Behavior therapy for obesity: where are we now?

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Purpose of review

To describe the short-term and long-term results of lifestyle modification for obesity.

Recent findings

Randomized controlled trials, which compared different diet and activity interventions were reviewed. Studies that investigated the efficacy of new technologies to provide lifestyle modification, such as web-based delivery, also were examined.

Summary

In general, comprehensive lifestyle modification programs delivered in person induce a loss of approximately 10% of initial weight in 16–26 weeks of treatment. The use of portion-controlled diets, which typically involve the use of meal replacement products, was associated with significantly larger weight losses in the short term. In contrast, interventions delivered via the Internet induced a loss of approximately 5%. However, web-based programs appear to have potential in facilitating the continuation on patient-provider contact, which along with high levels of physical activity, appear to be key strategies for successful long-term weight control. Recent studies also have suggested that the combination of lifestyle modification with long-term use of pharmacotherapy holds promise for maximizing initial weight losses and promoting long-term maintenance.

Keywords

behavioral weight control, diet, maintenance of lost weight, physical activity, weight loss

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Introduction

Lifestyle modification is the cornerstone of treatment for overweight and obese individuals [1–3]. Used interchangeably with the terms behavioral treatment or behavioral weight control, lifestyle modification encompasses three core components, namely diet, physical activity, and behavior therapy (a set of principles and techniques to help patients replace maladaptive behaviors with new eating and activity habits) [4].

Selecting a treatment approach

Lifestyle modification is the cornerstone for any weight loss treatment. Although lifestyle modification is the first line of treatment for overweight individuals (BMI $>25\,kg/m^2$), pharmacotherapy is recommended as an adjunct treatment for obese individuals (BMI $>30\,kg/m^2$) or for those with a BMI of at least $27\,kg/m^2$ with obesity-related comorbid conditions. Bariatric surgery is currently reserved for individuals with a BMI of at least $40\,kg/m^2$ (or $>35\,kg/m^2$ with comorbidities) who have failed previous treatment [3] (Table 1).

Traditional lifestyle modification programs for weight management typically include weekly sessions for an initial period of 16–26 weeks [5]. Treatment is often provided in 60–90-min sessions to groups of 10–20 individuals by registered dieticians, behavioral psychologists, exercise physiologists, or other health professionals [5]. A structured curriculum with weekly homework assignments is commonly used. Self-monitoring of food intake and energy expenditure, as well as regular weighing provide patients with feedback on their targeted behavior and an opportunity to modify these behaviors as appropriate [6].

In general, participation in a lifestyle modification program results in a weight loss of 7–10% [7], which confers significant health benefits. In numerous studies [8,9], regular self-monitoring of food intake and weekly weighing have been associated with larger weight losses.

Several large clinical trials have provided strong evidence for the efficacy of lifestyle intervention for the prevention and treatment of type 2 diabetes. In the Diabetes Prevention Program (DPP), 3200 overweight and obese

Table 1 A guide to selecting treatment

Treatment	BMI category (kg/m^2) 25–26.9	27–29.9	30–34.9	35–39.9	≥40
Diet, physical activity, and behavior therapy	With comorbidities	With comorbidities	+[a]	+	+
Pharmacotherapy		With comorbidities	+	+	+
Surgery				With comorbidities	+

Reproduced with permission [3].
[a] The '+' represents the use of indicated treatment regardless of comorbidities.

participants (mean BMI of 34 kg/m^2) with impaired glucose tolerance were randomly assigned to one of the three treatment conditions: placebo, metformin, or lifestyle intervention designed to achieve a loss of 7% of initial body weight [10]. After an average treatment duration of 2.8 years, weight losses were 0.1, 2.1, and 5.6 kg, respectively. More importantly, the risk of progression to type 2 diabetes was reduced by 58% in the lifestyle intervention compared with placebo and by 31% compared with metformin.

The Look Action for Health in Diabetes (Look AHEAD) study, a long-term randomized controlled trial that includes 5145 overweight patients with type 2 diabetes, builds on the results of the DPP. Look AHEAD was designed to assess whether weight reduction, in combination with increased physical activity, reduces cardiovascular morbidity and mortality in participants with type 2 diabetes. Participants were randomized to two conditions: intensive lifestyle intervention (ILI), which includes group and individual meetings, or to a diabetes support and education (DSE) condition. At the end of 12 months, participants assigned to ILI lost 8.6% of their initial weight versus 0.7% in the DSE group ($P < 0.001$). Mean hemoglobin A1c (HbA1c) decreased from 7.3 to 6.6% in the ILI group versus from 7.3 to 7.2% in the DSE condition. These two studies, with others, provide strong evidence of the health benefits of a 5–10% reduction in initial weight [1–3,11,12].

Dietary approaches in lifestyle modification

Most lifestyle modification programs utilize a high carbohydrate, low-fat diet. Other dietary approaches have been used to produce greater initial weight losses, which are highly desirable to patients [13,14].

Meal replacements

Very low calorie diets (VLCDs) have, in recent years, been largely replaced by diets providing 900–1500 kcal/day, which use meal replacement bars, cereals, and preprepared entrees. The use of meal replacements appears to be superior to isocaloric diets composed of conventional foods [15]. Meal replacements also have been used for overweight adults with type 2 diabetes, who experienced a significantly greater weight loss at 1-year compared with individuals on a diet of conventional foods [16].

Portion-controlled servings of conventional foods

The regular use of portion-controlled servings of conventional foods also improves weight loss. Individuals who were prescribed a diet of 1000 kcal/day, and were provided with the actual foods for five breakfasts and five dinners a week, lost significantly more weight at 6, 12, and 18 months than those who were prescribed the same number of calories but consumed a diet of self-selected table foods [17]. Several other studies [18–22] have shown the benefits of using prepackaged, portion-controlled meals, including frozen-food entrees.

Low-carbohydrate, high-fat diets

Low-carbohydrate diets (50–100 g of carbohydrate daily without restrictions in fat or caloric intake) are associated with rapid weight loss. Several short-term studies [23–27] have demonstrated superior weight loss and significant reductions in triglycerides and glycemic indices among both diabetic and nondiabetic participants who followed a low-carbohydrate diet compared with those assigned to a low-fat diet. However, longer duration studies (up to 12 months) have consistently shown that weight loss is not maintained in the low-carbohydrate group, and by 12 months, weight change is equivocal between dietary groups [27]. A recent 2-year trial [28•] found no difference in weight loss among four groups assigned to isocaloric diets of varying carbohydrate and fat content.

Low-glycemic index diets

Low-glycemic index diets are popular, but research so far has not shown evidence of positive effect on weight loss [29•]. The glycemic index of a food is calculated by measuring the change in blood glucose following consumption of 50 g of the target food compared with an equal amount of a control food (e.g., white bread and glucose) [30].

Low-glycemic index diets may be associated with greater reductions in cardiovascular risk factors such as low-density lipoprotein (LDL) cholesterol than a

high-glycemic index diet [31,32]. A meta-analysis [33] similarly showed that low-glycemic index diets were associated with significantly greater reductions in HbA1c or fructosamine (glycated proteins) than were high-glycemic index diets. Low-glycemic index and/or low-glycemic load diets also are associated with a reduced risk of certain chronic diseases such as diabetes and heart disease [34•]. Although glycemic index measures the ability of the carbohydrates in a food to increase blood sugar levels, the glycemic load concept also takes quantity into account. The glycemic index of a food multiplied by the amount of carbohydrate in a typical serving of that food equals glycemic load. Glycemic load might more accurately predict how blood sugar is affected by the intake of a certain food. For example, raw carrot has a high glycemic index; however, a normal portion of carrots contains very few carbohydrates, and thus glycemic load would be low.

In summary, several dietary options can be incorporated into lifestyle modification programs. Personal preference should dictate the choice of the dietary intervention, as adherence level rather than diet type appears to be the key determinant of weight loss [35]. Low-carbohydrate and/or low-glycemic index diets appear to be of particular benefit to obese individuals with type 2 diabetes.

Physical activity in lifestyle modification

Physical activity to increase energy expenditure is another central component of lifestyle modification program. Overweight and obese individuals can increase their energy expenditure in two ways, that is, with programmed or lifestyle activity [36]. Programmed activity is completed in a discrete period of time (i.e., 30–60 min) at a relatively high-intensity level (i.e., 60–80% of maximum heart rate). Examples of programmed activity include jogging, biking, or swimming. Lifestyle activity, by contrast, involves increasing energy expenditure throughout the course of the day, without concern for the intensity or duration of the activity [37]. Patients can increase their lifestyle activity by parking further away from store entrances or taking stairs rather than escalators. The energy expenditure associated with such events may amount to 300 kcal/day, the equivalent of walking 3 miles [37].

Physical activity alone (in the absence of reduced caloric intake) is of limited benefit in inducing weight loss [4] but is critical for long-term weight maintenance [38–41]. To achieve optimal long-term weight control, patients are encouraged to exercise at moderate intensity of 60–90 min/day [42]. Additionally, physical activity confers cardiovascular benefits and may decrease the risk of obesity-related mortality [43,44].

Long-term weight maintenance

Weight regain is a problem following virtually any type of weight loss intervention [45]. Patients treated by lifestyle modification for 20–30 weeks typically regain about 30–35% of their lost weight in the year following treatment. Weight regain slows after the first year, but more than 50% of patients are likely to have returned to their baseline weight by 5 years [46]. Several mechanisms may contribute to weight regain. Compensatory physiological responses to weight loss include reductions in resting energy expenditure [47], decreased leptin (anorexigenic) secretion [48], and increased ghrelin (orexigenic) secretion [49]. These responses protect humans against the adverse effects of starvation, which the body cannot distinguish from intentional dieting [50]. In addition, once patients leave weight loss treatment, they are confronted daily by an environment that explicitly encourages them to consume large quantities of foods, high in fat and sugar, and is filled with time-saving devices that indirectly limit physical activity [51•].

Data from the National Weight Control Registry (NWCR), which include individuals who have successfully maintained a weight loss of at least 30 lbs for at least 1 year, reveal that weight maintenance is associated with the continued application of behavioral modification techniques. Members of the NWCR report eating a low-fat, reduced calorie diet (approximately 1400 kcal/day) while engaging in high levels of physical activity [40]. Other studies [52,53] have underscored the importance of regular self-weighing as a strategy for successful weight maintenance.

Long-term onsite treatment

In conjunction with sustained physical activity, continued patient-provider contact appears to be critical in helping individuals to achieve long-term weight control [46]. These weight maintenance sessions provide participants with the support and motivation needed to continue to practice weight control behaviors, which include regularly monitoring food intake, physical activity, and body weight [8,40,54]. Despite these benefits, long-term, face-to-face lifestyle modification has limitations; principally, it appears to delay rather than to prevent weight regain [8].

Electronically provided treatment

As it is difficult for some individuals to attend frequent onsite sessions, several studies have evaluated the electronic delivery of behavioral treatment for both induction and maintenance of weight loss. In a 12-month randomized trial [55] of 92 obese participants at risk for diabetes, the addition of weekly e-mail counseling to a

basic Internet weight loss intervention program induced a significantly greater weight loss. In the Study to Prevent (STOP) Regain study [53], 314 participants who had lost 19.3 kg in the preceding 2 years were randomly assigned to one of the three treatment conditions: control, face-to-face intervention, and an Internet-based intervention. At 18 months, there were no significant differences in weight regain between the face-to-face group and the Internet group (although the face-to-face group regained less weight). The efficacy of an Internet-based intervention was also evaluated in the Weight Loss Maintenance study, in which 1032 overweight or obese participants who had lost at least 4 kg during a 6-month weight loss intervention were randomly assigned to one of the three conditions for 30 months: monthly personal contact, unlimited access to an interactive technology-based intervention, or a self-directed control group. Although individuals in all three groups were able to maintain some of the weight that they lost, those who received personalized contact maintained significantly greater weight losses than the other two treatment groups 24 and 30 months later [56].

Combining lifestyle modification and pharmacologic approaches to weight loss and weight maintenance

Long-term use of weight loss medications, which alter internal signals that regulate hunger and/or satiation or cause nutrient malabsorption, provides another option for weight maintenance and may augment lifestyle approaches [57,58]. Two weight loss medications, sibutramine (Meridia; Abbott Laboratories, North Chicago, Illinois, USA) and orlistat (Xenical; Roche Laboratories, Burlington, North Carolina, USA), currently are approved by the Food and Drug Administration for long-term usage. Despite their distinctly different mechanisms of action and side-effect profiles, the medications produce approximately equivalent weight losses of 7–10% of initial weight after 1 year of treatment [57]. In conjunction with weight loss, pharmacotherapy for obesity confers significant benefits in improving metabolic outcomes and reducing cardiovascular risk factors [59]. Both medications also have been shown to facilitate the maintenance of lost weight over a 2-year period [60–65].

The combination of lifestyle modification (which helps patients to control the external food environment) and pharmacotherapy induces the greatest short-term and long-term weight losses [66]. A 12-month randomized trial [67] found that participants who were assigned to sibutramine along with intensive lifestyle modification counseling lost significantly more weight than those who received sibutramine alone, lifestyle counseling alone, or sibutramine along with brief lifestyle counseling delivered by a primary care provider. In another randomized trial, participants received sibutramine for 6 months, combined with lifestyle intervention of various intensity. The participants who had high-frequency contact with a counselor either face-to-face or on the telephone lost significantly more weight than those who had low-frequency face-to-face contact, high-frequency e-mail contact, or no contact with a counselor [68•].

Lifestyle modification after bariatric surgery

Bariatric surgery appears to be the most effective treatment for severe obesity. Unfortunately, approximately 20–30% of patients fail to reach the typical postoperative weight loss or begin to regain large amounts of weight within the first few postoperative years [69,70]. Suboptimal results are typically attributed to poor adherence to the postoperative diet or a return of maladaptive eating behaviors rather than surgical reason [71–73].

Success after bariatric surgery requires regular follow-up. Postoperative visits can be used not only to monitor patients' weight loss but also to counsel patients on issues related to dietary adherence and eating behavior, which are often forgotten after surgery [74–76]. More frequently scheduled follow-up in a bariatric surgery program provides an opportunity to incorporate many of the lifestyle modification strategies detailed above and could positively impact outcomes following bariatric surgery.

Conclusion

Comprehensive programs of lifestyle modification for obesity and overweight are effective in inducing and maintaining losses of approximately 10% of initial weight. Losses of this size are associated with the prevention and amelioration of obesity-related health complications, including type 2 diabetes and hypertension. The combination of lifestyle modification and pharmacotherapy appears to hold great promise in producing even larger weight losses, and several studies of this issue are currently in progress.

The greatest challenge for lifestyle modification is long-term maintenance. Increasing patient-provider contact, either through in-person visits or telephone, e-mail as well as web-based contact, provides an opportunity to promote successful weight maintenance in the face of the challenges of the toxic food environment.

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