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Type 2 diabetes prevention in the community: 12-Month outcomes from the Sydney Diabetes Prevention Program

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ABSTRACT

Aims/hypothesis: The Sydney Diabetes Prevention Program (SDPP) was a community-based type 2 diabetes prevention translational research study with screening and recruitment in the primary health care setting. We aimed to investigate the program's effectiveness in reducing risk factors for diabetes as well as the program's reach, adoption and implementation.

Methods: 1238 participants aged 50–65 years at high-risk of developing type 2 diabetes were recruited by primary care physicians in the greater Sydney region. The intervention, delivered by trained allied health professionals, included an initial consultation, three group sessions/individual sessions, three follow-up phone calls, and a final review at 12 months. Biomarkers and behavioural goals were compared between baseline and 12 months.

Results: At baseline, the mean age of those who entered the program was 58.8 ± 4.4 years, 63% female, and the mean body mass index was 31.6 ± 5.2 kg/m². There was a significant weight reduction of 2 ± 4.3 kg ($p < 0.02$) in the 850 participants who completed the 12-month follow-up accompanied by improvements in diet (total fat, saturated fat, and fibre intake) and physical activity. There were also significant reductions in waist circumference

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Abbreviations: AUSDRISK, The Australian Diabetes Risk Assessment Tool; BMI, body mass index; CATI, Computer Assisted Telephone Interview; FPG, fasting plasma glucose; HbA_{1c}, glycated hemoglobin A_{1c}; HDL, high density lipoprotein; LDL, low density lipoprotein; LO, Lifestyle Officer; MVPA, moderate to vigorous physical activity; PASE, Physical Activity Scale for the Elderly; PCC, Primary Care Centre; PCP, primary care physician; PRT, progressive resistance training; RCT, randomised controlled trial; RE-AIMr, each, efficacy/effectiveness, adoption, implementation, maintenance; SPSSs, statistical package for social sciences; SAS, Statistical Analysis Software; SDPP, Sydney Diabetes Prevention Program; WC, waist circumference.

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2.6 ± 4.7 cm ($p < 0.001$) and total cholesterol -0.2 ± 0.8 mmol/L ($p < 0.001$) but not blood glucose. The diabetes risk reduction was estimated to be 30%, consistent with similar trials.

Conclusions/interpretation: This study demonstrates that a community-based lifestyle modification program is effective in reducing important risk factors for diabetes in individuals at high-risk of developing type 2 diabetes.

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1. Introduction

The prevalence of type 2 diabetes continues to increase and prevention of type 2 diabetes is a worldwide public health priority [1]. There is strong and consistent evidence from randomised controlled trials that type 2 diabetes can be prevented or delayed through lifestyle modification interventions which improve diet, increase physical activity and achieve weight loss in high-risk people [2–4]. The Finnish [3] and United States (US) [4] studies achieved a 58% reduction in type 2 diabetes incidence with lifestyle modification, and Chinese [5], Finnish [6], and US [7] studies all demonstrated long-term diabetes risk reduction in those who were exposed to the interventions compared with control groups.

The challenge is to translate this evidence into effective community-based programs that can be scaled up and rolled out. An emerging body of translational studies in a range of settings suggests that such community based programs can be effective, but the risk reduction may be less than is achieved in randomised controlled efficacy trials [8–10]. This paper reports on a type 2 diabetes prevention program in which screening and recruitment were conducted exclusively in the primary care setting, with the lifestyle intervention delivered by trained allied health professionals in community-based settings.

2. Methods

The Sydney Diabetes Prevention Program (SDPP) was a 12 month lifestyle modification program targeting people aged 50–65 years at high-risk of developing type 2 diabetes conducted in the greater Sydney area [11]. This study was developed and evaluated as a real world implementation study to inform policy and practice. Effectiveness was measured by comparing nutrition and physical activity behavioural outcomes, weight changes and other modifiable risk factors at 12 months in a cohort screened and recruited in the primary health care setting.

The content and design of the lifestyle intervention was adapted from other successful programs [4,8]. The intervention, delivered by Lifestyle Officers (LO), who were trained allied health professionals from a range of backgrounds (nurses, dietitian, exercise physiologist, psychologists) included one individual and three two-hour face-to-face group sessions of behavioural intervention using a health coaching approach [12] which aimed to increase physical activity, reduce total and saturated fat, increase fibre, and reduce weight. At the initial consultation participants unable to attend groups were offered an individual session module consisting of three telephone health coaching sessions

covering the same content as the group sessions [11]. The program was free and was delivered in English.

All participants were then offered 3 monthly follow-up telephone health coaching calls from their LO (at three, six and nine months). A final 12 month review was conducted with a face-to-face visit to both the LO and primary care physician (PCP). The specific goals of the intervention were to increase moderate to vigorous physical activity (MVPA; including both strengthening and aerobic activities) to at least 30 min per day (210 min per week); reduce total daily fat intake ($\leq 30\%$ total energy (E)); reduce daily saturated fat intake ($\leq 10\%$ of E); increase daily fibre intake (≥ 15 g/1000 kcal per day); and reduce body weight by 5%.

In total, 222 PCPs in 83 primary care centres (PCC) agreed to participate in the study and they screened and recruited participants from September 2008 until June 2010. Risk status was assessed using a validated Australian risk questionnaire (The Australian Diabetes Risk Assessment Tool (AUSDRISK)) that included waist circumference (WC) [13]. The risk test took approximately 5 min to complete and high-risk was defined as a risk score of ≥ 15 [14]. Exclusion criteria included previously undiagnosed diabetes, use of blood glucose lowering or weight loss medications, recent cancer, severe cognitive impairment or behavioural disturbance, inability to undertake moderate physical activity, not being able to speak English, or, unstable cardiovascular disease. Prevalent diabetes was excluded by measurement of either a fasting plasma glucose (FPG), an oral glucose tolerance test (OGTT) if required, or glycated haemoglobin (HbA_{1c}) [15]. PCCs employed several screening procedures including opportunistic approaches or direct mail to patients [16].

Height, weight and WC were measured at the initial consultation and 12 month review by the LOs who undertook standardised training. Level of education, employment status, income, and having private health insurance were assessed at baseline by Computer Assisted Telephone Interview (CATI). General health (using the item from the SF12 [17]) and physical activity (Physical Activity Scale for the Elderly (PASE [18]) were assessed at baseline and again at 12 months by CATI. Total PASE score, minutes per week of moderate to vigorous physical activity including progressive resistance training (PRT), and walking minutes, were calculated. Body mass index (BMI) was calculated by dividing weight (kg) over height squared (m²). Non-weighed three-day food diaries were completed by participants at baseline and the 12-month review. Nutrient intake was analysed by Xyris software [19] by trained dietitians. The key measures assessed were total fat intake (%E), saturated fat (%E), fibre intake (g/1000 kcal), MVPA (min/week) and weight change from baseline (kg). Fasting lipids (total cholesterol, triglycerides, HDL, and calculated LDL) and FPG were measured in commercial pathology laboratories. Other outcomes included changes in WC from baseline to 12 months.

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