Review

Epidemiology, risks and pathogenesis of obesity

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Abstract

Obesity is operationally defined using a relationship of height and weight called the body mass index. Using this measure, more than 60% of Americans are overweight and over 30% are obese. To determine the importance of the body mass index, which would also label many athletes "overweight", we also need assessment of central fatness, and the medical conditions present in any given person. A problem of this magnitude is expensive, costing between 3% and 8% of health budgets in various countries. An increasing body weight increases the risk of early mortality, and enhances the risk of developing diabetes, gall bladder disease, high blood pressure, heart disease, osteoarthritis and certain forms of cancer. Although obesity results from an imbalance between what is eaten and what the body needs for its daily activities, these relationships are complex, and it is the "devil in the details" that is needed to provide clear public health strategies to prevent the progression of what some have called an epidemic.
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1. Introduction

I start with the premise that all of us want to have a healthy weight, and that no one wants to be obese. Interest in obesity has taken a sharp up-turn in recent years and the prevalence of this problem by any standards has increased rapidly. An unhealthy weight can be viewed as the result of a chronic, stigmatized, neurochemical disease. In this context, the goal is to return body weight to a healthy level and to remove the stigma associated with the use of the word obesity. To consider it in the context of a neurochemical derangement has the advantage of focusing on the underlying mechanisms that produce the distortion in energy balance that produces the unhealthy weight (Bray & Champagne, 2005).

2. Definition of obesity

2.1. Body mass index

Throughout the past 50 years there has been a steady rightward shift in the distribution curve for body weight. This trend can be most effectively traced using the BMI, defined as the weight in kilograms divided by the height in meters squared $[W/(H)^2]$, which provides a useful operating definition of overweight. A normal BMI is between 18.5 and <25 kg/m^2, a BMI between 25 and 29.9 kg/m^2 is operationally defined as overweight, and individuals with BMI >30 kg/m^2 are obese, after taking into consideration muscle builders, and other resistance trained athletes. BMI also provides one way to estimate the risk associated with obesity (NHLBI, 1998; WHO, 2000). However, to interpret it properly, several other pieces of information are needed. These include information about the ethnicity of the individual. For Asians, a BMI of more than 23 is considered overweight, and the cut-point for obesity is a BMI of greater than 25 kg/m^2, well below that of the Caucasian population. Age is also an important consideration. A high BMI at a young age implies longer years of excess weight and a higher lifetime risk. Whether the BMI is rising, falling or stable is also important. A rising BMI carries more risk than a stable one. Whether the individual is physically active is also important. Higher levels of physical activity reduce the detrimental effects of any given BMI and all Americans should be encouraged to have a regular program of physical activity. The final piece of information needed to interpret the BMI is whether it is associated with an increase in central adiposity.

2.2. Central adiposity

Centrally distributed body fat carries more risk for health than fat located primarily on the hips and thighs. The waist circumference is a practical measure of central adiposity and is a surrogate for more precise measures such as a CT or MRI scan of the abdomen at the L-4-5 position. When BMI and waist circumference were used to predict the risk of hypertension, dyslipidemia and the metabolic syndrome, the waist circumference was shown to be a better predictor than the BMI (Bray, 2004; Janssen, Katzmarzyk, & Ross, 2004).

2.3. Prevalence of obesity

Using the BMI, it is clear that there is an epidemic of obesity that began in the 1980s and which continues unabated. It affects children as well as adults. We are now seeing a rise in the prevalence of Type 2 diabetes in adolescents that is directly related to obesity. Obesity and overweight now affect more than 60% of adult Americans. Diabetes mellitus, hypertension, heart disease, gall bladder disease and some forms of cancer result from obesity. Whether these diseases are yet present or not, the obese patient should be encouraged to lose weight by appropriate methods in order to reduce the future likelihood that they will develop. More females than males are overweight at any age. The frequency of overweight increases with age to reach a peak at 45–54 years in men and at age 55–64 in women.

At birth, the human infant contains about 12% body fat. During the first year of life, body fat rises rapidly to reach a peak of about 25% by 6 months of age and the declines to 18% over the next 10 years. At puberty, there is a significant increase in the percentage of body fat in females and a fall in males. By age 18, males have approximately 15–18% body fat, and females 25–28%. Between ages 20 and 50, the fat content of males