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Behavioral weight loss: A promising treatment for obesity in adults with HIV

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Abstract

Obesity and chronic disease are growing problems among people living with HIV (PLWH) across the globe. While a variety of treatments have been developed to address cardiovascular and metabolic disease among PLWH, few treatments have focused on helping PLWH and obesity lose weight. In the general population, behavioral weight loss interventions (i.e., diet, physical activity, and behavior therapy) are the first-line treatment for adults for whom weight loss is recommended. However, little research has tested whether the benefits of these programs translate to PLWH. This paper highlights the key components of behavioral weight loss programs, their outcomes in the general population and in the few studies of PLWH, and suggestions for tailoring these programs for PLWH. Behavioral weight loss programs are a strong potential treatment for reducing the burden of obesity among PLWH and merit future research attention.

Keywords

diet; physical activity; weight loss programs; cardiovascular disease; HIV

The Growing Problem of Obesity Among Adults with HIV

Historically, HIV infection has been associated with “wasting”, or uncontrolled weight loss. While modern antiretroviral therapies (ART) have improved HIV treatment and extended the lifespan of people living with HIV (PLWH), this group now faces a new problem: rising rates of obesity and chronic disease (1). Obesity (i.e., body mass index > 30kg/m^2) has become increasingly common among PLWH in both developing countries (2-4) and in high-resource settings like the U.S. (5, 6). In fact, the prevalence of obesity among PLWH in the

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U.S. (20-31%) now matches the prevalence in the general population (5, 7). PLWH also have higher rates of obesity-related comorbidities than adults without HIV (5, 8-10). For example, type 2 diabetes (T2DM) has been diagnosed in 14% of PLWH on ART and 7% of PLWH not on ART, compared to 5% of adults without HIV (11, 12). PLWH are also nearly 2 times more likely to have cardiovascular disease (CVD), hypertension, and a myocardial infarction than adults without HIV (13, 14).

These increasing chronic disease rates among PLWH are likely related to some combination of the effects of ART, HIV-related inflammation, and traditional risk factors (e.g., inactivity, diet, genetics) (1, 6, 15). Compared to adults without HIV, PLWH also have poorer diet quality, greater rates of food insecurity, and are less likely to meet global physical activity recommendations (16-18). ART medication, though life-saving, has also been associated with metabolic dysregulation and, in some cases, weight gain (15, 19). Independent of ART, PLWH and obesity have 4.5 times greater risk of developing T2DM compared to PLWH of normal and overweight (20). Having obesity and HIV also magnifies risk for metabolic syndrome (9), hypertension (21), and CVD (22), consequences that may result from the compounded inflammatory effects of obesity and HIV.

Despite the serious health consequences of obesity for PLWH, few obesity treatments have been tested in this population (23). In the general population, behavioral weight loss interventions (i.e., lifestyle interventions) that focus on changing diet, exercise, and teaching behavioral strategies are recommended as the first-line treatment for adults for whom weight loss is recommended (24). To date, most lifestyle interventions for PLWH have focused on treating wasting (pre-ART era), lipodystrophy (early ART era) or CVD risk factors (modern era), but few have focused on weight loss per se (25-28). While many of these programs improve cardiovascular health, they have limited effects on body weight, leaving obesity largely unaddressed among PLWH.

It is critical to shift attention to developing interventions that focus on weight loss for PLWH and obesity for 2 major reasons. First, as reviewed above, obesity is a growing problem with urgent health consequences in PLWH (2, 6, 7), and research in the general population demonstrates the long-term health benefits of even modest weight loss for adults with obesity (24). Second, weight loss may be an important priority for PLWH and obesity. In a recent study (29) that surveyed 46 patients with HIV and obesity across 2 immunology clinics, 93% of patients reported being motivated to lose weight and 50% reported wanting more help with weight loss from their physicians. However, only 30% of patients had ever been referred to an outside weight management program (29).

The goal of this paper is to raise awareness about behavioral weight loss programs as a potential obesity treatment for PLWH by highlighting the key components of these programs, their outcomes in the general population and in the few previous studies of PLWH, and how these programs can be tailored for PLWH.

Lifestyle Interventions for PLWH

Lifestyle interventions are comprehensive programs that help patients change their diet, exercise habits, and learn behavioral strategies to improve any number of health outcomes (24). While lifestyle programs can focus on weight loss (i.e., behavioral weight loss programs), many do not. Below we briefly highlight some of the key lifestyle programs for PLWH that did not focus on weight loss.

Considerable research has tested dietary interventions for PLWH (e.g., low-fat, Mediterranean, micronutrient-supplemented) (25, 30, 31). These programs can improve dietary quality and a variety of CVD risk factors in PLWH (e.g., hypercholesterolemia, hyperlipidemia), but few prescribe calorie restriction, which is key for weight loss (25, 30). Many studies have also tested exercise interventions for PLWH, with most targeting CVD risk factors or lipodystrophy and not weight loss (27, 28, 32, 33). Studies typically test different types of exercise (e.g., aerobic, resistance, a combination) and find that all types of exercise can improve cardiorespiratory fitness, strength, and body composition in PLWH. However, only aerobic exercise typically benefits mood and quality of life (27, 28, 32).

Considerably fewer studies have tested lifestyle interventions for PLWH that focus on changing both diet and exercise to reduce CVD risk (34-37). Of these studies, 3 programs prescribed a low-fat but not low-calorie diet, weekly physical activity, and regular sessions with a dietician, with programs lasting between 6 - 36 months (34, 35, 37). PLWH in these programs improved their cardiorespiratory fitness and CVD risk factors relative to controls, but weight loss was not an outcome or a goal. Alternatively, one recent study used an innovative selfmanagement intervention (SystemCHANGE) to promote healthy lifestyle behaviors among sedentary PLWH (36). As a result of the 3-month program, participants decreased their carbohydrate intake and lost 0.73 kg body weight, though this was not a clinically meaningful weight loss (36). Collectively, these studies show that PLWH are willing and able to participate in lifestyle programs and can use them to improve their diet, exercise habits, and CVD risk, but these programs will need to be modified to achieve the goal of weight loss.

Shifting Attention to Weight Loss in Lifestyle Interventions

Given limited obesity treatment research in PLWH, it is important to draw from our knowledge of obesity treatment guidelines in adults without HIV to improve weight management guidelines for PLWH. In 2013, the Obesity Society, the American Heart Association, and the American College of Cardiology established research-based guidelines for treating obesity in adults (24). These guidelines recommend behavioral weight loss as an effective and safe obesity treatment that intervenes in 3 areas: diet, physical activity, and behavior therapy (24, 38). We outline the key components of these programs below.

Diet.

The critical component for weight loss is calorie restriction (24), but this element is missing in most lifestyle programs for PLWH. While this omission may stem from pre-ART era concerns about wasting, the need for calorie restriction (24) contrasts sharply with

recommendations that asymptomatic PLWH consume 10% *more* daily calories than adults without HIV (31, 39). These recommendations were established in 2003 by the World Health Organization and were upheld by a 2011 conference called by the National Institute of Health to comment on these guidelines (31, 39).

Typically in weight loss programs, patients follow a low-calorie diet that will reduce their intake by 500-1000 calories/day to produce a 1-2 pound weight loss per week (24). Recommended daily calorie intake is typically 1200-1500 calories for those weighing under 250lbs and 1500-1800 calories for those over 250lbs. Although many behavioral weight loss programs stress reducing fat intake as a way to lower overall calorie intake, research clearly shows that people can lose weight on any dietary plan (e.g., low-fat, Mediterranean) as long as they reduce their intake (24). The key then becomes selecting a diet that the patient can consistently follow (24). In behavioral programs, patients are encouraged to eat a healthy diet, similar to what has been used in prior studies with PLWH, but the difference is that now the calorie level is carefully prescribed and monitored over time. One strategy for helping patients limit their calorie intake is to recommend using meal replacements like pre-packaged low-calorie meals (e.g., Lean Cuisine), bars, or shakes. Using meal replacements has been shown to enhance weight loss relative to eating only conventional foods (40-42), and has been used effectively for PLWH (43).

Physical activity.

Likewise, the physical activity approaches used for weight loss are slightly different than those that have been tested previously in PLWH. Though physical activity alone has a limited effect on weight loss, it can prevent weight gain and facilitate long-term weight loss maintenance, in addition to extensive metabolic, cardiovascular, and mental health benefits (24, 44). National guidelines recommend 150 - 300 minutes of moderate-to-vigorous physical activity (MVPA) weekly for adults. To help patients achieve these physical activity goals and maintain them over time, behavioral weight loss programs teach patients to gradually increase aerobic lifestyle activity through activities like brisk walking, aiming for 150-180 weekly MVPA minutes (24). Patients set their own specific physical activity goals, such as completing frequent but shorter bouts of activity (e.g., 5-10 minutes), reducing sedentary time, increasing daily step count (e.g., 10,000 steps per day), and changing daily routines to incorporate more activity (e.g., taking stairs rather than elevators). Using pedometers or other devices to monitor progress can also be important for maintaining motivation and promoting adherence. Once patients have completed a behavioral weight loss program, higher levels of physical activity are advised (i.e., 200-300 weekly MVPA minutes) to minimize risk for weight regain and to promote long-term weight loss maintenance (38).

Behavioral skills.

To help patients meet their dietary and physical activity goals, behavioral weight loss interventions teach a range of behavioral skills that facilitate behavior change (24, 38). One core skill is self-monitoring (e.g., tracking or logging) weight, food intake, and physical activity steps or minutes. This information provides patients with immediate feedback on progress toward goals and helps them identify areas for improvement. Another important

tool is stimulus control, which involves altering one's environment so desired changes are more likely to occur (e.g., not keeping tempting foods in the house). Other skills include problem solving (e.g., developing solutions to obstacles, such as joining a gym near work to save time), goal setting (e.g., identifying specific, attainable goals and a plan for doing them), and cognitive restructuring (e.g., re-framing negative thoughts that may interfere with goals) (24, 38). When patients use these skills regularly, they are more likely to meet their weight loss goals (38).

Intervention format.

Behavioral weight loss programs can be delivered face-to-face, over the phone, or online. Programs using any of these formats can be effective, though face-to-face and phone programs typically lead to greater weight loss (5 - 10%) than internet programs (3 - 5%) (38). Programs can also be delivered individually and or in a group, methods that are equally effective (24). Regardless of delivery format, frequent contact is important in treatment to reinforce skills, provide feedback on progress, and adjust goals when necessary (38).

Outcomes of Behavioral Weight Loss Programs in the General Population.

A large literature has tested behavioral weight loss interventions for different populations of patients with overweight and obesity and documented the outcomes that one can expect to achieve (24, 38). The beneficial outcomes of lifestyle interventions are best exemplified by results from 2 major multi-center trials. The Diabetes Prevention Program (DPP) (45) evaluated a behavioral weight loss program compared to metformin (a T2DM medication) or placebo for the prevention of T2DM in over 3,000 adults at high risk for developing T2DM. The lifestyle program (ILI) provided 16 individual sessions over the first 6 months, and then less frequent individual and group sessions to help with maintenance. On average ILI patients lost 6.5 kg (mean, −7%) at 6 months and maintained a weight loss of 4.5kg (−5%) at 3 years (46). Although modest, these weight losses were sufficient to reduce the risk of developing T2DM by 58% compared to placebo, and significantly more than the 31% reduction seen with metformin. Moreover, the benefits of lifestyle intervention for T2DM prevention were still highly significant at 10 year follow-up despite a gradual regain to baseline weight in the ILI group and no long-term weight loss differences between arms (47).

Look AHEAD (Action for Health in Diabetes) (48) is another lifestyle intervention trial in over 5,000 individuals with T2DM. This intervention included group plus individual sessions and recommended meal replacements. On average, the lifestyle arm lost 8.7% body weight at 1 year (relative to 0.7% in the Diabetes Support and Education [DSE] control arm, $p < 0.001$) and maintained a weight loss of 6.2% at 4 years and 4.7% at 8 years (49-51). While the ILI did not improve CVD morbidity and mortality relative to DSE, the ILI showed significant benefits for fitness, CVD risk factors, kidney disease, medication use, hospitalizations, and health care costs (52). In addition to improving eating and exercise behaviors, these lifestyle interventions also produced marked improvements in psychosocial outcomes, including depression and quality of life (24). These studies show that even with

modest weight losses and some weight regain over time, lifestyle interventions have long-term health benefits.

Weight Loss Interventions for PLWH.

We conducted a literature search to identify behavioral lifestyle interventions for PLWH and obesity that focused on weight loss (43, 53-55). From January to October of 2018, we searched multiple databases (e.g., PubMed, Google Scholar) using key terms that included "HIV" and at least one of the following terms: "lifestyle intervention," "behavioral weight loss intervention," "weight loss intervention", and "obesity intervention." We also searched reference lists of pertinent articles. Studies were included if they tested a lifestyle intervention for PLWH and obesity that prescribed a low-calorie diet and included weight loss as a primary treatment goal. Four studies met these criteria. One study (53) was an uncontrolled trial that recruited 18 women with HIV and obesity to complete a 12-week intervention. The program prescribed a low-calorie diet, weekly in-person nutrition sessions, and 180 weekly minutes of supervised exercise. Women who completed the program (65%) lost significant weight (mean, −7.3%), with most weight loss coming from subcutaneous and visceral fat rather than lean mass. Completers also improved their strength, fitness, and quality of life, though there were no immunologic benefits. In a subset of 9 participants with insulin resistance, no metabolic benefits were seen despite their moderate weight loss (53).

Building on these findings, Becofsky and colleagues (2017) tested an online behavioral weight loss program in 40 PLWH, the only trial to use a randomized controlled design and an internet-based format (54). The 12-week intervention delivered 12 lessons on diet, exercise, and behavioral strategies through online videos. Participants also followed a low-fat, low-calorie diet, gradually increased their unsupervised physical activity, and received weekly feedback on self-monitored weight, calorie intake, and activity. Compared to controls who only received educational online lessons, intervention participants lost more weight (mean, −4.5% vs. −1.1%), had greater reductions in daily energy intake, and had greater improvements in quality of life, use of behavioral strategies, and dietary quality (54, 56). Among intervention participants, greater adherence (more online log-ins, lessons viewed, entry of self-monitoring data) was linked with greater weight loss. Retention to the program was also excellent (92.5%), suggesting that online programs may be a promising way to engage PLWH and obesity in treatment (54). However, the study did not find any significant improvements in cardiometabolic parameters (56).

In contrast, a recent study (55) found that behavioral weight loss interventions can produce meaningful cardiometabolic benefits for PLWH. In this uncontrolled pilot trial, 28 PLWH who were at risk for T2DM were given a 6-month lifestyle intervention that was based on the DPP (45). Over the course of 6 in-person visits and 1 phone call, participants followed a low-calorie diet consistent with Dietary Approaches to Stop Hypertension (DASH) guidelines (57), gradually worked toward a physical activity goal of 10,000 daily steps, and implemented behavioral strategies (e.g., self-monitoring). The intervention significantly reduced participants' body weight (−4.6%), waist circumference, daily energy intake, fasting and postprandial glucose and insulin, systolic and diastolic blood pressure, triglycerides, and 10-year cardiovascular risk. Participants also self-reported more daily steps and life

satisfaction (55). Though the strength of these findings is limited by the absence of a control group, these data provide important preliminary evidence that behavioral weight loss programs may improve cardiometabolic health in PLWH at risk for T2DM. While the 2 prior weight loss programs for PLWH (53, 56) did not improve CVD risk factors, there are a number of methodological differences between these studies and the current study (55), including the duration of the treatment program (i.e., 12 weeks vs. 24 weeks).

To help clarify whether PLWH experience similar weight loss benefits as those without HIV, one study (43) compared the metabolic effects of a 6-8% weight loss in insulin-resistant women with and without HIV. To achieve this weight loss, meal replacements were used as part of a calorie-restricted diet. Approximately two thirds of participants met the weight loss goal. However, PLWH took longer to lose weight (18 vs. 12 weeks) and showed a greater decline in fat-free mass than women without HIV (−4.4% vs. −1.7%, $p < 0.05$). These moderate weight losses improved insulin sensitivity in both groups. However, the generalizability of these results is limited by the small sample size, and women who dropped out or did not lose 6-8% body weight (32%) were not included in analyses (43). Thus the question of whether PLWH experience equivalent beneficial effects of weight loss as the general population is still unclear.

Considerations for Tailoring

While behavioral lifestyle interventions hold promise for improving obesity treatment for PLWH, these programs may need to be adapted to fit the needs of an HIV population.

Addressing racial, ethnic, and socio-economic considerations.

HIV disproportionately affects people from Black, Hispanic/Latino, American Indian, and Native Hawaiian racial and ethnic backgrounds, so lifestyle intervention materials should be available in multiple languages, and dietary advice and self-monitoring tools should be applicable to participants with culturally diverse diets (58). Food cost may also be important to consider, as PLWH have higher rates of food insecurity (i.e., inconsistent access to safe nutritious foods) and socioeconomic disadvantage than the general population (16, 59). Behavioral weight loss programs for PLWH should address these obstacles by helping patients identify low-cost high-nutrient foods, access local resources for obtaining nutritious foods (e.g., food stamp programs), and provide practical nutrition information (60, 61).

Stigma and health barriers.

Compared to the general population, PLWH are more likely to experience physical and mental health problems (e.g., fatigue, compromised immunity, depression) and stigma (e.g., unfair treatment) due to HIV and other minority identities (62, 63). These problems may prevent PLWH from enrolling in weight loss treatment and may make adherence more difficult by interfering with treatment attendance, participation, and self-monitoring (64). For example, PLWH in a weight loss program reported being afraid that losing weight would make their HIV status more identifiable, making them more vulnerable to HIV stigma (55). To address these barriers, lifestyle programs should acknowledge stigma and health barriers in treatment and teach strategies for coping with these problems. Delivering behavioral

weight loss programs online may also reduce stigma and health barriers by allowing people to engage in treatment privately and conveniently, making PLWH more likely to enroll and participate.

Placing obesity in context.

It is important to note that among PLWH, obesity treatment may not be indicated in the presence of higher priority behavioral problems. For example, rates of intravenous drug use, substance use, and alcohol use are significantly higher among PLWH relative to the general population (65). For these PLWH, a comprehensive weight loss program may not be indicated until higher priority problems are under better control.

Safety concerns.

Historically, weight loss among PLWH was a symptom of wasting and advanced AIDS infection (8). Given this history, concerns persist about the potential harmful effects of weight loss in PLWH, even in the context of obesity. Recently, PLWH who tried approved weight loss medications or alternative over-the-counter medications to reduce their weight suffered adverse immunologic consequences (66). Taking weight loss medications interfered with patients' viral suppression, though it is not clear how often this occurs. In contrast, to date there is no evidence to suggest that weight loss resulting from lifestyle interventions has any negative effects on physical or immune health in PLWH. As reviewed earlier, behavioral weight loss has shown primarily positive effects in PLWH, including benefits to weight loss, quality of life, and a variety of other health parameters. Given the early stage of research exploring weight loss interventions for PLWH, it is important to continue to investigate potential adverse outcomes and to medically monitor patients to ensure no harmful effects of weight loss.

Conclusions

Obesity and chronic disease are growing problems among PLWH. Behavioral weight loss programs produce weight loss and long-term health benefits in the general population, and may be a promising treatment for reducing obesity and improving long-term health among PLWH.

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