



Adverse Health Consequences of Overweight and Obesity

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Abstract

Nowadays everywhere precisely in North America amalgamation of thin standard of beauty with fat ways of living has resulted in the current era being referred by some as “the age of caloric anxiety” because of the tough pressures from society to be thin, overweight and obese people often suffer feelings of guilt, depression, anxiety and low self-worth type 2 and hypertension in obese is three times more common than in normal-weight persons. Even in children among schoolchildren, increases obesity is associated with corresponding increases in blood pressure, and weight loss may be an effective treatment for high blood pressure as it is in adults. Consequently, obesity places individuals at greater risk of coronary heart disease. Obesity develops when the body’s chronic energy intake exceeds its energy expenditure. At first glance, this may be seen as simple and straight forward. Among the key factors contributing to obesity are specific medical and psychiatric disorders or their treatment, genetics and obesigenic environment that promotes a high energy intake and discourage physical activity it/obesity can also result from a specific medical disorder such as Cushing’s syndrome, hypothyroidism, or Prader-Willi syndrome but these are relatively rare. Genetics affects body weight and body composition by influencing such factors as appetite, taste preferences, energy intake, resting energy expenditure, the thermic effect of food, nonexercise activity thermogenesis (NEAT), and the body’s efficiency in storing energy. Understanding the etiology role of genetics in obesity is complicated by the fact that obesity is not inherited in families in a predictable manner as are other diseases such as sickle cell anemia, cystic fibrosis, or Huntington’s disease. Persons born with a genetic predisposition to obesity are not necessarily destined to a life of obesity. The treatment of obesity is a two-step process: assessment and management. Management of overweight and obesity involve the appropriate use of recommended therapies for initial and long term successful weight loss, and control of the factors known to increase risk of mortality and morbidity in overweight and obese persons. Recommended therapies for overweight and obesity include diet/nutrition therapy, physical activity, and behavioral therapy. For some patients, pharmacologic treatment and bariatric surgery are indicated.

Keywords: Pharmacologic; Caloric; Obesity; Hypothyroidism

Introduction

Nowadays everywhere precisely in North America amalgamation of thin standard of beauty with fat ways of living has resulted in the current era being referred by some as “the age of caloric anxiety”. The media are relentless in promoting the ingestion of foods and beverages having high caloric density while simultaneously advancing an “ideal” body shape that is impossible to attain for practically all females and males. Because of the tough pressures from society to be thin, overweight and obese people often suffer feelings of guilt, depression, anxiety and low selfworth [1]. Excess body fat, especially when located within in abdominal region, elevates fasting and postprandial levels of plasma free fatty acids can stimulate secretion of insulin from the Bcell of the pancreas, cause insulin resistance in peripheral tissues, inhibit cellular uptake of glucose from the blood, reduce the glycogen storage, and increase hepatic glucose production, all of which lead to hyperglycemia, hyperinsulinemia, and eventual development of type 2 diabetes as it’s three times as prevalent among the obese as compared with

normal-weight persons [2]. Obesity results in the over production of very-low-density lipoprotein (VLDL) by the liver, Because the body eventually converts VLDL to LDL increased serum levels of VLDL result in elevations of serum LDL. The prevention of onset obesity in early life may be important for reducing the risk of coronary heart disease in later life [3].

A number of studies have confirmed that obesity is a significant risk factor for death from cancer generally and from cancer in several specific sites. Obesity in males is associated with increased death from cancer of esophagus, colon, rectum, pancreases, liver, and prostate. In females, obesity increases risk of death from cancer of gallbladder, bile duct, breast, endometrium, cervix, and ovaries [4].

Etiology of obesity

Obesity develops when the body’s chronic energy intake exceeds its energy expenditure. At first glance this may seem simple and straight forward. However, because of the multiple and com-

plex neuroendocrine and metabolic systems influencing energy intake and energy expenditure, obesity is actually a heterogeneous group of disorders. Its etiology remains elusive, and its successful, long term treatment is difficult. Among the key factors contributing to obesity are specific medical and psychiatric disorders or their treatment, genetics, and an obesogenic environment that promotes a high energy intake and discourages physical activity [5,6].

Medical disorders and medical treatments

Obesity can result from specific medical disorder such as Cushing syndrome, hypothyroidism or Prader-willli-syndrome, but these are relatively rare. When an adverse health condition results from some treatment administered by a physician or other health-care provider, the condition is said to be iatrogenic or literally "brought forth by a physician". Weight gain is common when people stop smoking. Compared to the weight gain of males and females who continue to smoke, males who quit smoking gain 9.7 lb. over a 10 year and female who quit smoking gain 11 lb. over a 10-year period [6,7].

Two non-normative eating patterns or forms of disordered eating known to contribute to weight gain are night eating syndrome and binge eating. Night eating syndrome, a common practice among the obese, is defined as consumption of at least 25 percent of total energy intake between the evening meal and the next morning. However, some patient with night eating syndrome consume as much as 50 percent of their total energy intake at night after their evening meal [7].

Genetics and body weight

Genetic effect of body weight and body composition by influencing such factors as appetite, taste preferences, energy intake, resting energy expenditure, the thermic effect of food, nonexercise activity thermogenesis (NEAT), and the body efficiency in storing energy. For example, it has been observed that despite some daily variation in energy intake and energy expenditure, most people maintain their body weight within a fairly narrow range. One explanation for this is the idea that each person's body has a genetically determined metabolic "set-point" that maintains a preferred body weight. While this appears to hold true if the environment remains fairly consistent, significant changes in the past several decades in eating habits and activity level throughout most of the world have to lead to a gradual increase in average body weights [8].

Understanding the etiology role of the genetics in the obesity is complicated by the fact that obesity is not inherited in families in a predictable manner as are other diseases such as sickle cell anemia, cystic fibrosis, or Huntington's disease. Further, more separating the influence of genetics from the impact of environmental and cultural factors on body weight is difficult. To explore the question of genetics versus environment, investigators have studied individuals within in the family unit, pairs of twins, and body weights

of adoptees in relation to their biologic and adoptive parents. Having obese family members increases one's risk of obesity, even if the family member do not live together or have similar dietary or physical activity patterns. However those who are genetically predisposed to obesity will gain the most weight while those who are not genetically predisposed to obesity will gain little if any weight. as important as genetics influences are persons born with a genetic predisposition to obesity are not necessarily destined to a life of obesity [9,10].

Obesogenic environment

The term "toxic food environment" aptly describes the convenient availability of low-cost, tasty, energy dense foods, in large portion sizes, in the developed countries. The toxic food environment, a key component of our obesogenic environment, encourages a high energy intake and has been a major contributing factor in the epidemic of overweight and obesity. This is sharp contrast to what was the norm throughout most of human history, when considerable energy and time were spent in obtaining food, obesity was rare, and hunger, malnutrition, and starvation were common. In the past gene favoring the efficiency use and storage of energy allowed our ancestors to survive periods of food shortage. Now these same genes work against maintaining a healthy weight in the present environment where food is plentiful, inexpensive, and accessible and energy dense [11,12].

A successful strategy for reducing energy intake while maintaining satiety is providing as a first course of a meal satisfying portion of low-energy dense food such as vegetables salads or brothbased soups. Greater use of cooked vegetables as side dishes can be an effective way of decreasing the energy density of a meal. An additional strategy to reduce energy density is to prepare the main course of a meal using ingredients that reduce its fat content and increase its water content. Fat can be reduced by using smaller amount of high-fat ingredients such as meat, dairy products, and oils, or by using leaner cuts of meat and/reduced-fat dairy products. By using more vegetables in the preparation of dish such as pasta salads or casserole, one can increase water content of that dish while decreasing the energy density.

Two barriers to success in promoting a lower-energy-dense diet are cost and convenience. There is an inverse relationship between energy-density and cost [12,13].

Energy expenditure

Of the three major component 24-hour energy expenditure illustrate in box 1. energy expended through physical activity is the most highly variable and the one humans can most easily control. Physical activity energy expenditure includes movement from the performance of the routine activities of daily life and purposeful exercise as well as energy expended by maintain posture, fidgeting, and spontaneous muscle contraction. Most studies indicate that obese children and adults are less physically active than their

leaner counterparts. However, when obese persons engage in physically activity, they expend more energy than leaner persons performing the same activity. Overall, daily energy expenditure from physical activity by obese persons appears to be no different than that of leaner persons. Because obese persons have a greater amount of weight to carry than do persons, their lean body mass is greater consequently, the obese have a greater resting energy expenditure compared to leaner persons. The choices an individual makes about energy intake and energy expenditure are the most important factors determining his or her body weight. However, an individual’s environment is an important factor influencing that person’s behavior, either by facilitating or impeding healthy eating and regular physical activity. There is a growing awareness among researchers and public health experts that successfully addressing the problem of overweight and obesity will require identifying feasible ways to cope with and to change the current environment. A first step in this process would be to give people strategies to better manage within the current environment and to better resist the many factors promoting weight gain.

Treatment of overweight and obesity

The treatment of overweight and obesity is a two-steps process; assessment and management. Assessment by calculating BMI, measuring waist circumference, checking for the presence of life-threatening conditions often accompanying obesity, evaluating dietary and exercise habits, and determining the patient’s readiness to lose weight. Management includes applying therapies to lose weight and maintain weight loss and applying measures to control other disease risk factors [18].

Assessment

Determining the degree of overweight or obesity is based on BMI calculated from an accurate measurement of patient’s weight and height. Clinical judgment must be used in interpreting BMI of persons who are very muscular, have lost a significant amount of lean body mass, are short, or who have edema or ascites. Waist circumstances are used as an index of abdominal adiposity and are interpreted using classification shown in Box 2.

Table: 7. Examples of Equations for Estimating Resting Energy Expenditure in Healthy Persons:

Harris-Benedict			
Females	REE = 655.096 + 9.563 W + 1.850 S - 4.676 A		
Males	REE = 66.473 + 13.752 W + 5.003 S - 6.755 A		
Harris-Benedict (Values Rounded for Simplicity)			
Females	REE = 655.1 + 9.6 W + 1.9 S - 4.7 A		
Males	REE = 66.5 + 13.8 W + 5.0 S - 6.8 A		
World Health Organization (WHO)			
			<i>SD</i> [†]
Females	3-10 years old	22.5 W + 499	±63
	10-18 years old	12.2 W + 746	±117
	18-30 years old	14.7 W + 496	±121
	30-60 years old	8.7 W + 829	±108
	> 60 years old	10.5 W + 596	±108
Males	3-10 years old	22.7 W + 495	±62
	10-18 years old	17.5 W + 651	±100
	18-30 years old	15.3 W + 679	±151
	30-60 years old	11.6 W + 879	±164
	> 60 years old	13.5 W + 487	±148

From Harris JA, Benedict FG. 1919. *A biometric study of basal metabolism in man*. 279. Washington, DC: Carnegie Institution of Washington; World Health Organization; *Energy and protein requirements. Report of a Joint FAO/WHO/UNU expert consultation. Technical Report Series 724*. Geneva, Switzerland: World Health Organization. 1985.

*REE = resting energy expenditure in kilocalories (kcal); W = body weight in kg; S = stature in cm; A = age.

†SD = standard deviation of the differences between actual and computed values—68% of the time, actual REE will be within ±1 standard deviation of the predicted REE.

Box 1

A second, long-term approach would be to build an environment that is more conducive to the adoption and maintenance of healthily dietary and excise habits [14-17].

<p>Premature Death: Individuals who are obese (BMI>30 kg/m²) have 50%- 100% increased risk of premature death from all causes, compared to individuals in the healthy weight range (BMI 18.5 kg/m² to 24.9 kg/m²). The risk of death rises with increasing weight.</p> <p>Heart Disease: The incidence of heart disease is increased in person who are overweight or obese. High blood pressure is twice as common in adults who are obese than those who at a healthy weight.</p> <p>Diabetes: A weight gain 11 to 18 pounds increases a person’s risk of developing type 2 diabetes to twice that of individuals who have not gained weight.</p>	<p>Arthritis: For every two pounds increase in weight, the risk of developing arthritis is increased by 9 percent to 13 percent. Symptoms of arthritis can improve with weight loss.</p> <p>Reproductive Complication: Obesity during pregnancy is associated with an increased risk of fetal and maternal death and increases the risk of maternal high blood pressure tenfold.</p> <p>Additional Health Consequences: Overweight and obesity are associated with increased surgical risk as we, as increased risk of gall bladder disease, incontinence, and depression.</p>
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<p>Over 80 % of people with diabetes are overweight and obese.</p> <p>Cancer: Overweight and obesity are associated with an increased risk of some types of cancer.</p> <p>Breathing Problem: Sleep apnea is more common in obese persons. Obesity is associated with a higher prevalence of asthma.</p>	<p>Children and Adolescent’s: The most immediate consequences of overweight, as perceived by children themselves, is social discrimination. Risk factors for heart disease, such as hyperlipidemia and hypertension, occur more frequently in individuals in the healthy weight range.</p> <p>Benefits of Weight Loss: Weight loss as modest as 5% to 15% of total body weight in a person who is overweight or obese reduces the risk of chronic diseases.</p>
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Box 2: Health consequences of overweight and obesity.

Patients should be evaluated for the presence of disease that places them at high risk of morbidity and mortality and that requires aggressive treatment [19].

Patients who are pregnant, lactating, or anorexia nervosa, bulimia nervosa, a serious uncontrolled psychiatric illness such as major depression, or active substance abuse should be excluded from weight loss therapy.

Management of overweight

Management of overweight and obesity involve the appropriate use of recommended therapies for initial and long term successful weight loss, and control of the factors known to increase risk of mortality and morbidity in overweight and obese persons. Recommended therapies for overweight and obesity include diet/nutrition therapy, physical activity, and behavioral therapy. For some patients, pharmacologic treatment and bariatric surgery are indicated [20].

A minimum goal is to avoid additional weight gain with age once a person reaches his/her ideal or healthy, adult weight. Those who are at a there normal or healthy weight (BMI 18.5-24.9 kg/m²) should be counseled about effective dietary and physical activity habits that can prevent further weight gain.

The recommended approach is for a patient to reduce their energy intake by 500-1000 kcal/day [21].

Successful weight maintenance is regaining of weight that is less than 6.6 pound (3 kg) in two years and a sustained reduction in waist circumference of at least 1.6 inches. The success I weight maintenance is dependent on pregnant adoption of a low-energy-dense diet and regular physical activity and will be enhanced by long term practitioner monitoring and encouragement through regular clinic visit group meeting, postal mailing, telephone calls, and emails [20,22].

Nutrition therapy

The cornerstone of weight reduction therapy is individually planned low-kcal diet (LCD) that reduces energy intake by 500-1000 kcal/day and achieves a slow but progressive weight loss of 1 to 2 pounds per week. The key feature of this approach, as recommended by the national institute of health, are shown in Box 3.

Although greater energy deficits may be useful during the period of active weight loss to provide need motivation to some patient, a very-low-kcal diet (VLCD) providing less than 800 kcal/day should not be used boxed for routine weight loss. VLCDs required special monitoring and nutritional supplementation and should be used only in very limited circumstances by a specialized practitioner experienced in their use. Clinical trials indicate that VLCDs are no more effective in achieving weight loss after 1 year than are LCDs. A meal plan providing 1,000 to 1200 kcal/day is generally recommended for most. A meal plan providing 1200-1600 kcal/day is generally recommended for most man and may be suited

Nutrient	Recommended Intake
Calories	Approximately 500-1,000 kcal/day reduction from usual intake.
Total fat	30% or less of total calories.
Saturated fatty acids	8 %-10 %of total calories.
Monosaturated fatty acids	Up to 15% of total calories.
Polyun saturated fatty acids	Up to 10% of total calories. <300mg/day
Cholesterol	Approximately 15% of total calories.
Protein	55% or more of total calories
Carbohydrates	No more than 100 mmol/day
Sodium chloride	1,000 to 1500 mg/day
Calcium	20 to 30 g/day
Fiber	

Box 3: Low caloric diet recommended by NIH.

for women who exercise more or weight 165 lb. or more. A greater reduction in energy intake may be necessary for patients failing to respond to this energy level, whereas patients complaining of hunger or having difficulty adhering to the recommendation may need a somewhat more liberal intake [22].

The practitioner and patient must collaboratively establish a goal for modifying dietary and physical activity patterns, and the patient must see these modifications as desirable and achievable. In helping patient be a better-informed consumer, particular attention should be given to the topics listed in Box 3. [23].

Physical activity

Although physical activity is less important than an energy-restricted diet in promoting initial weight loss, it is nevertheless considered an important component of weight loss therapy. Moreover, it appears to be crucial for maintaining weight loss. Physical activity has the added benefit of minimizing loss of lean body mass, reducing LDL-cholesterol level, increasing HDL cholesterol levels, improving insulin sensitivity, and improving fitness. A minimum goal for physical activity is 30 to 45 minutes of moderate's activity, 3 to 5 days per week. For the sedentary and obese, physical activity should be initiated slowly and then gradually increased in duration and intensity. Physical activity can involve either programmed or lifestyle activities. Programmed or formal activities include regularly scheduled periods of swimming, running, jumping rope, or other aerobic activities performed at a relatively high intensity for a short period of time (30 to 60 minutes). Lifestyle activity involves moving the body more throughout the day in the discharge of the activities of daily life. Examples include walking or bicycling instead of riding in a motor vehicle, climbing stairs instead of using an elevator or escalator, decreasing time spent in sedentary behaviors such as watching television and increasing time spent performing common chores such as house cleaning and yard work [20,24].

Behavior therapy

Behavior therapy provides patients with a set of techniques (self-monitoring, stimulus control, rewards, etc.) to identify and overcome barriers to positive dietary, exercise and other lifestyle habits. The practitioner collaborates with the patient to establish specific, achievable, and measurable goals related to food intake, physical activity and weight loss. Patients are taught to observe and record their food intake, physical activity, and body weight. Self-monitoring of behavior generally changes behavior in the desired direction and is associated with long term weight loss. Self-monitoring also helps the patient identify social or environmental stimuli that are identified, steps can be taken to prevent them from occurring or to change one's reaction to them. This is referred to as stimulus control. Behavioral therapy is a valuable adjunct to diet and physical activity, resulting in marked improvements in weight loss and weight maintenance [22,25,26].

Pharmacologic treatment

Drug therapy can be useful as an adjunct to diet, physical activity, and behavioral therapy in patients whose BMI is >30 kg/m² or in patients whose BMI is 27 kg/m² and who have obesity related risk factors or diseases. The modest benefits of drug treatment are offset by its cost and side effects and rebound weight gain following cessation of drug use. The US food and drug administration has approved drugs for long term use for weight loss and the maintenance of weight loss: sibutramine and orlistat. Several have been approved for short-term treatment (6-12 weeks), including mazindol, diethylpropion, benzphetamine, phendimetrazine, and phentermine. Phentermine, the drug most commonly used for short-term treatment, is an amphetamine-like drug with a low addictive potential that acts on the hypothalamus to suppress appetite. Sibutramine, marketed under the trade name meridian, is a serotonin-norepinephrine reuptake inhibitor that acts on receptors in the hypothalamus to suppress appetite. Because it increases heart rate and blood pressure (1-2 mmHg), it should not be used by patients with CVD or uncontrolled hypertension. Orlistat, marketed under the trade name Xenical, inhibits the action of gastrointestinal lipase and reduces the digestion of triglycerides by about 30 %. If taken with meals providing more than 20 grams of fats, there is an increased risk of gastrointestinal side effects such as flatus with discharge, oily stools, and fecal urgency. These adverse events serve an incentive to consume a low-fat diet, thus further decreasing energy intake. Because Orlistat inhibits the absorption of fat-soluble vitamins supplement to offset losses of vitamin A, D, E and K. Clinical trials of diet plus Orlistat resulted in 10 % weight loss after a year compared to 6% loss from diet alone [26,27].

Surgery

Weight loss or bariatric surgery is reserved for patients who have failed to lose weight by the methods and who have clinically severe obesity: BMI > 40 kg/m² or BMI > 35 kg/m² with obesity-related risk factors or disease. Commonly used bariatric surgical procedures are the Roux-en-Y gastric bypass, the vertical banded

gastroplasty, and the adjustable gastric band. Bariatric surgery more common than the other surgeries and with it the death of patient declined to 64%. The future demand for bariatric surgery will likely increase as the number of eligible patients rises and as the safety of the procedure continues to improve. The average cost of the procedure is approximately \$20,000 and vice versa in other countries [28].

Conclusion and Recommendation

Throughout human history, energy balance has been an issue of concern for most people. Prior to the mechanization of agriculture in the middle of the twentieth century, most humans faced an uncertain food supply and hunger, malnutrition and starvation were common. Tragically, these contributions remain a threat to many people living in developing nations: yet a much more common condition, particularly in developed nations, is an obliging environment that promotes the consumption of high-energy-dense foods and tends to discourage regular physical activity. The dramatic rise in the prevalence of overweight and obesity in recent decades has been aptly described as an epidemic, and the term "globesity" has been coined to represent the global nature of the obesity epidemic. The complex etiology of obesity requires a multifactorial approach to its prevention and treatment. This will involve better understanding of the biological basis of the body weight regulation and the control of hunger and appetite, more informed personal choices about food intake and physical activity and modifying the environment to promote the adoption and maintenance of healthy dietary and physical activity behavior. At the same time, eating disorders remain a threat to health and demand attention, particularly considering the high mortality associated with anorexia nervosa.

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