

Pitfalls of fad diets and weight loss drugs

Abstract

The Obesity epidemic of the last several decades has spawned an overwhelming number of dietary intervention strategies. Given the diverse array of diet plans from the practical to the irrational (i.e. the cookie diet???) it is somewhat comforting to know that this global scourge has now garnered world-wide attention. As such, you may readily find a host of weight loss and cook books during a visit to any library or book store to address this seemingly intractable condition. Whether the authors have good intentions or not, most diet plans may produce desirable results at the outset (within six months of initiation), only to lead to rapid weight gain, sometimes landing at a higher set point than when the dieter initiated the weight loss venture. These next few paragraphs may shed some light as to why these weight loss strategies might not produce the desired results. A summary of the diets plans reviewed in this article can be found in Table 1. Much of this information is derived from an informative review written for Everyday Health by Debbie Strong (<http://www.everydayhealth.com/food/the-10-most-famous-fad-diets-of-all-time.aspx>).¹ I would also like to comment on the pitfalls of current weight loss drugs, summarized in Table 2, which have failed to gain traction due to limited efficacy and unwanted or life-threatening side effects.

Keywords: obesity, nutrition, diet, Mediterranean, drug, vegan, vegetarian, macrobiotic, supplements, body mass index

Volume 1 Issue 1 - 2014

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Received: August 04, 2014 | **Published:** October 21, 2014

Abbreviations: BMI, body mass index; CNS, central nervous system; NIH, national institute of health

Introduction

Pitfalls of fad diets and other weight loss strategies

Atkins and south beach diets: Let's start with the very popular Atkins diet which has evolved from a program that encouraged the over-consumption of unhealthy proteins loaded with saturated fat (think bacon and Taylor Ham) to a more balanced regimen of lean protein with controlled portions of fat and healthy carbohydrates. However, since this plan is so restrictive of carbohydrates it is not well-balanced and may lead to loss of essential nutrients, calcium in particular, along with a lack of fiber. It also leads to muscle weakness due to the depletion of glucose stores. Weight loss is driven by ketosis, a process associated with elevation of cholesterol levels. The South Beach food plan is similar to Atkins albeit more generous with respect to carbohydrates, as whole grains and fruits are less restrictive. Dairy constraints of the South Beach diet also pose a risk for calcium deficiency. To avoid food cravings dieters of the South Beach program are encouraged to eat every three to four hours but this strategy does not encourage fat burning.

Gluten-free diet: The Mintel group, an industry leader in Food trends, reports (<http://www.mintel.com/press-centre/food-and-drink/gluten-free-food-to-lose-weight>)² that the majority of people who follow a Gluten-free diet do not have bona fide celiac disease (sensitivity to gluten). The diet is popular among health enthusiasts as it eliminates consumption of refined carbohydrates. However, since whole grains are also avoided there is a tendency to consume too much sugar along with a loss of essential nutrients and fiber.

Paleo diet: The Paleo diet has been gaining quite a bit of traction in the past few years. This practice supports the consumption of fish, lean meats, fruit, non-starchy vegetables and nuts but starchy

vegetables, dairy foods, grains, and processed foods are excluded. As with the Atkins diet nutrient deficiencies may occur due to the lack of whole grains and dairy. Those who follow the Paleo trend may be hard-pressed to find high quality lean meats at an affordable price. The high protein content of this diet may also put unwanted stress on the kidneys.

Zone diet: Dr. Barry Sears is the well-known author of the Zone diet (<http://www.drsears.com>).³ This diet is the least restrictive of all of the protein-based diets. To achieve weight loss every meal or snack should consist of the following ratio: 1g healthy fat: 2g protein: 3g carbohydrates. There is a strong emphasis on consumption of Omega-3 fatty acids found in fish, nuts and olive oil, consumption of lean protein and whole grains. Adding protein to balance the carbs at every meal or snack will promote satiety and encourage weight loss. Followers may find achieving this ratio somewhat of a challenge as well as costly. Another challenge is that this diet is limited to less than 1200calories per day which may prove to be too restrictive for some. Five to six small meals are favored over fewer, larger meals but for those who exceed the calorie limit, the constant eating does not promote fat utilization.

Raw food diet: Many vegans and vegetarians subscribe to a raw food diet purporting that essential nutrients are lost in any cooking process above 116 to 118°Fahrenheit. Although this may be true, the elimination of cooked foods may lead to loss of essential B vitamins and calcium and the absence of animal products can also leave you low on protein and iron. Furthermore, consumption of uncooked foods could lead to food-borne illness. Raw food devotees should work very closely with a seasoned nutritionist to ensure their nutrient needs are met. In the long-run, this strategy is just too hard to maintain but can be combined with any other plan that includes higher protein levels.

Caloric restriction: Studies in rodents have shown that restricting calories promotes longevity Weindruch et al.⁴ This observation however, has not been conclusively demonstrated in people or non-

human primates. Careful analysis of the studies with animals suggest that the increase in lifespan might simply be due to a healthier diet enriched in anti-oxidants compared to the control animals Taormina and Mirisola.⁵ However, for those individual who would like to test out this challenging strategy there are online calculators (eg. <http://www.scientificpsychic.com/health/cron1.html>)⁶ that can quantify the number of calories that you should be consuming based on your current body mass index (BMI) and lifestyle. Obviously, with a reduced calorie count a much greater emphasis should be placed on highly nutritious foods. Best of luck sticking with this plan.

Weight watchers: Weight Watchers is one of the most successful and well-known of all weight loss plans. This success is due in part to the extensive amount of Health Coaching that comes with enrollment. The main tenants of weight watchers are to eat what you want in moderation, subscribing to a food-based point system. The thought behind this is that if you eat small amounts of foods that are satisfying and appealing then you are more likely to stick with the diet. However, since food choices are not strictly defined, you may not be eating meals that are nutritious and well balanced. Followers are not restricted from eating refined carbohydrates or foods with a high glycemic load. Weight loss may be realized through reduced calorie consumption but may not be providing the health benefit of a more nutritious food plan.

Macrobiotic diet: A Macrobiotic diet emphasizes whole grains, fruits, and vegetables but excludes dairy products, meats, and fatty foods. Although weight loss is achievable naysayers caution that this plan's strict adherence to such a limited, organic regimen makes it difficult to maintain and can even lead to nutritional deficiencies. The Macrobiotic diet is unique among weight loss strategies in that it includes elements of Buddhism. Foods should be prepared in a peaceful and carefully crafted environment using utensils made of specific materials. Not only is this an onerous platform but the use of supplements is discouraged, so a Macrobiotic Diet is best implemented under the care of a well-versed Nutritionist or Dietician.

Blood type diet: The Blood Type diet as described on WebMD (<http://www.webmd.com/diet/blood-type-diet>)⁷ was conceptualized by Peter J D'Adamo⁸ (<http://www.dadamo.com/>), who claims that the foods you eat react chemically with your blood type. If you follow a diet designed for your blood type, your body will digest food more efficiently. Although this is not one of the most popular fad diets it is certainly one of the most intriguing. The guidance Dr. D'Adamo subscribes to is as follows:

- i. **Type O blood:** A high-protein diet heavy on lean meat, poultry, fish, and vegetables, and light on grains, beans, and dairy.
- ii. **Type A blood:** A meat-free diet based on fruits and vegetables, beans and legumes, and whole grains; ideally, organic and fresh, because D'Adamo says people with type A blood have a sensitive immune system.
- iii. **Type B blood:** Avoid chicken, corn, wheat, buckwheat, lentils, tomatoes, peanuts, and sesame seeds. He encourages eating green vegetables, eggs, certain meats, and low-fat dairy.
- iv. **Type AB blood:** Foods to focus on include tofu, seafood, dairy, and green vegetables. He says people with type AB blood tend to have low stomach acid. Avoid caffeine, alcohol, and smoked or cured meats.

This strategy has not been validated and would be quite difficult to implement in a family setting or by those who suffer from food

allergies. It could also be an issue when dining out since food options would be rather limited.

Bariatric surgery: Although bariatric surgery has proven to be the most successful of all weight loss options, it is fraught with adverse effects. First, all surgical procedures are associated with risk, especially since this option is reserved for the morbidly obese (BMI>40) or those with profound metabolic disease. In this case, abdominal hernias would not be unexpected. Post-operative assessment of bariatric patients has uncovered a number of complications including nutrient deficiencies due to mal absorption and poor supplement compliance Tack.⁹ A condition known as dumping syndrome can occur from eating high-fat, high-sugar foods. The results can be unpleasant and may include vomiting, nausea, weakness, sweating, faintness, and diarrhea. Bariatric patients are also more prone to ulcers and increased gas. Additional details may be found at <http://www.realize.com/gastric-bypass/risks-and-complications>.¹⁰

Pitfalls of weight loss drugs: This section will only cover FDA-approved weight loss drugs. The efficacy of supplements and related products will be the topic of a separate Opinion piece to be published at a later date.

Weight-loss drugs-should only be used by individuals whose BMI is greater than 30 or greater than 27 for those suffering from the symptoms of metabolic disease. In general, such medical interventions produce an expected weight loss of just 5%-10%, so would not be very therapeutic for the morbidly obese. The reason why development of pharmaceutical interventions for weight loss has been stifled can be attributed to the fact that efficacy drops off over time and to adverse side effects, some of which are life-threatening.

Weight loss drugs fall in to three main categories

1. Stimulant-like drugs that stimulate the central nervous system and reduce appetite.
2. Drugs that increase levels of neurotransmitters such as serotonin and norepinephrine, helping you feel full.
3. Drugs that inhibit fat absorption in the gut.

These Prescription medications are very well-described in a review authored by the National Institute of Health¹¹ (NIH Publication No. 07-4191) and other online publications (http://en.wikipedia.org/wiki/Anti-obesity_medication).¹² It is important to note that in order to be effective all of these drugs must be combined with a reduced calorie diet.

Stimulant-like drugs: Stimulants such as Bensedrine, a type of amphetamine, have been banned since 1979 due to a number of deaths attributed to these types of diet pills. Since their mechanism of action occurs in the Central Nervous System (CNS), amphetamines can be neuro toxic and should only be used under a doctor's care. At present, they are largely prescribed as maintenance therapy to treat ADHD and narcolepsy in adults.

Neurotransmitter-releasing drugs: Another appetite suppressant pulled from the market in 1997 is Phen-fen, consisting of Fenfluramine, a serotonin releasing agent and phentermine, a norepinephrine, dopamine and serotonin releasing agent. The withdrawal was made in response to the finding that Fenfluramine can directly cause potentially fatal pulmonary hypertension and heart valve problems. Phentermine is now used in combination with piramate for appetite suppression but users should be aware of a number of side effects including but not limited to trouble sleeping, constipation, and dry mouth. Serious

but rare side effects include allergic reactions (such as rash, hives, difficulty breathing), thoughts of suicide, memory problems, mood problems (such as anxiety, depression, panic attacks), and changes to your vision. Rare side effects associated with topiramate include kidney stones and acute glaucoma.

Sibutramine (Meridia) also promotes satiety by increasing levels of serotonin and norepinephrine but was withdrawn from the US and some European markets due to risk for non-life-threatening myocardial infarction and stroke. Such serious side effects offset the weight loss benefit.

Lorcaserin (Belviq) is a relatively new satiety-inducing product that was approved for weight loss in 2012. Lorcaserin may not be effective for everyone and users may suffer from headaches, dizziness, feeling tired, nausea, dry mouth, cough, and constipation. A rare but serious side effect is serotonin syndrome (high fever, muscle rigidity, and confusion), which can occur if the drug is taken along with SSRI antidepressants or MAOI medications.

Fat absorption inhibitors: Orlistat (Xenical) reduces intestinal fat

absorption by inhibiting pancreatic lipase. Some side-effects of using Orlistat include stomach pain, gas, diarrhea, and leakage of oily stool. These effects can be mitigated by reduction of fat in the diet. Liver damage has also been reported by a small number of users.

The symptoms of Metabolic Disease are as follows: waist circumference ≥ 35 " for women, ≥ 40 " for men; blood pressure $\geq 135/85$ mm Hg; blood glucose ≥ 100 mg/dL; HDL Cholesterol ≤ 50 mg/dL for women, ≤ 40 mg/dL for men.

Conclusion

Given the austere outlook and limited efficacy for weight loss drugs (Table 1) the truly Obese (BMI ≥ 40) are encouraged to pursue surgical interventions, which have proven to be the most effective for people who fall into this category. Despite such positive outcomes, this solution also comes with a health penalty- limited food consumption coupled with reduced nutrient absorption may lead to profound nutritional deficiencies. These patients should work closely with a Nutritionist or Dietician to replace critical nutrients they are lacking.

Table 1 Weight loss drugs

Drug	Mechanism of action	Issues
Benzedrine withdrawn from market	· Stimulant-like amphetamine · Appetite suppressant	Neurotoxic
Phen-Fen (phentermine and fenfluramine) withdrawn from market	Neurotransmitter release	· Pulmonary hypertension · Heart valve failure (with drawn from)
Qsymia® (phentermine and topiramate)	Neurotransmitter release and anti-convulsant	Sleep disruption, constipation, dry mouth, allergic reactions (such as rash, hives, difficulty breathing), thoughts of suicide, memory problems, mood problems (such as anxiety, depression, panic attacks), and changes to your vision. Rare side effects associated with topiramate include kidney stones and acute glaucoma.
Sibutramine (Meridia) withdrawn from market	Neurotransmitter release	Myocardial infarction and stroke
Lorcaserin (Belviq)	Neurotransmitter release	· Users may suffer from headaches, dizziness, feeling tired, nausea, dry mouth, cough, and constipation · Serotonin syndrome (high fever, muscle rigidity, and confusion), which can occur if the drug is taken along with SSRI antidepressants or MAOI medications.
Orlistat (Xenical)	Fat absorption inhibitor	· Stomach pain, gas, diarrhea, and leakage of oily stool. · Liver damage

For those individuals who are looking to simply lose a few pounds or to improve their diet, they are advised to wade into the pool of weight loss strategies (Table 2) with caution. The most nutritionally sound of the Fad diets described above is probably the Zone diet by Dr. Barry Sears. However, the relatively low calorie count coupled with the continuous eating strategy may not bode well for those who need to burn abdominal fat. Followers who cheat with a few extra carbs at each meal will end up storing fat instead of burning it.

The only diet strategy not mentioned in this Opinion piece, since it does not fall into the category of Fad diet, is the Mediterranean

diet. While not a diet per se but more a way of life, it has served large swaths of Europeans rather well. Its emphasis on whole grains, omega-3 fatty acids and so many wonderful phyto-nutrient-containing, colorful fruits and vegetables coupled with red wine provides the most health benefits of any diet strategy Trichopoulos et al.¹³ The Mediterranean diet is also the most flexible and can be followed by vegans, vegetarians, and meat-eaters, alike. The relative lack of global support for this diet is rather unfortunate, likely overshadowed by the glut of low-cost, processed foods readily available to the masses in lieu of the fresh, healthy Mediterranean food.

Table 2 Weight loss diets

Diet	Premise	Advantages	Disadvantages
Atkin's	Very low carb	Very effective for immediate weight loss	<ul style="list-style-type: none"> · Ketosis · Vitamin and mineral deficiency · Bone loss · Elevated cholesterol levels · Muscle weakness
South Beach	Low carb but includes fruits and vegetables	<ul style="list-style-type: none"> · Effective weight loss · Heart healthy · Good blood sugar control · Limits processed foods 	<ul style="list-style-type: none"> · Frequent eating may not promote fat burning · Too calcium restrictive · Limits consumption of whole grains
Gluten-free	Avoid all wheat products	<ul style="list-style-type: none"> · Reduces calorie consumption · Improved overall well-being 	<ul style="list-style-type: none"> · Reduces fiber intake · Nutrient restrictive · Glucose stores may derive from sugar · Nutrient deficiencies may occur due to the lack of whole grains and dairy
Paleo	Hunter-gatherer strategy-focus on lean protein, fish, fruits and vegetables	Heart healthy	<ul style="list-style-type: none"> · Expensive · High protein may stress kidneys · Achieving macronutrient ratio is challenging
Zone	Reduce hunger by including protein with every meal	Anti-inflammatory	<ul style="list-style-type: none"> · Costly · Frequent eating may not promote fat burning
Raw Food	Focus on uncooked foods	Pairs well with vegan and vegetarian lifestyle	<ul style="list-style-type: none"> · loss of essential B vitamins calcium and iron · Risk of food-borne illness · Not proven
Caloric Restriction	Typically, < 1,000 calories per day	Promotes longevity Cost effective	<ul style="list-style-type: none"> · Risk of nutrient deficiency · Non-compliance · Diet plan not clearly defined · Food choices not clearly defined
Weight Watchers	Flexible food-based point system	Strong support system	<ul style="list-style-type: none"> · Diet can lack balance · Can be over-managed
Macrobiotic	Focus on whole grains, legumes, fruits and vegetables	Heart healthy	<ul style="list-style-type: none"> · Nutrient loss due to high fiber and avoidance of supplements · Difficult to maintain · Not validated · Not practical for families
Blood Type	<ul style="list-style-type: none"> · O-Focus on meat and fish · A-Grains and vegetables · B-Meat and plants · A/B- Includes tofu, seafood, dairy, and green vegetables. Limit meat 	Improves digestion and metabolism	

Acknowledgements

We gratefully acknowledge Ms. Daphnie Manzione of GoDaphers, LLC for her invaluable editorial and technical assistance.

Conflict of interest

The author declares no conflict of interest.

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