Family Support is Associated with Success in Achieving Weight Loss in a Group Lifestyle Intervention for Diabetes Prevention in Arab Americans

Nicole R. Pinelli, PharmD, MS; Morton B. Brown, PhD; William H. Herman, MD, MPH; Linda A. Jaber, PharmD

Objective: We have recently shown the feasibility of a community-based, culturally-specific, Diabetes Prevention Program-adapted, goal-oriented group lifestyle intervention targeting weight loss in Arab Americans. The objective of this study was to examine factors associated with weight-loss goal attainment at 24-weeks of the lifestyle intervention.

Methods: We assessed the relationship among demographic, psychosocial, and behavioral measures and the attainment of ≥7% decrease of initial body weight among 71 lifestyle intervention participants.

Results: Weight loss goal of ≥ 7% of body weight was achieved by 44% of study participants. Demographic and psychosocial factors were not associated with weight loss. Individuals attaining the weight loss goal were more likely to have family support during the core curriculum sessions (70% vs 30%; $P=.0023$). Decrease in body weight was positively correlated with attendance at sessions ($r=.46$; $P=.0016$) and physical activity minutes ($r=.66$; $P<.0001$) and negatively correlated with reported caloric intake ($r=-.49$; $P=.0023$), fat intake ($r=-.52$; $P=.0010$), and saturated fat intake ($r=-.39$; $P=.0175$) in women; these trends were similar but not significant in men.

Conclusions: Family support was an important predictor of attainment of the weight loss goal. Family-centered lifestyle interventions are likely to succeed in curtailing the rising epidemic of diabetes in the Arab-American Community. (*Ethn Dis.* 2011;21(4):480–484)

Key Words: Diabetes, Prevention, Lifestyle Intervention, Diabetes Prevention Program, Arab Americans

From Department of Pharmacy Practice, Wayne State University (NP and LJ) and Department of Biostatistics, University of Michigan (MB) and Departments of Internal Medicine and Epidemiology, University of Michigan (WH)

Address correspondence to Linda A. Jaber, PharmD; Professor, Department of Pharmacy Practice; Eugene Applebaum College of Pharmacy and Health Sciences; Wayne State University; 259 Mack Avenue; Detroit, MI 48201-2417; 313.577.5899; 313.577.5369 (fax); ljaber@wayne.edu

Introduction

Diabetes and prediabetes are major health problems in Arab Americans, a rapidly growing segment of the US population. We have previously shown that the age- and sex-standardized prevalence of diabetes, impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT) are 18% and 23% of adults, respectively.[1] Several randomized clinical trials have demonstrated that diabetes can be delayed or prevented with lifestyle interventions.[2–5] In the Diabetes Prevention Program (DPP), intensive lifestyle intervention, that aimed to achieve a ≥ 7% reduction in body weight and at least 150 minutes of moderate exercise per week, has reduced the risk of progression from IGT to diabetes by 58%.[2] Weight loss was the major determinant of the reduced diabetes incidence in the DPP.[6]

Despite the evidence of the effectiveness of lifestyle interventions in reducing the rate of progression to diabetes, many individuals do not succeed in adopting behavioral interventions. In the DPP, 50% of the participants in the lifestyle-intervention group had achieved the targeted weight loss goal of ≥7% at 24 weeks, and only 38% had a weight loss ≥7% at the time of the most recent visit.[2] We have recently demonstrated the feasibility of a community-based, culturally-specific, DPP-adapted, group-delivered, 24-week lifestyle intervention targeting weight loss in Arab Americans.[7] The lifestyle intervention was modeled on the DPP but modified and adapted for Arab Americans. Our findings are comparable to those reported in the DPP where 44% of study participants were successful at achieving the targeted weight loss of ≥7% of initial body weight at 24 weeks.[7] Cultural and social elements, as well as additional baseline factors at the individual level may influence the effectiveness of the lifestyle intervention. The objective of our study was to identify demographic, psychosocial, and behavioral factors associated with the attainment of the targeted weight loss goal at week 24 in Arab Americans. The identification of factors predictive of outcomes is important for targeting those individuals most likely to benefit from lifestyle intervention and in tailoring cost-effective diabetes prevention programs for broad dissemination in this community.

Methods

Self-identified Arab Americans aged ≥30 years and with a BMI ≥27 kg/m^2 and without a self-reported history of diabetes or antihyperglycemic medication use were recruited using a constructed sampling list and by soliciting volunteers from Dearborn, Michigan. The age and BMI inclusion criteria were based on our previous finding that prediabetes was likely to be detected in overweight (BMI ≥27) individuals aged

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Table 1. Attainment of weight loss goal by demographic and psychosocial factors

Characteristic*	Row Total, *n*	≥7% Weight Loss, %	*P*†
Age			
30–44	27	33	.26
45–59	38	53	
60+	6	33	
Sex			
Males	27	33	.22
Females	44	50	
Baseline BMI			
<30	20	45	1.00
≥30 and <35	22	41	
≥35	27	44	
Education			
Completed high school	39	38	.33
Completed < high school	29	52	
Marital status			
Married	56	48	.24
Other	14	29	
Employment status			
Employed full- or part-time	14	36	1.00
Retired	35	39	
Other	22	41	
Income			
<35,000	53	45	.86
≥35,000 and <75,000	9	33	
≥75,000+	2	50	
Household size			
1	4	0	.28
2	4	75	
3	6	67	
4	13	38	
5	11	55	
≥6	22	41	
Perceived health			
Excellent	3	67	.82
Very good	12	33	
Good	35	46	
Fair	20	45	
Poor	1	0	
Quality of life			
High	29	36	.24
Medium	19	32	
Low	22	55	
Depressive symptom severity			
0–8	49	45	1.00
≥9	19	42	
Weight‡			
Gained	30	53	.33
Lost	17	41	
Same	24	33	
Following diet or meal plan§			
Yes	11	27	.34
No	56	45	

≥30.[8] Eligible and willing individuals providing informed consent were enrolled in a community-based, culturally-specific, goal-oriented group lifestyle intervention modeled after the DPP. In short, the entire DPP core curriculum was re-organized into 12 sessions, made culturally relevant to Arab Americans, translated into Arabic, and delivered in weekly sessions by a trained bilingual study coordinator. Thereafter, group members met on a monthly basis for another 12 weeks to assess achievement of goals and to discuss barriers and strategies to overcome them. Although these meetings were optional, most group members attended. Follow-up was performed at week 24. The primary goal of the intervention was to achieve ≥7% decrease in body weight. The study was approved by the Wayne State University and University of Michigan Institutional Review Boards.

Body weight was measured weekly during the intervention using a standardized scale with the participants reporting at the same time of the day and wearing light clothing and no shoes. Verbally administered, previously validated and standardized questionnaires were used to measure demographic, psychosocial, and behavioral factors. These questionnaires were translated into Arabic, back-translated, and pilot tested prior to use. Acculturation was assessed with a validated 4-item survey.[8] Risk perception was measured with the Risk Perception Survey for Developing Diabetes (RPS-DD), which evaluates multiple dimensions of perceived risk and assesses worry about developing diabetes and knowledge of 11 diabetes risk factors.[9] Health-related quality of life was measured with the EQ-5D, a standardized instrument applicable to a wide range of health conditions and outcomes.[10] Depressive symptom severity was assessed with the 9-item PRIME-MD Patient Health Questionnaire.[11] Nutrient intake (with 24-hour dietary recall), and self-reported physical activity (with the DPP-Modifiable-

Table 1. Continued

Characteristic*	Row Total, *n*	≥7% Weight Loss, %	*P*†
Family history of diabetes			
Yes	48	44	1.00
No	22	41	
Acculturation			
High	7	43	1.00
Low	64	44	
Family support at sessions			
Yes	23	70	.0023
No	48	31	

* Data are expressed as *n* or percentages.
† Analyses between individuals with ≥7% weight loss and those with <7% weight loss were performed using a Fisher's exact test. A two-tailed $P<.05$ was considered significant.
‡ Weight change over 12-month period prior to intervention.
§ *n* or percent following a low calorie, low fat, low cholesterol, low salt, low carbohydrate or vegetarian diet prior to intervention.

Activity questionnaire) were collected.[2] Attendance of participants and their family members at the scheduled sessions was documented.

Data management and analysis were performed by the Biostatistics and Economic Modeling Core of the Michigan Diabetes Research and Training Center. An intent-to-treat analysis (defined as all individuals who attended at least one session) was utilized. Participants who dropped out of the intervention were assigned a change of zero (no improvement) for the purpose of the analyses. Continuous and categorical data were analyzed utilizing a two-sample *t* test and Fisher's exact test, respectively. Spearman correlation coefficients were calculated to examine the association between behavioral measures and weight loss at week 24. Post hoc analyses were performed in which logistic regression models were fitted to identify factors associated with success in achieving a 7% reduction in body weight from baseline. Data are expressed as mean ± SD or percentage. Analyses were performed using SAS, version 9.1 (SAS Institute, Cary, NC).

RESULTS

A total of 71 individuals enrolled in the lifestyle intervention. Most participants were from Lebanon (73%) or Iraq (18%) and 38% were male. The mean (±SD) age was 47 ± 9 years. Most were obese with a mean BMI of 34 ± 6. Participants consumed mostly calorie-dense traditional Middle-Eastern foods. The majority (70%) did not engage in regular physical activity.

By week 24, 44% of participants achieved the 7% weight loss goal. Demographic, socioeconomic, and psychosocial factors were not associated with goal attainment (Table 1). Family support defined as attendance of family members at the core curriculum sessions emerged as an important predictor of weight loss goal attainment. Individuals successful in achieving ≥7% weight loss at week 24 were more likely to have family support compared to those who did not reach the targeted goal (70% vs 30%; $P=.0023$). When family support was analyzed separately by sex, women with support were significantly more likely to achieve the weight loss goal than those without support (85% of 14 women vs 33% of 30 women, $P=.0028$). In men, success in achieving weight loss was also higher for those with family support, however, the difference was not statistically significant (44% of 9 men vs 28% of 18 men, $P=.42$). In a post hoc analysis weight loss was fitted to family support by a logistic regression in which sex and attendance were included as covariates; family support remained significant ($P=.0046$), attendance at sessions was also significant ($P=.0175$) and sex was marginally nonsignificant ($P=.08$).

In terms of perceived risk, a positive relationship between knowledge of diabetes risk factors and the weight loss goal attainment was observed. Individuals meeting the weight loss goal had significantly higher mean scores on the knowledge risk subscale of the RPS-DD (6.17 ± 1.97 vs 5.02 ± 1.82; $P=.020$). No differences in the other subscales were noted (Table 2).

The relationship between weight loss and behavioral factors varied as a function of sex. In women, mean decrease in body weight was positively correlated with attendance at sessions

Table 2. Attainment of weight loss goal by risk perception for developing diabetes

Risk perception subscale score*	≥7% weight loss	<7% weight loss	*P*†
Comparative disease risk	1.52±.48	1.67±.50	.36
Comparative environmental risk	1.87±.63	1.94±.52	.94
Optimistic bias	2.15±.50	2.27±.52	.50
Personal control	2.84±.25	2.85±.32	.79
Worry	2.70±.28	2.66±.37	.77
Composite risk score	1.73±.35	1.82±.35	.51
Knowledge	6.17±1.97	5.02±1.82	.0197

* Data are expressed as mean ± standard deviation.
† Analyses between individuals with ≥7% weight loss and those with <7% weight loss were performed using two-sample *t* test. A two-tailed $P<.05$ was considered significant.

(r=.46; P=.0016) and physical activity minutes (r=.66; P<.0001) and negatively correlated with calorie (r=−.49; P=.0023), fat (r=−.52; P=.0010) and saturated fat intake (r=−.39; P=.018). In men, the direction of these correlations was similar to those observed in women but none achieved statistical significance; correlation coefficients were (r=.01; P=.96), (r=.10; P=.66), (r=−.35; P=.09), (r=−.28; P=.17), and (r=−.17; P=.42), respectively.

DISCUSSION

Despite the evidence of the effectiveness of lifestyle interventions in reducing the risk of diabetes, many individuals do not succeed in adopting such interventions that often require long-term behavioral changes. Individual and community based differences influence the robustness and translatability of diabetes preventive lifestyle intervention. Retrospective analyses from the DPP and the Finnish Diabetes Prevention Study have demonstrated significant associations between participants' baseline characteristics and the effectiveness of lifestyle interventions.[12–13] The characterization of factors predictive of outcomes is fundamental for identifying individuals most likely to benefit from diabetes prevention activities and in tailoring intervention strategies with the highest likelihood of success in reducing the risk of diabetes.

In our analysis, demographic, socioeconomic, and psychosocial factors including age, sex, baseline BMI, educational level, income, employment, acculturation, and depressive symptoms were not found to be associated with weight loss at week 24 in Arab Americans. These findings are similar to those reported by the DPP where these factors were not associated with weight loss goal achievement at week 24 after adjustment for age.[12] In the DPP, however, an effect of participant age on weight loss outcome was observed; older individuals (≥65 years) were more likely to succeed at achieving the weight loss goal compared to those aged <45. Our failure to detect an effect of age on goal attainment in Arab Americans may be explained by the fact that only 8% of our study population was aged >60 years.

Our study provides compelling evidence that family support is an effective strategy to enhance the adoption of diabetes preventative behaviors in this culturally unique, immigrant, and medically-underserved population. This finding is consistent with data obtained from a series of focus group sessions that we have previously conducted in a representative sample of individuals completing the 24-week lifestyle intervention program (unpublished data). Among these focus groups participants, there was a consensus as to the central role of family and they suggested that any future program of behavioral intervention to prevent diabetes should actively seek family involvement and support. Many individuals expressed that their purpose for being involved in the lifestyle intervention was to disseminate what they had learned to their own families and to the broader community.

Another interesting finding of this study is that the observed association between weight loss goal attainment and family support varied as a function of sex. Although family involvement has likely contributed to improved adherence and performance in both sexes, the treatment effect observed was much smaller in men compared to women. The lack of statistical significance shown between weight loss goal attainment and family support in men may be related to the small sample size evaluated (n=28).

In summary, family-centered interventions aimed at behavior modification are likely to be successful in reducing the burden of diabetes in the vulnerable Arab American community. These types of interventions warrant further study.

Our study provides compelling evidence that family support is an effective strategy to enhance the adoption of diabetes preventative behaviors in this culturally unique, immigrant, and medically-underserved population.

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AUTHOR CONTRIBUTIONS

Design concept of study: Brown, Herman, Jaber
Acquisition of data: Pinelli, Jaber
Data analysis and interpretation: Pinelli, Brown, Herman
Manuscript draft: Pinelli, Brown, Herman, Jaber
Statistical expertise: Pinelli
Acquisition of funding: Brown, Herman, Jaber
Administrative: Brown, Herman
Supervision: Pinelli, Herman, Jaber