ORIGINAL INVESTIGATION

Weight Control in the Physician's Office

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Background: Lifestyle changes involving diet, behavior, and physical activity are the cornerstone of successful weight control. Incorporating meal replacements (1-2 per day) into traditional lifestyle interventions may offer an additional strategy for overweight patients in the primary care setting.

Methods: One hundred thirteen overweight premenopausal women (mean±SD age, 40.4±5.5 years; weight, 82±10 kg; and body mass index, 30±3 kg/m^2) participated in a 1-year weight-reduction study consisting of 26 sessions. The women were randomly assigned to 3 different traditional lifestyle-based groups: (1) dietitian-led group intervention (1 hour per session), (2) dietitian-led group intervention incorporating meal replacements (1 hour per session), or (3) primary care office intervention incorporating meal replacements with individual physician and nurse visits (10-15 minutes per visit).

Results: For the 74 subjects (65%) completing 1 year, the primary care office intervention using meal replacements was as effective as the traditional dietitian-led group intervention not using meal replacements (mean±SD weight loss, 4.3%±6.5% vs 4.1%±6.4%, respectively). Comparison of the dietitian-led groups showed that women using meal replacements maintained a significantly greater weight loss (9.1%±8.9% vs 4.1%±6.4%) (P=.03). Analysis across groups showed that weight loss of 5% to 10% was associated with significant (P = .01) reduction in percentage of body fat, body mass index, waist circumference, resting energy expenditure, insulin level, total cholesterol level, and low-density lipoprotein cholesterol level. Weight loss of 10% or greater was associated with additional significant (P = .05) improvements in blood pressure and triglyceride level.

Conclusions: A traditional lifestyle intervention using meal replacements can be effective for weight control and reduction in risk of chronic disease in the physician's office setting as well as in the dietitian-led group setting.

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RECENT SURVEYS have shown that Americans are getting heavier, with an estimated 97 million adults classified as overweight or obese.[1] Obesity fulfills the criteria of a chronic disease and is associated with considerable increases in morbidity and mortality. It is lifelong or lasts many years, is progressive and relapsing, and is associated with a wide range of comorbid conditions, including coronary heart disease, type 2 diabetes, hypertension, and dyslipidemia.[1] The direct cost of obesity is estimated to be almost 6% of our national health expenditure, but the relative costs and benefits of various approaches to control obesity are not available.[2]

The vast majority of the excess burden of overweight and obesity is in those subjects with a moderately high body mass index (BMI).[3] The traditional goal of therapy has been the reduction of a subject to "an ideal weight," a difficult task for those faced with this condition. However, new guidelines based on more recent evidence suggest that small weight losses (5%-10% of initial body weight) can improve obesity-related health complications.[1,3-8] In addition, the maintenance of modest reductions, even with partial weight regain, is frequently sufficient to sustain improvements in health,[9,10] particularly if healthy diets and increases in physical activity are maintained.

Physician recommendations have consistently been shown to exert a powerful influence on patient behavior.[11,12] Unfortunately, the health care community as a whole is not as active as it might be in the treatment of obesity as a chronic disease.[13,14] In a recent national survey, nearly 40% of women and 25% of men who were overweight or obese reported having ever received medical counseling about the adverse health consequences of increased

SUBJECTS AND METHODS

SUBJECTS

Overweight or obese premenopausal women aged 25 to 50 years with a BMI (calculated as weight in kilograms divided by the square of height in meters) between 25 and 35 were selected from a larger sample responding to media announcements and flyers distributed in the local community. After being screened by a telephone questionnaire, interested women attended a group orientation meeting, at which the objectives and protocols of the study were explained before written consent was obtained. Exclusion criteria included current chronic or psychological disease, abnormal serum laboratory values of clinical significance, or current hormone-replacement therapies. In addition, women were excluded who were pregnant, planning to become pregnant, lactating, or planning to move out of the area within the following year. Eligible women were scheduled for a 1-hour clinic assessment to determine their fasting serum chemistry, lipid, insulin, and glucose values; weight; height; BMI; waist circumference; body fat percentage, resting energy expenditure (kilocalories per 24 hours); blood pressure; dieting history; eating and activity habits; and psychosocial status. Only those subjects who obtained a medical release form signed by their physician were admitted to the study. There were no costs to subjects for assessment measures, lifestyle-modification materials, consultations (whether provided in the physician's office or in groups), or meal-replacement products. The University of Nevada Human Subjects Committee approved all procedures used in this study.

LIFESTYLE INTERVENTION

Subjects were randomly assigned to 1 of 3 interventions, as described below. All subjects attended a total of 26 sessions during the 1-year study and received instruction manuals that included lessons based on the Lifestyle, Exercise, Attitude, Relationships, and Nutrition (LEARN) Program for Weight Control.[21] At each session, 1 of 26 intervention lessons of the treatment manuals was distributed to subjects. Diet instruction included a low-calorie diet of approximately 1200 kcal/d (with no more than 30% of calories from fat) using the US Department of Agriculture food guide pyramid food groups and portion sizes to ensure adequate nutrients and a variety of foods. Activity instruction as a method of self-motivation included increasing energy expenditure by walking up to 10 000 steps a day as measured by a pedometer (Yamax Digi-Walker; Yamax Inc, Tokyo, Japan) that was supplied to each participant. Subjects completed homework assignments that recommended recording food intake and activity levels. There were 3 traditional lifestyle-based intervention groups:

Group 1: Traditional Dietitian-Led Intervention Group

Subjects in group 1 (n=37) attended small classes (8-10 subjects per class) led by a registered dietitian. A total of 26 one-hour sessions were held weekly for the first 3 months (introduction and 12 sessions), biweekly for the second 3 months (6 sessions), and monthly for the final 6 months (6 sessions and a 1-year session). The diet consisted of all meals and snacks prepared from self-selected conventional foods following 1200 kcal/d using the US Department of Agriculture food guide pyramid.

Group 2: Traditional Dietitian-Led Intervention Group Incorporating Meal Replacements

Similar to group 1, subjects in this intervention group (n=38) also attended small classes led by a registered dietitian, including the 26 sessions held on the same weekly, biweekly, and monthly schedule. This group followed similar self-selected diets; however, 2 of the 3 main meals (breakfast, lunch, or dinner) were replaced with meal-replacement shakes or meal-replacement bars (Slim·Fast; Slim·Fast Foods Co, West Palm Beach, Fla). Each liquid meal-replacement shake contained 220 kcal, 7 to 10 g of protein, 40 to 46 g of carbohydrates (of which 5 g was dietary fiber), and 1.5 to 3 g of fat, and was supplemented with 15% to 100% of the percentage of daily value for essential vitamins and minerals. Each meal-replacement bar contained 220 kcal, 8 g of protein, 33 to 36 g of

weight.[15] To encourage health providers to increase their involvement in obesity management, effective and practical lifestyle intervention options that can be delivered in a busy clinical setting are needed.[14,16] Recent reports indicate that meal replacements coupled with a low-calorie diet can offer an effective option for long-term compliance or improvements in metabolic risk factors in clinic patients.[17-20] These studies examined a meal-replacement intervention in a university-based clinic, in a community-based intervention program, or with minimal clinic intervention. The present study is the first randomized trial to compare the use of meal replacements in an established university-based weight loss clinic and a primary care physician practice.

This 1-year study was designed to address 2 main questions regarding diet and weight loss in moderately overweight and obese subjects. First, can a primary care physician implement a successful long-term lifestyle change using meal replacements within the time constraints existing in the general office practice of medicine? Second, can a traditional lifestyle-modification program administered by a registered dietitian using a meal-replacement strategy be as effective as the same program using a standard food plan exchange strategy? A further aim of this study was to evaluate the potential health benefits of sustained weight loss for specific chronic disease risk factors associated with the moderately overweight and obese.

RESULTS

WEIGHT AND RISK FACTOR COMPARISONS BY INTERVENTION GROUP

The body weight results were evaluated for those subjects who completed the 1-year study (74/113 [65%]), as well as for all 113 subjects enrolled. This second evalua-

carbohydrates, 5 g of fat, and 2 g of dietary fiber, and was supplemented with 25% to 35% of the percentage of daily value for essential vitamins and minerals.

Meal-replacement shakes were supplied through coupons that the subjects redeemed at local stores, while meal-replacement bars were distributed at scheduled group sessions.

Group 3: Primary Care Office Intervention Incorporating Meal Replacements With Individual Physician and Nurse Visits

Subjects in this intervention group (n=38) met with a primary care physician or a registered nurse at intervals similar to those routinely prescribed for other types of long-term medical care. The focus of these brief visits was to help the patients achieve their weight goal, although related medical problems were also addressed. During the study, the patients were seen by the same physician (for two thirds of the visits) and the same registered nurse (for one third of the visits), both of whom were practitioners in our university outpatient practice. Biweekly visits (26 sessions) lasted 10 to 15 minutes (approximately equal time with each subject) for a year, so that the total number of sessions was the same as for groups 1 and 2. The diet prescription in this group was identical to that for group 2, using self-selected diets with meal-replacement shakes and bars. During the structured physician or nurse visits, each subject's progress was reviewed, including diet, behavior modification, and physical activity habits. Any brief questions about the LEARN-based instruction manual lessons were addressed. These subjects received no further counseling during the year.

Subjects in groups 2 and 3 who reached their goal weight (a loss of 10% of initial body weight) were instructed to replace 1 of 3 main meals each day with a meal-replacement shake or bar. If a subject regained weight, she was instructed to reinitiate the 2-meal–replacement plan until she lost the regained weight.

DEPENDENT MEASURES

Milestone measures were taken at baseline and 1 year and included weight, height, waist circumference, skinfolds, resting energy expenditure, and blood pressure. Certified technicians took blood pressure and body measurements. Fasting blood was taken to measure serum lipid levels (total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, triglyceride levels) and glucose and insulin levels. Blood values were analyzed by standard methods at a statewide certified clinical laboratory (Laboratory Corporation of America, Reno, Nev). Weight measurements (to the nearest 0.1 kg) were taken using the study's calibrated balance beam scale with patients dressed in light clothing without shoes; height measurements (to the nearest 0.10 cm) were taken using a mounted wall stadiometer; and BMI was calculated. Waist circumference was measured at the narrowest point of the torso (to the nearest 0.5 cm) using a nonstretchable tape measure. Skinfolds (triceps, thigh, and superior iliac crest) were measured (to the nearest 0.1 mm) with a Lange caliper (Cambridge Scientific Industries, Cambridge, Md) and used to calculate percentage of body fat.[22] Twenty-four–hour resting energy expenditure (kilocalories) was estimated from a 20-minute respiratory sample in fasting subjects using a ventilated canopy hood by indirect calorimetry as previously reported[23] (Sensor Medics, Anaheim, Calif). Blood pressure was measured on the right arm using a mercury-column manometer to the nearest millimeter of mercury after the fasting subject had been seated quietly for 5 minutes.

STATISTICS

All data are presented as mean±SD. The primary dependent variable, weight change, was examined by 1-way analysis of variance with subsequent a priori analyses using contrasts for completers and for all subjects by intent to treat (last observation carried forward). Secondary dependent variables, percentage of weight loss from initial body weight, total cholesterol level of 220 mg/dL or greater (≥5.7 mmol/L), and systolic/diastolic blood pressure of 140/90 mm Hg or greater were recoded into dichotomous variables (collapsing across the 3 intervention conditions). The mean differences for these variables were assessed with independent *t* tests. The SPSS statistical package (version 7; SPSS Inc, Chicago, Ill) was used to analyze the data for statistical significance.

tion followed the standard approach of intent to treat with the last observation carried forward and provides an analysis of the programs, taking into account those individuals who were not successful in completing the program.

Subjects Completing the 1-Year Study

Of the 113 initial female subjects who met the inclusion criteria and agreed to be randomly assigned to study groups, 74 (65%) completed the 1-year study. Baseline characteristics of the 3 treatment groups are shown in **Table 1**. There were no significant differences among the baseline parameters by treatment group. Retention rates among the 3 treatment groups were similar: ie, group 1, n=23; group 2, n=26; group 3, n=25. Older subjects were more likely to remain in the study ($t=2.425$; $P=.02$), as were those with a higher initial percentage of body fat ($t=3.652$; $P<.001$). Other baseline characteristics did not differ between those subjects who chose to remain in the study and those who chose to leave.

Weight change and the percentage of weight lost for the subjects who completed the 1-year study are shown in **Table 2**. Subjects in group 2 (n=26) had lost significantly more weight than those in either group 1 (n=23; $P=.03$) or group 3 (n=25; $P=.03$) at 1 year. Subjects in group 2 showed a mean±SD loss of 7.7±7.8 kg (9.1%±8.9% of initial body weight), whereas subjects in group 1 and group 3 lost 3.4±5.4 kg (4.1%±6.4% of initial body weight) and 3.5±5.5 kg (4.3%±6.5% of initial body weight), respectively. Table 2 also shows that there was a significant decrease in BMI in group 2 compared with group 1 ($P=.02$).

All Subjects Enrolled in the Study (Intent to Treat)

Year-end changes in weight were also examined in the intent-to-treat model. This analysis included all sub-

Table 1. Baseline Characteristics*

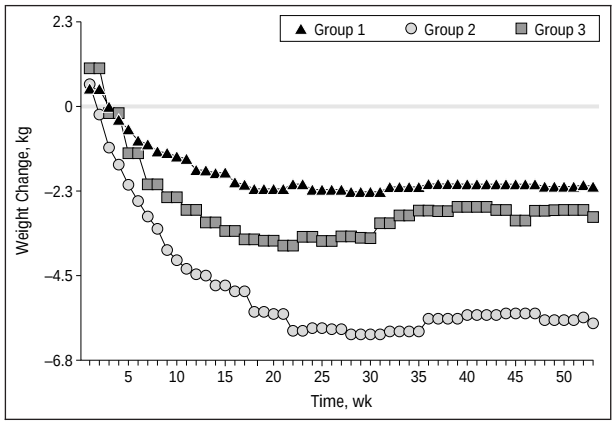
Variable	Group 1 (n = 23)	Group 2 (n = 26)	Group 3 (n = 25)	All Groups (N = 74)
Age, y	42.3 ± 4.1	41.0 ± 4.3	41.0 ± 5.7	41.4 ± 4.7
Weight, kg	82.9 ± 9.1	83.5 ± 9.5	83.2 ± 11.0	83.2 ± 9.8
BMI, kg/m^2	29.9 ± 2.6	30.1 ± 2.9	30.1 ± 3.7	30.0 ± 3.1
Body fat, %	38.4 ± 5.2	38.4 ± 3.9	36.7 ± 5.4	37.8 ± 4.9
Waist circumference, cm	93.7 ± 8.0	93.7 ± 8.3	92.8 ± 9.6	93.4 ± 8.6
REE, kcal/24 h	1561 ± 153	1586 ± 193	1608 ± 267	1586 ± 209
Systolic blood pressure, mm Hg	124 ± 12	123 ± 17	117 ± 12	121 ± 14
Diastolic blood pressure, mm Hg	70 ± 8	71 ± 10	70 ± 10	70 ± 9
Glucose, mg/dL (mmol/L)	87.7 ± 7.4 (4.87 ± 0.41)	87.7 ± 8.8 (4.87 ± 0.49)	83.1 ± 7.4 (4.61 ± 0.41)	86.1 ± 8.1 (4.78 ± 0.45)
Insulin, µIU/L	2.1 ± 1.6	1.7 ± 1.0	1.7 ± 0.7	1.8 ± 1.1
Total cholesterol, mg/dL (mmol/L)	189.2 ± 35.5 (4.90 ± 0.92)	207.3 ± 32.0 (5.37 ± 0.83)	204.2 ± 41.3 (5.29 ± 1.07)	200.8 ± 36.7 (5.20 ± 0.95)
Triglycerides, mg/dL (mmol/L)	110.6 ± 56.7 (1.25 ± 0.64)	128.3 ± 68.1 (1.45 ± 0.77)	123.0 ± 64.6 (1.39 ± 0.73)	121.2 ± 63.7 (1.37 ± 0.72)
HDL-C, mg/dL (mmol/L)	54.1 ± 12.4 (1.40 ± 0.32)	56.4 ± 15.4 (1.46 ± 0.40)	53.3 ± 11.2 (1.38 ± 0.29)	54.4 ± 13.1 (1.41 ± 0.34)
LDL-C, mg/dL (mmol/L)	112.7 ± 33.2 (2.92 ± 0.86)	125.5 ± 28.6 (3.25 ± 0.74)	126.3 ± 32.8 (3.27 ± 0.85)	121.6 ± 31.7 (3.15 ± 0.82)

*All values are mean ± SD. There were no significant differences among the 3 groups. BMI indicates body mass index; REE, resting energy expenditure; HDL-C, high-density lipoprotein cholesterol; and LDL-C, low-density lipoprotein cholesterol.

Table 2. Year-End Changes in Weight and Anthropometrics*

Variable	Group 1 (n = 23)	Group 2 (n = 26)	Group 3 (n = 25)	All Groups (N = 74)
Actual weight change, kg	−3.4 ± 5.4	−7.7 ± 7.8†	−3.5 ± 5.5	−5.0 ± 6.6
% Weight change	−4.1 ± 6.4	−9.1 ± 8.9†	−4.3 ± 6.5	−5.9 ± 7.6
BMI, kg/m^2	−1.0 ± 2.0	−2.5 ± 2.7‡	−1.3 ± 2.0	−1.6 ± 2.3

*All values are mean ± SD.
†P = .03 compared with groups 1 and 3.
‡P = .02 compared with group 1.



Changes in initial body weight over time (N=113).

jects (n=113) enrolled in the study, whether or not they completed the 1-year intervention. Results calculated with the last weight value carried forward are shown in the **Figure**. In this analysis, there was a significant difference in weight loss and percentage weight loss between group 1 and group 2 (P=.008). Subjects in the groups using meal replacements tended to have lost more weight at 1 year, with those in group 2 losing the most weight. Those in group 2 lost, on average, 3.7 kg more than those in group 1 (P=.008) and 3.0 kg more than those in group 3 (P=.04). Thus, we drew similar conclusions from this intent-to-treat analysis, although they were not of the same magnitude as for the patients who completed the 1-year study.

PERCENTAGE WEIGHT LOSS AND RISK FACTOR IMPROVEMENT

Percentage Weight Loss Groups

To evaluate the reduction in chronic disease risk within levels of weight loss, a secondary variable analysis was done using subgroups of subjects who had lost weight in selected ranges after the 1-year study (59/74), regardless of intervention group assignment. The first variable included those subjects who had lost 5% or less of their initial body weight (n=20); the second variable included those who had lost 5% to 10% of their weight (n=22); and the third variable included those who had lost 10% or more of their weight (n=17)(**Table 3**). A loss in initial body weight of more than 5% was associated with significant decreases in body fat, BMI, waist circumference, resting energy expenditure, plasma insulin level, total cholesterol level, and low-density lipoprotein cholesterol level ($P \leq .05$). In addition, subjects with weight loss of more than 10% had significantly greater decreases in systolic and diastolic blood pressure and plasma triglyceride level ($P \leq .05$).

Cholesterol and Blood Pressure Changes

The data from subgroups of subjects at high risk for cardiovascular disease based on baseline total cholesterol level or blood pressure were also analyzed to determine the associations between 1-year changes and weight loss, regardless of intervention group assignment. For the 25 subjects who had a baseline total cholesterol level of 220 mg/dL or greater (≥5.7 mmol/L), the difference between baseline and 1 year was significant (P=.001), with a mean reduction of 24.7±30.9 mg/dL (0.64±0.80 mmol/L). For these higher-risk subjects, the improvements in risk factors corresponded to a mean±SD percentage weight loss of 4.1%±7.3%. For the 9 subjects who had a baseline systolic blood pressure of 140 mm Hg or

Table 3. Change in Associated Risks Between Baseline and Year 1 by Percentage Weight Loss*

Variable	Weight Loss		
	0%-5% (n = 20)	5%-10% (n = 22)	≥10% (n = 17)
Body fat, %	−2.0 ± 4.5	−3.3 ± 4.1†	−9.7 ± 4.0†
BMI, kg/m^2	−0.52 ± 0.73†	−2.1 ± 0.76†	−4.7 ± 2.0†
Waist circumference, cm	−1.6 ± 2.4†	−4.9 ± 3.6†	−14.8 ± 4.9†
REE, kcal/24 h	−44 ± 172	−158 ± 102†	−211 ± 194†
Systolic blood pressure, mm Hg	2 ± 7	−6 ± 15	−11 ± 13†
Diastolic blood pressure, mm Hg	1 ± 7	−2 ± 9	−4 ± 6†
Glucose, mg/dL (mmol/L)	3.4 ± 6.3 (0.19 ± 0.35)‡	0.4 ± 7.2 (0.02 ± 0.40)	−0.5 ± 8.5 (−0.03 ± 0.47)
Insulin, µIU/mL	−0.07 ± 0.78	−0.68 ± 0.65†	−0.65 ± 0.95‡
Total cholesterol, mg/dL (mmol/L)	2.3 ± 20.8 (0.06 ± 0.54)	−20.5 ± 33.6 (−0.53 ± 0.87)†	−21.2 ± 22.8 (−0.55 ± 0.59)†
Triglycerides, mg/dL (mmol/L)	6.2 ± 45.1 (0.07 ± 0.51)	−4.4 ± 60.2 (−0.05 ± 0.68)	−29.2 ± 42.5 (−0.33 ± 0.48)‡
HDL-C, mg/dL (mmol/L)	−1.2 ± 7.7 (−0.03 ± 0.20)	−0.2 ± 8.9 (−0.004 ± 0.23)	1.5 ± 10.0 (0.04 ± 0.26)
LDL-C, mg/dL (mmol/L)	2.3 ± 18.1 (0.06 ± 0.47)	−17.4 ± 26.7 (−0.45 ± 0.69)†	−17.0 ± 22.0 (−0.44 ± 0.57)†

*All values are presented as mean ± SD. BMI indicates body mass index; REE, resting energy expenditure; HDL-C, high-density lipoprotein cholesterol; and LDL-C, low-density lipoprotein cholesterol.
†$P \leq .05$.
‡$P \leq .01$.

greater (only 1 subject had a baseline diastolic blood pressure ≥90 mm Hg), the difference between baseline and 1 year was significant ($P = .02$), with a mean±SD reduction of 13.0±16.4 mm Hg. For these higher-risk subjects, this difference corresponded to a mean percentage weight loss of 11.0%±9.8%.

COMMENT

The brief primary care physician intervention incorporating meal replacements achieved the same result as the dietitian-directed traditional group intervention without meal replacements. In the 2 dietitian-led traditional groups, the women using meal replacements maintained a greater weight loss. Thus, the incorporation of a meal replacement into a traditional lifestyle intervention was an independent contributor to the outcomes.

It has been shown previously that meal replacements are an effective strategy for the long-term maintenance of weight loss as well as the promotion of greater short-term weight loss compared with a traditional reduced-calorie diet regimen.[17,18] Using a pharmacotherapeutic combination of fenfluramine and phentermine in a group of patients treated with traditional group behavior modification or brief structured physician visits, Wadden et al[24] demonstrated significant and equivalent weight loss in both groups. These findings indicate that physicians can promote successful weight loss using pharmacological interventions. The present study is the first attempt that incorporates long-term use of meal replacements with a lifestyle intervention in a primary care practice and in a traditional dietitian-led group weight control program.

The main finding in our study was that the primary care physician can lead a successful lifestyle intervention for weight control with the appropriate tools, ie, meal-replacement strategies and the LEARN manual. This study extends the medical literature by suggesting that physicians can address overweight and obese subjects in primary care in a way similar to that used for other chronic disease risk factors. The Institute of Medicine of the National Academy of Sciences has proposed that successful weight loss be defined as the reduction in initial body weight of 5% or more and the maintenance of this loss for at least 1 year.[9] Subjects in the traditional behavioral weight control program lost 3.4±5.4 kg (4.1%±6.4% of body weight) over 52 weeks, whereas subjects provided with meal replacements in addition to the traditional lifestyle program further improved their outcome, with an average weight loss of 7.7±7.8 kg (9.1%±8.9% weight loss), meeting the established Institute of Medicine guidelines. However, although the main findings of this study are both statistically and clinically significant, the conclusions drawn may overstate the results since they are based on completers, 65% of the initial group. Our second analysis using the intent-to-treat model may also overestimate the degree of success, because it is commonly assumed that individuals who drop out of a weight-control program do so because they regain the weight. While this may be true in many instances, a recent study using meal replacements reported that 22 (47%) of 47 subjects who had dropped out of a 4-year study between 6 months and 27 months were reweighed and found not to have regained the weight.[18]

Physicians often have the first opportunity to encourage weight control and primary prevention. Their clinical offices are the mainstay for treatment of obesity-related comorbid conditions.[12,15,25,26] However, there remains considerable resistance on the part of many practitioners to become actively involved with overweight and obese patients despite the rapid increase in prevalence.[13,27] The reasons for this reluctance are varied, but include perceptions of the causes of obesity, lack of training, insufficient office time to deal with the difficulties patients face, limited staff support, difficulty with insurance coverage, and the perceived poor long-term success rate.[13,25,27]

In our study, with intensive lifestyle modification and group support, subjects in the physician-led group and the traditional behavior modification group lost similar amounts of weight (3.4±5.4 vs 3.5±5.5 kg, respectively). This finding is particularly encouraging, since the markers for disease risk were improved in many

patients. The time required for weight management by the physician was minimal and was patterned after the usual clinic visit. Patients were able to educate themselves with written materials at their own pace but were also able to discuss key concerns with the physician. This personal advice provided by the physician has been shown to provide a priming effect to help the patient make appropriate lifestyle changes.[26]

The significance of maintaining a healthy weight has been well established.[1,8,10] Being overweight or obese is associated with the development of a myriad of chronic diseases[1] that, with the attainment and maintenance of a modest weight loss, can be significantly improved.[1,8,17,18] An extensive review[1] of the causes of obesity led a National Institutes of Health expert panel to conclude that significant improvements in disease risk could be attained with moderate weight loss (5%-10% reduction in initial weight). Abnormal metabolic changes are not uniformly present in overweight individuals, and small numbers of moderately overweight women, as a group, may not show a significant mean change in the biomarkers measured. However, stratifying the patients in this study into specific weight loss categories clearly demonstrated an improving health profile with increasing weight loss regardless of treatment modality. Furthermore, the stratification of subjects into groups with abnormally high initial biomarkers showed the value of weight loss in improving the markers. Significant improvements in lipid and lipoprotein levels were most apparent in those patients with cholesterol blood levels of 220 mg/dL or greater (≥5.7 mmol/L) and in those experiencing a weight loss greater than 5%. Blood pressure improvement in this population was more sensitive and was significantly improved with a weight loss of 10% or more of initial body weight.

In conclusion, effective approaches are needed for changes in weight loss to reduce the risks of morbidity and mortality. This study demonstrates that weight loss can be achieved using lifestyle counseling incorporating meal-replacement strategies. For the physician, lifestyle counseling with meal replacement provides a useful tool that allows easy explanation and has demonstrated efficacy with patients. Although carried out in a university outpatient setting, this study was designed to evaluate a meal-replacement paradigm in the typical busy physician's office practice. Family practitioners should undertake a similar program to deal with overweight and obese patients in their practice. In addition, meal replacements can improve the magnitude of weight loss in a traditional dietitian-led group intervention that includes multiple sessions to promote changes in food selection, suggestions for increasing physical activity, and appropriate behavior changes.

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