Original Research

Community-Based Culturally Preferred Physical Activity Intervention Targeting Populations at High Risk for Type 2 Diabetes: Results and Implications

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ABSTRACT

Objectives: In Canada, an ageing population, obesity rates and high risk among certain ethnocultural populations are driving diabetes prevalence. Given the burden associated with type 2 diabetes and its link to modifiable risk factors, this study aimed to implement culturally preferred physical activities at the community level, targeting individuals at high risk for type 2 diabetes. Glycated hemoglobin (A1C) levels were used to detect potential improvements in glycemic control.
Methods: Participants were screened for diabetes risk using a questionnaire and capillary point-of-care A1C blood testing. Participants were offered community-based physical activity classes 2 to 3 times per week for 6 months. A subset of participants (n=84) provided additional measurements.
Results: In total, 718 subjects were reached during recruitment. Substantial participant dropout took place, and 487 participants were exposed to the intervention. Among those who participated in the physical activity and provided follow up, mean A1C levels were reduced by 0.17 (p=0.002) after 3 months (n=84) and by 0.06 (p=0.35; n=49) after 6 months. The homeostatic model assessment (HOMA-beta) showed a significant improvement of 23.6% after 3 months (n=20; p=0.03) and 45.2% after 6 months (n=12; p=0.02). Resting systolic blood pressure and diastolic blood pressure plus combined hand-grip strength improved after 6 months (n=12).
Conclusions: Implementation of this community-based, culturally preferred physical activity program presented several challenges and was associated with significant participant dropout. After considering participant dropout, the relatively small group who participated and provided follow-up measures showed improvements various physiologic measures. Despite efforts to enhance accessibility, it appears that several barriers to physical activity participation remain and need to be explored to enhance the success of future programs.

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RÉSUMÉ

Objectifs : Au Canada, le vieillissement de la population, les taux et le risque élevé d'obésité au sein de certaines populations ethnoculturelles entraînent la prévalence du diabète. Étant donné le fardeau associé au diabète de type 2 et son lien avec les facteurs de risque modifiables, la présente étude avait pour objectif la mise en place d'activités physiques culturellement privilégiées à l'échelle communautaire qui visent les individus exposés à un risque élevé de diabète de type 2. Les concentrations d'hémoglobine glyquée (A1c) ont été utilisées pour déceler les améliorations potentielles de la régulation de la glycémie.
Méthodes : Les participants ont été soumis à un dépistage du risque de diabète au moyen d'un questionnaire et d'un prélèvement sanguin par voie capillaire hors laboratoire de l'A1c. Les participants ont été invités à suivre des séances communautaires d'activités physiques 2 à 3 fois par semaine durant 6 mois. Un sous-ensemble de participants (n=84) a fourni des mesures supplémentaires.

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Résultats : Au total, 718 sujets ont été choisis durant le recrutement. Après qu'un nombre important de participants eurent abandonné, 487 participants ont participé à l'intervention. Parmi ceux qui ont pris part à l'activité physique et fourni des mesures de suivi, les concentrations moyennes d'A1c ont montré une réduction de 0,17 (p=0,002) après 3 mois (n=84) et de 0,06 (p=0,35; n=49) après 6 mois. Le modèle d'évaluation de l'homéostasie (HOMA-bêta) a montré une amélioration significative de 23,6 % après 3 mois (n=20; p=0,03) et de 45,2 % après 6 mois (n=12; p=0,02). La pression artérielle systolique et diastolique au repos et la force de préhension combinées se sont améliorées après 6 mois (n=12).

Conclusions : La mise en place de ce programme communautaire d'activités physiques culturellement privilégiées comportait de nombreux défis et était associée à un abandon significatif des participants. Ceux qui ont participé et fourni des mesures de suivi ont montré des améliorations dans les diverses mesures physiologiques. En dépit des efforts pour améliorer l'accessibilité, il semble que plusieurs obstacles à la participation aux activités physiques demeurent et doivent être examinés pour accroître le succès des programmes futurs.

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Introduction

As type 2 diabetes continues to impact funding of healthcare systems dramatically around the world, more community-based resources are needed to help limit the development of the disease. A shift in focus toward prevention is imperative, considering that management of diabetes and its complications are projected to cost approximately $17 billion in Canada by the year 2020 (1). Without alterations in the current healthcare paradigm, key stakeholders (government, employers and insurers) will all struggle to manage the overwhelming financial burden of diabetes and its associated complications. A shift of responsibility, allowing physicians to share the treatment and prevention burdens with other qualified professionals, such as certified exercise physiologists and community physical activity leaders, would broaden the reach of community-based diabetes-prevention initiatives. A targeted approach focusing on those at highest risk for developing diabetes should translate into reducing the impact of this disease on our healthcare system. There has been a great deal of research into the effects of physical activity (PA) on the treatment/prevention of type 2 diabetes (2,3) and prediabetes (4).

In Canada, there is a highly diverse population consisting of several ethnicities that are known to be at elevated risk for type 2 diabetes. It has been well documented that individuals of South Asian, Chinese, African-Caribbean and Aboriginal descent are at 3 to 5 times higher risk for developing type 2 diabetes, which tends to happen at earlier ages and in a seemingly healthier body compositions (5–8). It is important that prevention strategies in Canada address these high-risk ethnicities and identify ethnospecific recommendations for the assessment of diabetes risk and for effective PA-focused intervention. When targeting high-risk ethnicities in the community, volunteer support plus "buy in" and engagement by community members can be key contributors to successful intervention (9,10).

This study was designed to identify persons at risk for type 2 diabetes from specific high-risk ethnicities and enrol them in a PA program that was community based and culturally preferred. The primary goal of the study was to successfully implement a community-based PA program specific to individuals at high risk for type 2 diabetes by using a culturally preferred approach. The success of the program was determined primarily through participant adherence and measured changes in levels of glycated hemoglobin (A1C) over a 6-month period. Additional measures of physical and physiologic fitness and health were also examined in a subset of participants to evaluate potential concurrent health benefits relevant to prediabetes and type 2 diabetes as well as to several other chronic diseases.

Methods

Study design

This was a nonrandomized longitudinal effectiveness study designed to target persons at high risk for type 2 diabetes, as determined by the Prediabetes Detection and Physical Activity Intervention Delivery (PRE-PAID) risk questionnaire (11,12) and point-of-care capillary blood screening (A1C) for a period of 6 months during which these persons participated in various forms of community-based PA. This investigation received ethics approval from the York University Human Participants Review subcommittee, and prior to screening and baseline data collection, all participants provided written, informed consent. Recruitment efforts and screening opportunities targeting persons at high risk for type 2 diabetes were concentrated in specific communities chosen on the basis of their cultural demographics as well as their known prevalences of diabetes. The selection process utilized the City of Toronto neighbourhood profiles that were developed in conjunction with Statistics Canada (13) as well as the Institute for Clinical Evaluative Studies Atlas of Diabetes (14). Communities with high reported rates of type 2 diabetes and self-identified visible minorities were selected for participant recruitment. In each community, participants from the identified, high-risk ethnicities (Chinese, South Asian, Aboriginal and African Caribbean) were targeted, but all who expressed interest were able to participate, regardless of ethnicity. This process took place in various public locations, such as community health centres, religious centres and shopping malls and relied heavily upon partnerships with community organizations to provide access to space, volunteer support and a recognizable trusted relationship with community members. A schematic of participant flow through the components of the study is provided in Figure 1, and select participant demographics are illustrated in Figure 2.

Participant inclusion/exclusion criteria

Participants were initially screened using the PRE-PAID risk questionnaire and point-of-care capillary A1C levels based on fingerstick evaluations. Despite the fact that the project targeted those at high risk for type 2 diabetes, all participants who underwent screening were invited to attend the community-based PA intervention, regardless of diabetes status, in an effort to promote participation and social support. When classifying participants' A1C levels, the Canadian Diabetes Association (CDA) diagnostic criteria were used for normal glycemic control (<6.0%), prediabetes (6.0% to 6.4%) and diabetes (≥6.5%) (15). Participants were excluded if they were under the age of 18 or if they possessed a condition or functional limitation that would preclude their engagement in moderate-intensity PA. Such conditions included chronic heart failure, severe musculoskeletal injury or joint or mobility pain. All participants completed the Physical Activity Readiness Questionnaire for Everyone (PAR-Q+) to identify any potential risks for PA participation prior to enrolment (16). If risk factors were identified, subsequent questions are provided on the PAR-Q+ (www.eparmedx.com) and, in many cases, they determine that the individual is cleared for unrestricted progressive light- to moderate-intensity PA participation. The PAR-Q+ was administered and interpreted by a qualified exercise professional