



Participation and cardiovascular risk reduction in a voluntary worksite nutrition and physical activity program

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ABSTRACT

Objective. In a cohort of employees participating in a worksite nutrition and physical activity program, we compared program completion and changes in cardiovascular risk factors by baseline body mass index.

Methods. In 2007, 774 employees enrolled in a 10 week program at a hospital in Boston, Massachusetts. Program completion and change in weight, cholesterol, and blood pressure were compared between obese (body mass index ≥ 30), overweight (body mass index = 25–29.9), and normal weight (body mass index < 25) participants.

Results. At baseline, 63% were obese or overweight and had higher blood pressure and cholesterol compared to normal weight participants. Program completion was 82% and did not differ by body mass index. Mean weight loss was 1.9 kg at end of program ($p < 0.001$) and 0.4 kg at 1 year ($p = 0.002$). At end of program, participants with body mass index ≥ 30 lost 3.0% body weight vs. 2.7% for body mass index = 25–29.9 and 1.7% for body mass index < 25 ($p < 0.001$), but weight loss at 1 year did not differ by body mass index. Mean cholesterol and blood pressure were lower at end of program and 1 year (all, $p < 0.005$) but did not differ by body mass index.

Conclusions. Worksite programs can successfully initiate cardiovascular risk reduction among employees, but more intensive interventions are needed to make significant improvements in the health of higher risk obese employees.

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Introduction

The worksite is ideal for preventing and treating obesity because a majority of adults spend substantial time at work (Baicker et al., 2010), and employers pay more for obese workers in health care, disability, and absenteeism expenses (Aldana and Pronk, 2001; Durden et al., 2008; Wang et al., 2004). The Task Force on Community Preventive Services recommended that worksite programs should include both nutrition and physical activity interventions (Katz et al., 2005). Although these interventions result in modest weight loss, most reported studies lack the data to determine if high risk employees benefit from them (Anderson et al., 2009). However, employers are reluctant to target obese or high risk employees (Mello and Rosenthal, 2008; Schmidt et al., 2010; Okie, 2007), and most wellness programs are open to all employees regardless of weight or lifestyle habits (Baicker et al., 2010). There is little data to determine if wellness programs offered to all employees are making the healthy workers healthier or if they can

effectively recruit and treat higher risk employees. We collected data on employees who volunteered for a worksite nutrition and physical activity program to determine whether baseline body mass index (BMI) was associated with program completion, weight loss, and improvement in cholesterol and blood pressure.

Methods

This study received institutional approval from the Partners Healthcare Institutional Review Board in June 2006.

Setting and participants

Massachusetts General Hospital (MGH) is a teaching hospital in Boston, Massachusetts. During the study period, 16,979 (84%) of 20,159 employees were eligible for health benefits. Be Fit was a structured 10 week wellness program to improve nutrition and exercise habits and offered at no cost to employees eligible for benefits. Six teams of approximately 25 employees each participated during each 10 week program. The cost of the program for the employer was approximately \$450 per person. Using 2006–2007 medical claims data, we determined that Be Fit participants were similar to all employees in their rates of hypertension (14%), hyperlipidemia (15%), diabetes (5%), and cardiovascular disease (9%) but were more likely to have an obesity diagnosis compared to all employees (6% vs. 3%).

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Study design

This was a pre- and post-test comparison of all Be Fit participants who signed consent from December 2006 to December 2007. Exclusion criteria were definite plans to leave employment or pregnancy at the time of consent.

Be Fit intervention

For 10 weeks, the 6 teams met as a group weekly for a “rally” and a second time as an individual team. Team competition was encouraged by presenting rankings for weight loss at the rally. Participants were taught strategies of goal-setting, self-monitoring, and relapse prevention; they kept logs of food intake, physical activity, and pedometer steps. Participants had free access to the onsite health club, including weekly personal training, and one coupon per week for a healthy meal in the hospital cafeteria.

Measures and outcomes

Participants attended assessments and completed surveys at baseline, 10 weeks, and 1 year.

Physical assessments were conducted prior to 10 o'clock in the morning. Weight, height, waist circumference, blood pressure, and fasting lipids were collected. BMI was calculated for each participant, and participants were categorized as normal weight (BMI < 25), overweight (BMI = 25–29.9), or obese (BMI ≥ 30).

Surveys assessed average time spent per week during the past 3 months in physical activities, such as walking or running, bicycling, or other aerobic exercise.

Program completion was assessed by attendance at the final program assessment at week 10.

Analyses

During the study, 794 employees enrolled in Be Fit and 774 (97%) signed consent. Seventeen were excluded from the analyses; sixteen became pregnant, and one underwent gastric bypass surgery. We assessed data using a baseline observation carried forward method (Ware, 2003). This method makes a conservative assumption that participants who do not follow up return to their baseline weight, but it also has limitations since some participants may gain weight over time. Differences in characteristics by BMI category were assessed using chi-squared, ANOVA, and Kruskal–Wallis tests. Logistic regression was used to test for trends in program completion rates by age. Change in measurements at end of program and 1 year were assessed using a random-effects regression model with robust standard errors and accounting for clustering within team. Change in percent weight lost was assessed with a nonparametric sign rank test. All analyses were conducted using Stata statistical software (StataCorp, 2008).

Results

Table 1 shows baseline characteristics of Be Fit participants by baseline BMI category. Sixty-three percent were overweight or obese, and thirty-seven percent were normal weight. The prevalence of hypertension, hyperlipidemia, and diabetes increased with BMI category. Obese and overweight participants reported fewer hours of physical activity per week than normal weight participants.

A total of 82% of participants completed the 10 week program. The oldest participants were more likely to complete the program compared to the younger participants (90% for age >49, 82% for 35–49, and 78% for <35; p for trend <0.001), but program completion rates were similar for all BMI categories.

Mean overall weight loss at the end of program was 1.9 kg ($p < 0.001$) and at 1 year follow up was 0.4 kg ($p = 0.002$) (Table 2). Mean weight loss during the program differed significantly by baseline BMI category. At the end of program, obese and overweight participants lost a significantly higher percent body weight than normal weight participants, but by one year, the difference between BMI categories was not significant.

Waist circumference, systolic blood pressure, diastolic pressure, and total cholesterol decreased for all participants at the end of the

Table 1
Baseline characteristics of Be Fit participants by body mass index.

	Total <i>n</i> = 757	BMI < 25 <i>n</i> = 277	BMI = 25–29.9 <i>n</i> = 250	BMI ≥ 30 <i>n</i> = 230	<i>P</i> value ^a
Percentage of total participants	100	37	33	30	–
Mean age (SD)	42	39 (12.6)	42 (11.2)	44 (10.8)	0.03
Sex, % female	91	93	90	90	0.26
Race, % white	81	81	86	76	0.02
Marital status, % married	59	53	64	61	0.03
Education level, % with college or greater	62	62	61	64	0.84
Employment for >5 years, %	51	39	59	58	<0.001
Cares for others at home, %	39	31	44	42	0.007
No sick days in prior 6 months, %	84	89	82	80	0.02
Smoking					
Current, %	7	5	8	8	0.11
Past, %	32	29	35	33	
Never, %	61	67	56	58	
Hypertension, %	17	8	16	29	<0.001
Hyperlipidemia, %	18	14	18	24	0.01
Diabetes, %	3	1	2	8	<0.001
Cardiovascular disease, %	2	3	1	2	0.48
Amount physical activity/week, hours, median	4.1	5.1	4.2	3.4	<0.001
Participants who identify weight loss as a goal of joining the program, %	86	67	96	99	<0.001

This study was conducted at Massachusetts General Hospital in Boston, Massachusetts (2007).

BMI indicates body mass index; SD, standard deviation.

^a *P* value for difference by BMI category.

program (Table 2). At 1 year, the changes in waist, cholesterol, and diastolic blood pressure remained significant. Higher baseline BMI category was associated with higher baseline mean waist circumference, total cholesterol, and systolic and diastolic blood pressure. The decreases in cholesterol and blood pressure at the end of program and 1 year did not differ by BMI. Obese participants did have a significantly higher decrease in waist circumference at the end of program, but by one year, the reductions in waist were similar for all BMI categories.

Discussion

Our study showed modest improvements for all employees in weight and cardiovascular risk factors at the end of the program and at 1 year follow-up. The higher risk obese participants lost more weight during the program than the normal weight participants, but the reductions in cholesterol and blood pressure did not differ by BMI category. Although a limitation of this study is a lack of a control group who did not participate in the program, this is the first study of a worksite program to our knowledge that examines reduction of cardiovascular risk factors for employees of different weight categories. Because their baseline cardiovascular risk was higher, the obese and overweight employees may be less likely to experience long-term clinical benefit than normal weight employees, despite achieving similar absolute reductions in cardiovascular risk factors.

The rate of program completion was relatively high, and this did not vary by BMI category. Therefore, program dropout does not explain the relative reduction in health benefits for the obese and overweight participants. Although voluntary wellness programs open to all employees may be effective for prevention (Racette et al., 2009; Engbers et al., 2007), they are less effective for treating higher risk employees. Achieving maximal participation and success of high risk employees in wellness programs is critical to reducing the costs of

Table 2
Change in cardiovascular risk factors at end of program and 1 year by baseline body mass index.

	Total (n = 757)	P value ^a	BMI < 25 (n = 277)	BMI = 25–29.9 (n = 250)	BMI ≥ 30 (n = 230)	P value ^b
Baseline weight, kg, mean	77.1	–	62.6	74.8	97.1	–
Change in weight, kg						
End of program	–1.9	<0.001	–1.0	–2.0	–2.9	<0.001
1 year follow up	–0.4	0.002	–0.3	–0.3	–0.8	0.55
Change in % body weight						
End of program	–2.4	<0.001	–1.7	–2.7	–3.0	<0.001
1 year follow up	–0.6	<0.001	–0.4	–0.4	–0.9	0.69
Baseline waist circumference, cm	89.7	–	77.2	88.4	106.0	<0.001
Change in waist circumference, cm						
End of program	–3.6	<0.001	–2.8	–3.9	–4.4	<0.001
1 year follow up	–1.6	<0.001	–1.5	–1.5	–2.0	0.40
Baseline total cholesterol (mg/dL)	191.8	–	186.3	192.8	197.4	0.002
Change in cholesterol (mg/dL)						
End of program	–7.7	<0.001	–7.0	–7.2	–9.1	0.44
1 year follow up	–1.9	0.002	–2.3	–0.7	–2.8	0.31
Baseline systolic BP, mm Hg	124.7	–	118.8	124.3	132.2	<0.001
Change in systolic BP, mm Hg						
End of program	–2.6	<0.001	–2.7	–2.5	–2.5	0.97
1 year follow up	–0.4	0.30	–0.8	0.0	–0.4	0.69
Baseline diastolic BP, mm Hg	74.2	–	71.6	74.2	77.1	<0.001
Change in diastolic BP, mm Hg						
End of program	–1.9	<0.001	–2.2	–2.1	–1.6	0.68
1 year follow up	–1.5	<0.001	–1.4	–1.3	–1.9	0.59

This study was conducted at Massachusetts General Hospital in Boston, Massachusetts (2007).

BMI indicates body mass index; BP, blood pressure. All changes reported in table are unadjusted.

^a P value for comparison to baseline.

^b P value for difference by BMI category.

obesity to the employer (Wang et al., 2004; Pelletier, 1997; Matson Koffman et al., 2005; Goetzel et al., 2005). Future research will need to explore the costs and benefits of more intensive and longer-term interventions, such as sustained individual and group counseling, targeting high risk employees.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

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