Contents lists available at ScienceDirect

Primary Care Diabetes

journal homepage: http://www.elsevier.com/locate/pcd

Original research

Intensive lifestyle intervention goals can be achieved as effectively with large groups as with small groups

Sarah M. Brokaw, Diane Arave, Derek N. Emerson, Marcene K. Butcher, Steven D. Helgerson, Todd S. Harwell, the Montana Cardiovascular Disease and Diabetes Prevention Workgroup*[1]

Montana Department of Public Health and Human Services, Helena, MT, United States

ARTICLE INFO

Article history:
Received 29 July 2013
Received in revised form
14 February 2014
Accepted 16 February 2014
Available online 12 March 2014

Keywords:
Type 2 diabetes mellitus
Diabetes prevention
Group size
Intervention studies
Cardiovascular disease related risk factors
Montana
Pre-diabetes
Weight loss

ABSTRACT

Objective: The purpose of this study was to assess if group size is associated with weight loss outcomes among participants in an adapted diabetes prevention program.
Methods: Adults at high-risk ($N = 841$) for CVD and diabetes were enrolled in the lifestyle intervention in 2011. Multiple logistic regression analyses were used to identify if group size (smaller group < 16 participants; larger group ≥16 participants) was independently associated with weight loss outcomes among participants.
Results: In the bivariate analyses, participants in the smaller groups compared to those in the larger groups were significantly more likely to have a higher baseline body mass index, to attend fewer intervention sessions, and less likely to self-monitor their fat intake for ≥14 weeks, and to have lost less weight during the core intervention (5.1 kg [SD 4.7] versus 5.8 kg [4.5]). However, analysis adjusting for age, sex, baseline BMI, achievement of the physical activity goal, number of weeks self-monitoring fat intake, and group size, found only two factors to be independently associated with achievement of the 7% weight loss goal: frequency of self-monitoring of fat intake and achievement of the physical activity goal.
Conclusions: Our findings indicate that intensive lifestyle intervention goals can be achieved as effectively with large or small groups.

1. Introduction

The prevalence of type 2 diabetes continues to increase in the US, and it is estimated that one in three individuals born in 2000 will develop type 2 diabetes in their lifetime [1]. The Finnish Diabetes Prevention Study (DPS) and the National Institutes of Health Diabetes Prevention Programs (DPP) both demonstrated that the incidence of type 2 diabetes mellitus among adults at high-risk for diabetes can be

* *Corresponding author at*: Montana Department of Public Health and Human Services, Cogswell Building, C-314, P.O. Box 202951, Helena, MT 59620-2951, United States. Tel.: +1 406 444 1437; fax: +1 406 444 7465.
E-mail address: tharwell@mt.gov (T.S. Harwell).
[1] Members of the Montana Cardiovascular Disease and Diabetes Prevention Workgroup are identified in Appendix.

http://dx.doi.org/10.1016/j.pcd.2014.02.002
1751-9918/

significantly reduced through an intensive lifestyle intervention [2,3].

The lifestyle interventions in both the DPS and the DPP studies were delivered one-on-one to participants [2,3]. Since the publication of these landmark studies, a number of translation studies have shown that it is feasible to deliver the lifestyle intervention in a group setting and achieve similar weight loss outcomes [4–13]. Delivering the DPP lifestyle intervention in a group setting has a number of potential benefits including increasing the number of persons that can participate and enhancing the cost effectiveness of the intervention. Additionally, one of the key skills that participants are taught in the DPP curriculum is problem solving. Using a group setting to deliver the DPP can potentially enhance the learning process of individual participants through shared learning, feedback, and support from their peers. However, optimal group size to deliver the DPP or other weight loss related lifestyle interventions has not been documented nor has whether or not group size affects participant achievement of the targeted weight loss goals.

In 2008, the Montana Department of Public Health and Human Services (DPHHS) implemented an adapted group-based cardiovascular disease (CVD) and diabetes prevention program, resulting in similar weight loss outcomes as those in the NIH DPP [5,6]. This report uses the experience of 841 participants in 2011 to assess if group size was associated with weight loss outcomes for these participants.

2. Methods

2.1. Intervention sites and intervention design

A description of this intervention has been published previously [5,6]. Briefly, the Montana DPHHS began implementing an adapted DPP in a group setting in 2008 and currently supports fifteen health care facilities to implement this intervention. These facilities included ten diabetes self-management education (DSME) programs, two DSME programs in collaboration with their local YMCA, one cardiac rehabilitation program, one rural health clinic, and one local health department. Sites used trained health professionals as lifestyle coaches to provide the 16 core sessions followed by six monthly after-core sessions. These sessions were based on the original DPP curriculum (intervention length of 10 months) [14].

2.2. Participant eligibility criteria

Overweight (BMI $\geq$ 25.0 kg/m^2) adults with medical clearance from their referring physician and one or more of the following CVD and diabetes risk factors were eligible: a previous diagnosis of pre-diabetes, impaired glucose tolerance or impaired fasting glucose, hemoglobin A1C between 5.7% and 6.4%, high blood pressure ($\geq$130/85 mmHg or treatment), dyslipidemia (triglycerides > 150 mg/dl, LDL-cholesterol > 130 mg/dl or treatment, or HDL-cholesterol < 40 mg/dl men and <50 mg/dl women), a history of gestational diabetes (GDM), or had given birth to a baby weighing >9 pounds.

2.3. Data collection

Height, weight, blood pressure, fasting blood glucose and lipid values were collected at enrolment, at completion of the core (four months), and after core (10 months). Participants were weighed at each session and submitted weekly self-monitoring booklets. Participants attended the same group throughout the study.

Participants were assigned daily fat and calorie intake goals based on their baseline weight. Participants were offered a minimum of twice-weekly supervised physical activity opportunities. Following DPP guidelines, participants began self-monitoring daily fat gram intake starting after session two, physical activity after session five and calories, if necessary, after session seven [14]. Participants submitted completed weekly self-monitoring booklets beginning at session three to be reviewed by the lifestyle coaches.

Weekly dietary self-monitoring and weight data were recorded for each participant. Self-reported fat gram and calorie intake were reported as a daily average, and physical activity minutes as a weekly total. The lifestyle coaches measured participant weight at each session.

The goals for this lifestyle intervention are the same as the original DPP [14]. These goals include: (1) daily self-monitoring of fat intake and reduction in fat intake, (2) achieving $\geq$150 min weekly of moderately vigorous physical activity, and (3) achieving weight loss of $\geq$7% of participant's baseline weight by completion of the core sessions.

2.4. Data analysis

Participant data for 2011 were analyzed using SPSS version 15.0 (Chicago, IL). Participants were categorized into two group sizes (<16 vs. $\geq$16 participants) based on the number of participants that attended each of the weekly core sessions. The median group size was 16 (range 8–38), and the quartiles were $\leq$11, 12–15, 16–19, and $\geq$20. Participants weekly self-monitoring of fat intake was categorized into three groups: 0–6 weeks, 7–13 weeks, and $\geq$14 weeks. Participants mean weekly physical activity minutes over the 16 sessions were categorized into three groups: met the physical activity goal, did not meet the physical activity goal, and unknown. The proportion of participants enrolled in the core intervention that met the 7% weight goal was calculated. The proportion of participants who achieved $\geq$5% weight loss was also calculated, because previous studies suggest that this level of weight loss is associated with significant health-related outcomes.

Independent *t*-tests and Chi-square tests were used to compare the baseline characteristics, session attendance, weekly self-monitoring of fat intake, achievement of the physical activity goal, and weight loss among participants in the smaller (<16) versus larger group ($\geq$16). Intention-to-treat analyses were performed using the last observed weight of participants enrolled in the program to calculate weight loss measures, achievement of the 7% weight loss goal, and the $\geq$5% weight loss outcome. Multiple logistic regression analyses were used to indentify variables independently associated with participant achievement of the 7% weight loss goal and the $\geq$5% weight loss outcome. Adjusted odds ratios and 95% confidence intervals were calculated.