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Obesity Diets — Fact or Fiction

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The prevalence of overweight and obesity has increased steadily over past 30 years. The rapid spread of urbanization and industrialization and dramatic lifestyle changes that accompany these trends had led to pandemic of obesity, even in developing countries. The obesity has serious public health implications. Excess weight has been associated with mortality and morbidity. It is associated with cardiovascular disease, type II diabetes, hypertension, stroke, gall bladder disease, osteoarthritis, sleep apnea, respiratory problems and some types of cancer.

Due to this reasons, weight loss is of major concern in today's populations[1]. Dietary recommendations are key element in management of obesity. In recent years, numerous dietary fads have emerged as a response to rising prevalence of obesity[2]. Popular diets have become increasingly prevalent and controversial. Some popular diets are based on long-standing medical advice and recommend restriction of portion sizes and calories (e.g. weight watchers diet). A broad spectrum of alternatives have evolved. Some plans minimize carbohydrate intake without fat restriction e.g. Atkins' diet and many modulate macronutrient balance and glycemic load e.g. Zone diet and others restriction fat e.g. Ornish diet[3].

TRADITIONAL DIETS

Traditionally the strategy recommended by most medical groups for weight loss and weight maintenance was intake of low calorie low fat diet. The concept of fat restriction for weight management stems from traditional calorimetric measurements, which assigns greater energy value to fats (9 kcals/g) and less to carbohydrate and protein (4 kcals/g). The low calorie concept on other hand is a technique to induce negative energy balance.[2]

CLASSIFICATION OF SOME POPULAR DIETS[1]

1. High fat - low carbohydrate – high protein diets e.g. Dr Atkins new diet revolution, protein power, life without bread
2. Moderate fat - balance nutrient diets – high in carbohydrate and moderate in protein, e.g. use of food guide pyramid, DASH diet, weight watchers diet
3. Low fat/very low fat – high carbohydrate – moderate protein diets e.g. Dr. Dean Ornish's program for reversing heart disease, 'eat more weigh less', the New Pritikin program

HIGH FAT – LOW CARBOHYDRATE – HIGH PROTEIN DIETS

Low carbohydrate diets were first described by William Banting in 1860 and recently have received much attention in form of Atkins diet, Stillman diet, protein power life plan and zone diet[4]. This diets are high fat (55-65%) low carbohydrate (<100 g of carbohydrate per day).

Table 1:[2] Percentage of carbohydrate, protein and fat in some popular diets

Diet	*Carbo-hydrate*	*Protein*	*Fat*
Atkins diet[5]	5%	27%	68% (saturated fat 26%)
Stillman diet[6]	3%	64%	33% (saturated fat 13%)
Protein power diet[6]	16%	26%	54% (saturated fat 18%)
Zone diet[6]	36%	34%	29% (saturated fat 9%)

The proponents of high fat diet low carbohydrate diet dismiss the notion that caloric intake is important to either weight gain or weight loss. They believe that high carbohydrate meals leave individuals less satisfied than the meals that contain adequate fat, which results in increased hunger and increased food intake. Eating too much carbohydrate results in increased blood glucose, increased blood insulin and increased triglycerides. Also increased production of insulin inhibits brain serotonin release and reduction in these 'satiety' neurotransmitter results in decreased sense of satisfaction. Restricting carbohydrate severely enough leads to ketosis. The ketosis is an reliable indicator of fat mobilization. In this condition the key benefit is that the blood glucose and blood insulin levels are reduced and the appetite is suppressed. This leads to weight loss, body fat loss, preservation of lean body mass and correction of serious medical complications of diabetes, heart disease and blood pressure[1].

Close examination of diet reveals that weight loss results from caloric restriction. Diet analysis (assessed using food intake records) in many studies revealed a 500 kcal decrease in total caloric intake from the start of the study to the end of stage II. Yudkin and Carey[7] had reported that when proteins and fats were permitted in unlimited quantities subjects did not greatly increase their intake of these nutrients. In fact, fat intake decreased (5 g) and protein intake only slightly increased (11 g). The greatest caloric effect was the near total elimination of carbohydrate.

During the early stages of ketogenic diet, weight loss is partly due to water loss[8-10]. In contrast to mix diets where the weight loss is primarily due to loss of body fat. Losses of protein and fat are about the same during a ketogenic diet as during an isocaloric non-ketogenic diet[8,11,12].

Some scientist concluded that the greater initial weight loss improves the long term maintenance so long as the weight loss if followed by 1-2 years of integrated weight maintenance program consisting of dietary change, behavior modification and increased physical activity.

No scientific evidence exists who suggest that low carbohydrate ketogenic diet has metabolic advantage over more conventional diet for weight reduction. Studies have consistently shown that under condition of negative energy balance, weight loss is a function caloric intake and not diet composition[1].

Metabolic Effects of High Protein High Fat Low Carbohydrate Diet

Ketogenic diet may cause a significant increase in blood uric concentrations[13-17]. Other metabolic effect may range from decreased blood glucose and insulin levels to alter blood lipids. Many of these effects may be consequences of weight less rather than diet composition especially considering that the absolute amount of fat consumed on a low carbohydrate diet may be similar to that consume before diet. The effect of high saturated fat diets on endothelial dysfunction has yet to be assessed. Reviews of few studies showed that diets high in meat but low in fruits and vegetables could lead to bone loss[18]. Excessive dietary protein from foods with high potential renal acid load leads to calciuria which adversely affects bones unless buffered by consumption of alkali rich foods e.g. fruits and vegetables. Low carbohydrate diets are often low in fruits, vegetables and dietary fiber. This raises the specter of increase cancer risk if such diets are consumed long term[19-22].

Dietary compliance is one of the most difficult challenges faced by dieters. Indian diets are predominantly high carbohydrate and therefore, adhering to high protein high fat diet is difficult in long run. High protein high fat diets are usually non-vegetarian diets. It is very difficult to formulate pure vegetarian high fat high protein low carbohydrate diets. This is so because vegetarian protein sources are usually a rich source of carbohydrate as well.

Moderate Fat Balance Nutrient Reduction Diet

These diets contain 20-30% fat, 15-20% protein, and 55-60% carbohydrates. The DASH diet, diets based on use of food pyramid, NCEP Step I and Step II diet are based on these principles.

Principles of Diet

The principle of this diet is that weight loss occurs when the body is in a negative energy balance. Diets are calculated to provide a deficit of 500-1000 kcals/day. Increase energy expenditure in form of physical activity is also promoted. The goal of this diet is to provide great range of food choices to the consumer and to allow nutritional adequacy and compliance, while still resulting in slow but steady rate of weight loss.

Metabolic Effects of Moderate Fat Balance Nutrient Reduction Diet

Meta-analysis revealed that this diets reduce LDL cholesterol, normalized plasma TG's, and normalized the ratio of HDL/TG's[23]. Fasting insulin levels were significantly reduced in subjects who lost weights on balanced nutrient reduction diet. A number of studies in which subjects consumed such diets reported that the individuals do not complain of hunger rather that there

is too much food. Scientist have found that subjects consuming this diets have more positive changes in there eating behaviors and greater improvement in feeling of physical wellness that were not correlated with weight loss.

Low Fat and Very Low Fat Diets

Low fat diets contain between 11% and 19% fat, whereas very low fat diets contain <10% fat. Both of these diets are very high in carbohydrate and moderate in protein. Dr. Dean Ornish's diet and Pritikin diet are examples of very low fat diets. Proponents of this diets claim that reducing caloric intake and increasing energy expenditure is the way to achieve weight loss, rather than counting calories *per se*, here the focus is on type of calories and calorie density. There is a greater emphasis on consumption of complex carbohydrates and high fiber foods. These very low fat diets are primarily based on vegetables, fruits, wholegrains, beans with moderate quantities of egg whites, non-fat dairy or soya products with very small amount of sugar and white flour. Dean Ornish diet is basically a vegetarian diet, whereas Pritikin diet allows limited quantity of low fat animal protein daily. These plans also lay a greater emphasis on exercise and lifestyle modification.

These diets lower total cholesterol specifically LDL cholesterol level and lower the risk of coronary heart disease. Although triglycerides levels are reported to increase in response to short term consumption of very low fat diets. The type of carbohydrate consumption may play a role in determining metabolic response. For example, diet containing 70% carbohydrates do not lead to hypertriglyceridemia as long as leguminous high fiber foods are consumed[24]. Blood pressure decrease in most subjects consuming very low fat diets. These diets alone or in combination with exercise resulted in reduction or elimination of antihypertensive medication in some patients[25]. These diets usually result in decreased blood glucose and insulin level[26-29].

Very low fat diets are less palatable and hence, long-term compliance can be a issue. Hunger was not a problem in subjects consuming low fat diets. Patients in the maintenance phase of a low fat diet complaint about the food quantity and abdominal fullness making it difficult for them to consume all the food that was provided. Even when subjects were allowed to choose their own food, they ate less than what was expected.

Very Low Calorie Diets

Very low calorie diets are defined as diets that provide lesser than 800 kcals/day. These diets are designed to produce rapid weight loss while preserving lean body mass. This is accomplished by providing large amounts of dietary protein, typically 70-100 g/day or 0.8-1.5 g protein/kg ideal body weight[30,31]. Protein may be obtained from a milk-, soy-, or egg-based powder, which is mixed with water and consumed as a liquid diet. Such diets may provide up to 80 g carbohydrate/day and 15 g fat/day, and they include 100% of the recommended daily allowance for essential vitamins and minerals. Alternatively, protein may be obtained from a protein-sparing modified fast, consisting of servings of lean meat, fish, and fowl[32,33]. The modified fast must be supplemented with a multivitamin and 2-3 g/day potassium. Both diets require to drink 2 L/day non-caloric fuids[30].

Very low calorie diets are associated with varieties of side effects, with numerous complications such as cholelithiasis, loss of lean body mass, ketosis and increase serum uric acid concentrations due to severe negative balance[34].

Statistical analysis showed no significant difference in the rate weight loss on different diets. Kinsell et al[35] maintain obese subject on a fixed caloric intake and varied the macronutrient composition of diet (e.g. fat intake vary from 12-80%, protein from 14-26%, carbohydrate 3-61%). In any given subjects the rate of weight loss after initial depletion of fluid was essentially constant throughout the entire study irrespective of diet composition.

Few Other Modalities of Weight Loss

Meal Replacers: Meal replacers (e.g. liquid formulas) are a popular weight loss strategy that can help people start a weight loss program, but their short-term use does not substitute for a long-term healthy eating pattern, which must be followed for a lifetime to achieve and maintain a healthy weight[36].

Obese individuals typically underestimate their calorie intake by 40 to 50% when consuming a diet of conventional foods[37] because of difficulty in estimating portion sizes, macronutrient composition, and calorie content and in remembering all foods consumed. Meal replacements seem to decrease these difficulties and simplify food choices[38]. Portion-controlled servings of conventional foods similarly facilitate weight loss, as shown by Jeffery et al[39] and other investigators[40,41].

Dietary Fiber Supplements: These are fiber based drinks/foods , give a feeling of fullness and satiety when consume with hypocaloric diets –leading to weight loss. These also show other effects like reduction in

cholesterol, triglycerides, uric acid and also reduction in blood pressure[42,43].

CONCLUSION

Those trying to lose weight are quick to embrace the latest popular diet but are almost as quick to abandon it. This observation is evidenced by the rise and the apparent recent decline in the popularity of any diets. It is interesting that the public seems ready to abandon some of these diets, despite evidence of their effectiveness and labeling them fictious.

It may be useful to consider weight management as consisting of two different phases: achieving weight loss and maintaining weight loss. The strategies that work for losing weight may not be effective for keeping weight off. As stated by James .O Hill in his editorial, 'When it comes to choosing a hypocaloric diet, one size may not fit all'[44]. However, keeping weight off requires the achievement of a permanent balance between energy intake and energy expenditure. It is imperative that weight loss diets should be individualized. It is here is where physical activity becomes critically important[44] and may be as important as the diet composition.

The crux of a weight loss program is incorporation of healthier life style, and right food choices. Therefore, patient counseling for lifestyle modification is an important part of weight loss program as is the right dietary prescription.

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