were entered into SPSS 20.0 for Windows (15), and descriptive statistics and proportions were used to examine the age, BMI and food access characteristics of men and women separately. Men and women were analyzed separately because

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