

Weight Loss and Maintenance in Adult Populations: What Works?

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ABSTRACT: Selecting the optimal composition of macronutrients for a low-calorie meal plan is an important consideration for the initiation and maintenance of weight loss of overweight and obese patients. Physical activity is an effective adjunct plan after some initial weight loss has been achieved. However, the management of medications in patients with comorbidities is imperative for the prevention of complications. Suitable administration of medications that are associated with weight gain or satiety should be considered. The inverse association between the frequency of nut intake and body mass index found in epidemiologic studies may be due to several factors, including dietary compensation and reduced bioavailability of energy from nuts. Some studies have observed that nut consumption is advantageous for the initiation and maintenance of weight loss and yields an improvement in cardiometabolic risk factors. However, additional studies on the effectiveness of using nuts for maintenance of initial weight loss are warranted.

KEYWORDS: weight loss, weight maintenance, overweight, obese, diabetes, nuts

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Introduction

Prescribing a weight loss diet to overweight and obese patients with comorbidities (eg, hypertension, type 2 diabetes, hypothyroidism, severe steatosis, polycystic ovary syndrome (PCOS)) can be quite challenging for physicians and registered dietitian nutritionists (RDNs). There are no two overweight or obese patients with the same prior dieting experiences (eg, number and degree of yo-yo dieting episodes). Patients also vary in their perceived thoughts regarding the macronutrient(s) that they consider to be a deleterious contributing factor to their current body weight.

This perspective is based upon our interactions over several decades with patients seeking nutrition counseling for weight management using dietary and physical activity (PA) interventions to initiate and maintain weight loss in a variety of outpatient clinical settings. The opinions presented in this perspective stem from personal experiences of the topics discussed and should not be considered to be an empirical study or analysis. Additionally, we include a discussion regarding the findings from intervention trials in the context of the use of nuts for weight loss and maintenance. Some possible reasons for the inverse association between frequent nut intake and body mass index (BMI) are also presented. Although emerging pharmacologic and surgical treatments are promising for weight management, none of the authors have been involved with these options.

Weight-loss Recommendations

The reasons for seeking medically supervised weight-loss programs and nutrition counseling across the life cycle vary and may include the desire to look and feel better for an upcoming event (eg, class reunion, wedding), to engage in activities with children or grandchildren, to ameliorate a health-related concern, or to please a physician. A modest weight loss of 5–10% of total body weight has been shown to have major health benefits in the management of comorbidities.^{1,2}

Although a recommended rate of weight loss is one to two pounds per week for six months to achieve an initial weight-loss goal of up to 10%,³ we have anecdotally noted that a medically supervised weight-loss program may yield three-to fourfold results during the first month, especially among males. The initiation of PA should be based individually according to the rate of weight loss because PA confers discomfort in joints among overweight and obese patients. Additionally, at the start of a medically supervised weight-loss program, overweight and obese patients self-report feeling overheated and uncomfortable when engaging in simple light activity, which is heightened in hot and humid environments. Thus, it may be prudent to forgo recommending a daily goal involving a number of steps or minutes of PA until the patient has lost approximately 5 to 10 pounds. After a small magnitude of weight loss is achieved, the use of a pedometer and a



walking program using the buddy system can be suggested to maintain a PA regimen over time.⁴ In addition to the aforementioned physical considerations, it is also important to assess if the patient is at one of the more advanced stages of change using the Prochaska Stage of Behavior Change model. More specifically, Wee et al⁵ have shown that patients who are at the preparation, action, or maintenance stage and perceive their excess weight as a health risk will be more likely to increase their level of PA in addition to controlling food portions.

Establishing Individualized Daily Calorie Goals

There can be significant variability in establishing individualized daily goals for patients to achieve actual daily caloric deficits (eg, 500–1,000 calories). Variations in metabolic energy expenditure rates can be extreme between patients depending on genetics, current levels of PA, medications, and macronutrient food choices. BMI scores or age/activity/gender charts cannot closely capture the average operational metabolic rates for some individuals (eg, patients with relatively low metabolic rates). If an RDN or physician presumes that a 1,400 calorie per day diet should result in the loss of one pound per week for a specific patient, it can be very disappointing if their patient's actual energy expenditure is 1,400 calories per day.

The following steps may be considered to better assess a patient's required calorie deficit to produce a desirable rate of weekly weight loss. First, the patient should be instructed to engage in very accurate calorie counting using kitchen measuring tools and scale (eg, digital postal scale) in addition to recording their body weight daily over two weeks. The first week of weight change should be determined by comparing the patient's body weight on day 8 of the diet vs. day 1 of the diet and be divided by 7 to calculate the average daily body weight change. Likewise, day 12 can be compared to day 5. If this process is continued, an average delta can be computed and then factored in with the total average weekly number of calories to estimate the patient's operational metabolism and establish realistic goal setting.

For example, suppose that a patient is averaging an intake of 1,400 calories per day and averages a weekly weight loss of 0.7 lb. If we divide 0.7 lb by seven days, we will derive an average of 0.1 lb/day of weight loss. Utilizing an assumption of a 3,500-calorie deficit required for one pound of weight loss over seven days, we see a 350 calorie advantage per day for the client ($0.1 \times 3,500$ calories). Adding the 350 calories per day advantage to 1,400 calories, our hypothesis would predict that a daily intake of 1,750 calories might be determinative of equilibrium or an operational metabolism that could maintain body weight at this level. This testing will become more accurate as more data are collected over several weeks or months. The benefit of using this mathematical approach is to allow the caloric intake rate to vary according to periods of low versus high PA and reestablish reasonable expectations regarding the rate of weight loss as patients get closer to their target weight goal.

One Size Does not Fit All

Persons who have type 2 diabetes that are treated with sulfonylureas and/or insulin do very well on hypocaloric diets that feature a high monounsaturated fat component versus complex carbohydrates.⁶ This approach simulates the low-glycemic diet that has been shown to have the greatest impact for an obese patient with type 2 diabetes and for premenopausal women.⁷ The ability of a physician to adapt downward on the number and dosing of medications used to treat type 2 diabetes can be profound when carbohydrate intake is minimal in the context of a hypocaloric diet.⁶

Over the past several decades, we have noted that many patients have stated that they believe that a weight-loss diet that is higher in one or more of the macronutrients may work best for them for weight management (eg, low-fat, high-carbohydrate diet; high-protein, low-carbohydrate diet), which may reflect their unique level of success or failure with prior dieting experiences. Sacks et al randomly assigned 811 overweight adults to one of four diets (targeted percentages of energy derived from fat, protein, and carbohydrates in the four diets were 20%, 15%, and 65%; 20%, 25%, and 55%; 40%, 15%, and 45%; and 40%, 25%, and 35%) for two years and found that diets with varying amounts of carbohydrate, protein, and fat are equally successful in promoting clinically significant weight loss and maintenance over two years, thus refuting prior studies showing that a high-protein, low-carbohydrate diet can facilitate greater weight loss over a six-month initial period.⁸ In women with PCOS, the presence of insulin resistance, hyperinsulinemia, and elevated androgens can make weight loss difficult. Currently, there is not an ideal dietary prescription for weight loss in PCOS women, but emerging randomized controlled trials and a recent systematic review have demonstrated that a hypocaloric diet (500–1,000 daily caloric deficit) with various diet compositions (high monounsaturated fat, vegan, low glycemic index, etc.) can be used effectively.^{9,10} We have also noted that some patients who have been followers of the Atkins diet for several decades do very well with managing their weight using this approach, whereas we have found that others find the lack of fruits, vegetables, and other carbohydrates to be punishing and non-sustainable for more than a few days. Thus, it is imperative that physicians and RDNs review each patient's typical dietary eating pattern prior to prescribing a diet that is most likely to be adhered to for at least six months.

Medication Management Considerations

For patients with comorbidities, it is prudent to prescribe a low-calorie meal plan with a daily 500–1,000 calorie deficit that will have the greatest impact without negative health consequences. High caloric restriction can yield dramatic effects on the number and dosing of medications that are used to manage hypertension and/or type 2 diabetes.⁶ Medically supervised weight-loss programs must have experienced health professionals available to adapt hypertensive and diabetes medications downward to prevent episodes of hypotension and hypoglycemia, respectively.



Non-prescription medications, including herbal supplements, should also be addressed because they may contain an active chemical component of other medications and cause a possible cross-reaction of medications. As the number and dosages of specific medications are reduced, hunger levels are attenuated and hypotensive episodes typically diminish. We have observed that the effective downward titration of medications leads to a reduction in the self-reported occurrence of hypotensive events (eg, dizziness) that are commonly mistaken for hypoglycemia and subsequently treated with large amounts of calorically dense fruit juice, which deters weight loss. Further, it is important for health professionals to identify the medications that are associated with weight gain and/or known to affect satiety (eg, antidiabetics, antihypertensives, anti-inflammatories) and find suitable alternatives.

Weight Maintenance

Systematic reviews have shown that weight loss from participating in a multi-disciplinary weight management program typically peaks at six months, followed by graduate recidivism in the majority of patients.^{11,12} Several recommendations for maintaining initial weight loss that have stood the test of time include the limiting of the number of eating occasions away from home and selecting healthy options when eating out. The forthcoming 2015 menu labeling regulations may be of some additional guidance; however, the perception that a salad is the safest option may still preclude an individual to inquire about nutritional information. More specifically, a Caesar salad may contain more than 1,200 calories but be mistakenly considered the best low-calorie option in a menu during weight maintenance. Large portions of low-energy dense food (eg, raw vegetable-based salads) are helpful in decreasing food intake and hunger during weight maintenance, but added salad dressings must be of low calorie, portion controlled, and closely monitored.

The best evidence for the maintenance of weight loss comes from the findings of the National Weight Control Registry, which is a 10-year observational study of self-reported weight loss and behavior change in 2,886 subjects (78% female; mean age = 48 years) who achieved a weight loss of at least 30 pounds and maintained the weight loss for at least one year.¹³ The factors that led to successful maintenance of initial weight loss were found to be increased leisure-time PA, dietary restraint, increased frequency of self-weighing, and decreased percent of energy intake from fat.

The self-monitoring of dietary intake and PA has been shown to create a sense of accountability and awareness; however, record keeping typically declines over time.^{14,15} With the numerous apps available and the ability to enter dietary information into a portable device, we have a heightened degree of optimism that patients will more consistently engage in the tracking of their calorie intake and expenditure during active weight loss and weight maintenance. However, studies should be conducted to evaluate the effectiveness in using a variety of

electronic devices to assist in the maintenance of weight loss, which is important to sustain the health benefits from initial weight loss.

Portion control devices have emerged that can assist an overweight or obese individual in proper portioning of foods and beverages during weight maintenance. Further, portion-controlled frozen meals and medically prescribed shakes/bars (eg, HMR®, OPTIFAST®) can also be used when closely monitored by a physician or an RDN.^{16,17} If a client desires to consume a salad or cooked vegetables with meal replacements, it will increase the volume and nutrient density of the meal and may improve satiety. However, a recent meta-analysis of 45 randomized controlled trials found no evidence for the effectiveness of using food replacements as compared to dietary recommendations alone.¹⁸

Regardless of the method utilized for weight loss (eg, diet, exercise, bariatric/metabolic surgery), ongoing follow-up with an RDN and a physician is an essential component for success.¹⁹ In our experience, a patient's motivation and stage of readiness for weight loss plays a significant role in long-term success. Understanding this motivation and after determining that the patient is at one of the more advanced stages of change, the physician or RDN can provide guidance for choosing what might work best for their clients to keep them motivated and on target for weight loss. Thus, interventions including a variety of methods with follow-up visits that are tailored to meet the client's desires and health goals are more likely to promote successful weight loss and maintenance. In light of our experience with using nuts in overweight and obese patients seeking weight loss,^{6,20} a review of the current evidence to date and discussion of the potential mechanisms by which nuts may influence body weight are featured in the following section.

Role of Nuts in Weight Loss and Maintenance

Clients who consume medically prescribed protein-sparing shakes often report that they miss the crunch aspect of their diet and may indulge in pretzels and/or chips to satisfy their cravings. Although raw vegetables (eg, celery, carrots, jicama) are crunchy, overweight and obese patients often report becoming quickly dissatisfied with their intake with the prescribed shakes or as snacks. An alternative suggestion may be to include a portion-controlled serving of a crunchy nut (eg, dry roasted almonds) to satisfy the craving.

There have been four randomized trials that have evaluated the effect of nut consumption within weight-loss programs;^{6,21-23} however, only one of those trials evaluated the effect of nuts during a weight-maintenance program.²³ We were the first to report on the effectiveness of enriching a liquid-formula-based, low-calorie diet with almonds versus a liquid-formula-based, low-calorie diet with self-selected foods containing complex carbohydrate among 65 overweight and obese patients. Despite being prescribed an equivalent number of calories, the almond group lost an average of 18% of



body weight as compared to an average weight loss of 11% in the complex carbohydrate group over a 24-week period. More recently, Foster et al randomized 123 overweight and obese individuals to consume either an almond-enriched hypocaloric diet or a hypocaloric nut-free diet and observed greater weight loss in the nut-free group at 6 months but clinically significant and comparable weight loss at 18 months.²³ Also, the almond-enriched group experienced significantly greater improvement in total cholesterol (TC), TC to high-density lipoprotein cholesterol ratio, and triglycerides at six months. Alternatively, Li et al randomized 59 obese subjects to consume either pistachios versus pretzels in the context of a 12-week weight-loss program and did not observe differences in the degree of weight change between the groups.²¹ Similarly, Pelkman et al failed to show a difference in weight loss between 53 overweight and obese subjects who were randomized to consume a hypocaloric low-fat (20% of energy) diet or a hypocaloric moderate fat (35% of energy) diet enriched with peanuts.²² In the light of the favorable changes in plasma lipids in the aforementioned study by Foster et al, it is worth mentioning the findings of a study conducted by Kalgaonkar et al that randomized 31 PCOS patients to consume either almonds or walnuts containing 31 g of total fat per day for six weeks.²⁴ In the context of stable weight, nut consumption resulted in beneficial effects on specific plasma lipids and androgens. More specifically, almond consumption significantly reduced the free androgen index, whereas walnut consumption significantly decreased low-density lipoprotein cholesterol and apolipoprotein B, increased the insulin response during an oral glucose tolerance test, decreased HbA1C, and increased sex hormone binding globulin concentrations.

Although nuts are energy dense and rich in unsaturated fatty acids, frequent nut consumption has not been found to be associated with an increase in BMI in epidemiological studies.^{25–27} Four potential reasons have been postulated by Sabaté for the inverse association between frequent nut consumption and BMI as follows²⁸: reverse causation, greater calorie expenditure through increased PA or increased resting energy expenditure,^{26,27,29} increased satiety and dietary compensation,³⁰ and reduced bioavailability of energy from nuts.³¹

The satiating effect of nuts may be because of their low glycemic index, good fiber and protein content.^{32,33} Hence, the satiating qualities of nuts may be partially responsible for the 54–78% dietary compensation that was observed in a six-month almond supplement intervention,³⁰ which was consistent with the findings from a peanut study of shorter duration.²⁹ Thus, nuts may have the added benefit of eliciting strong dietary compensation attributes in the context of reduced energy bioavailability. More specifically, three recent studies that have been conducted in healthy adults have shown that 5%, 23%, and 21% of the energy from pistachios, almonds, and walnuts is unabsorbed, respectively.^{34–36} Therefore, patients should be advised that the calorie content on the food label for the aforementioned nuts is greater than the

actual energy that they will absorb and that nuts can be consumed responsibly during weight loss and weight maintenance if portion control measures are in place.

Conclusion

The intent of this perspective was to provide our opinions on specific topics that stem from our personal experiences in counseling overweight and obese adult patients during active weight loss and maintenance. Selecting the optimal composition of macronutrients when prescribing a low-calorie meal plan for overweight and obese patients is an important consideration for the initiation and maintenance of weight loss. Overweight and obese patients with comorbidities must be monitored closely and have their medications adjusted according to their rate of weight loss to prevent side effects. Physicians and RDNs should provide a structured low-calorie meal plan according to their patients' preferences and recommend adding mild PA after a small magnitude of weight loss has been achieved. The use of nuts may be advantageous in the initiation of the weight loss for specific patients; however, additional studies on the use of nuts for maintenance of initial weight loss are warranted.

Author Contributions

Wrote the first draft of the manuscript: MW. Contributed to the writing of the manuscript: MW, LMC and PD. Jointly developed the structure and arguments for the paper: MW, LMC and PD. Made critical revisions and approved final version: MW, LMC and PD. All authors reviewed and approved of the final manuscript.

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