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Review article in

Approach to obesity

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Abstract

Obesity generally is defined as excess body fat. The definition of excess, however, is not clear-cut. Adiposity is a continuous trait not marked by a clear division into normal and abnormal. Moreover, it is difficult to measure body fat directly. The worldwide prevalence rates of overweight and obesity have approximately doubled since 1980 to an extent that over one-third of the world's population is now classified as overweight or obese. The etiology of obesity is highly complex and includes genetic, physiologic, environmental, psychological, social, economic, and even political factors that interact in varying degrees to promote the development of obesity. The approach include many treatment modalities such as life style modifications, pharmacological treatment and surgery. In this review we will demonstrate the stander approach for obesity and its management.

Introduction

The human body contains essential lipids and also nonessential lipids in the form of triglycerides (triacylglycerols) stored in adipose tissue cells known as adipocytes. Obesity generally is defined as excess body fat. The definition of excess, however, is not clear-cut. Adiposity is a continuous trait not marked by a clear division into normal and abnormal. Moreover, it is difficult to measure body fat directly. Consequently, obesity often is defined as excess body weight rather than as excess fat (1).

In clinical practice, body fat is most commonly and simply estimated by using a formula that combines weight and height. The underlying assumption is that most variation in weight for persons of the same height is due to fat mass, and the formula most frequently used in epidemiological studies is body-mass index (BMI). Table 1 details the practical methods used in clinical practice to assess body fatness. A graded classification of

overweight and obesity using BMI values provides valuable information about increasing body fatness (2).

Table 1. The common methods to measure obesity

Method	Definition	Advantages/limitations
BMI	Weight in kilograms divided by square of the height in metres	BMI correlated strongly with densitometry measurements of fat mass; main limitation is that it does not distinguish fat mass from lean mass
Waist circumference	Measured (in centimetres) at midpoint between lower border of ribs and upper border of the pelvis	Waist circumference and waist-to-hip ratio provide measures for assessing upper body fat deposition; neither provide precise estimates of intra-abdominal (visceral) fat
Skinfold thickness	Measurement of skinfold thickness (in centimetres) with callipers provides a more precise assessment if taken at multiple sites	Measurements are subject to considerable variation between observers, require accurate callipers and do not provide any information on abdominal and intramuscular fat
Bioimpedance	Based on the principle that lean mass conducts current better than fat mass because it is primarily an electrolyte solution; measurement of resistance to a weak current (impedance) applied across extremities provides an estimate of body fat using an empirically derived equation	Devices are simple and practical but neither measure fat nor predict biological outcomes more accurately than simpler anthropometric measurements

The effects of excess weight on morbidity and mortality have been known for more than 2000 yr. Hippocrates recognized that “sudden death is more common in those who are naturally fat than in the lean,” and Malcolm Flemyng in 1760 observed that “corpulency, when in an extraordinary degree, may be reckoned a disease, as it in some measure obstructs the free exercise of the animal functions; and hath a tendency to shorten life, by paving the way to dangerous distempers.” (3).

The worldwide prevalence rates of overweight and obesity have approximately doubled since 1980 to an extent that over one-third of the world's population is now classified as overweight or obese. Kelly et al. estimated that 57.8% of the world population will be overweight or obese by the year 2030 if the current trends continue (4).

Although obesity is most commonly caused by excess energy consumption (dietary intake) relative to energy expenditure (energy loss via metabolic and physical activity), the etiology of obesity is highly complex

and includes genetic, physiologic, environmental, psychological, social, economic, and even political factors that interact in varying degrees to promote the development of obesity (5).

The food, or ‘‘built’’ environment has shifted in ways that promote overeating: highly caloric and fat-laden foods are not only affordable but also easily accessible (i.e., numerous fast food restaurants, vending machines of energy dense items in schools and offices, etc.). These highly palatable foods are frequently available in large portions, which contribute to increased daily caloric intake (6). Not only have commercial portion sizes increased, the number of processed food items (typically high in sugar, fat, and sodium) available in grocery stores, mini-marts, and convenience stores has skyrocketed. Today, the majority of products in grocery stores are non-perishable, highly processed, and pre-packaged foods. These products are heavily marketed not only to adults but also to children as well. Convenient, easy to prepare, and inexpensive, these high calorie products are frequently consumed by millions of families who are struggling to meet the economic and scheduling demands of today’s fast paced lifestyle (7).

In addition to the primary influences of increased caloric intake and decreased energy expenditure, Keith et al. (8) identified ten other contributing factors to the obesity epidemic. Weight gain is associated with several commonly used medications including psychotropic medications, diabetic treatments, antihypertensives, steroid hormones and contraceptives, antihistamines, and protease inhibitors. The deleterious effects of drug-induced weight gain include, paradoxically, increased risks for developing type II diabetes, hypertension, hyperlipidemia, as well as poor medication compliance. Table 2 show the commonest factors associated with obesity.

Table 2.

Contributing factor
The food environment
Decreases in physical activity
Sleep debt
Drug-induced weight gain
Decline in cigarette smoking
Endocrine disruptors
Reduction in variability of ambient temperature
Changes in distribution of ethnicity and age
Increasing gravida age
Intrauterine effects
Greater reproductive fitness of higher BMI individuals yielding the selection for obesity-predisposing genotypes
Assortative mating and floor effects
Changes in policy
Infections

In this review, we will discuss the approach and managemet of obesity.

Approach to obesity

Assessment

The obese phenotype is complex, and some patients do not have any evident cardiometabolic effects, a phenomenon that has been called the "metabolically healthy" obese state. Clusters of findings related to insulin resistance with an enlarged intraabdominal and upper-body subcutaneous adipose-tissue mass are consistent with the diagnosis of a metabolic syndrome (13).

Although the BMI is a good proxy for adiposity at the group level, each patient's risk can be stratified further on the basis of a personal and family medical history, a psychiatric history, and blood studies, as well as a behavioral history that includes information about physical activity,

nutrition, and eating behavior. Waist circumference is also a useful measure of intraabdominal and upper-body subcutaneous adipose tissue, and some guidelines include it as a risk marker in addition to or in place of the BMI (14).

Diet

The Obesity Guidelines recommend an energy deficit of 500 to 750 kcal/d, which can usually be achieved by prescribing 1,200 to 1,500 kcal/d for women and 1,500 to 1,800 kcal/d for men. This prescription should yield an average loss of 0.5 to 0.75 kg/wk (9).

As noted in the Obesity Guidelines, a variety of diets can be incorporated into lifestyle interventions, including evidence-based diets that restrict certain types of foods (eg, high carbohydrate, high-glycemic value). All diets, regardless of macronutrient composition, will produce weight loss if a consistent caloric deficit is achieved. This was demonstrated by the 2-year POUNDS LOST (Preventing Overweight Using Novel Dietary Strategies) study, in which all participants in four groups were prescribed a 750 kcal/d deficit but were instructed to consume different percentages of protein, fat, and carbohydrate. Short- and long-term weight losses did not differ significantly at any time among the four diets, all of which were combined with a lifestyle program (10).

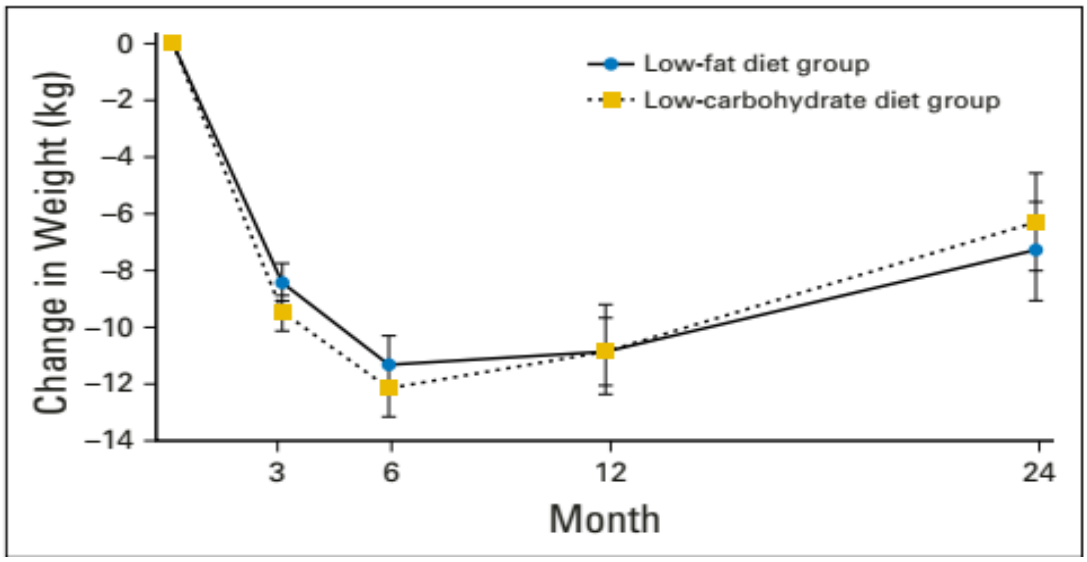

Figure 1. Change in body weight for participants in low-fat and low-carbohydrate diet groups after 24 months, based on random-effects linear model. Reprinted with permission.

Physical Activity

Lifestyle interventions instruct patients to gradually increase physical activity to approximately 150 to 180 min/wk over 6 months. Activity usually consists of brisk walking or similar aerobic exercise. Short-term studies have shown that physical activity alone induces minimal weight loss (1 to 2 kg) compared with losses produced by diet alone or diet plus exercise (8 to 10 kg). However, patients should be encouraged to increase physical activity in the short term, given findings that cardiorespiratory fitness may attenuate CVD mortality. Even in the absence of substantial weight loss, regular aerobic activity may reduce blood pressure, lipid concentrations, and visceral fat, while also improving glycemic control (11).

Pharmacological treatment

Several clinical studies have shown that pharmacotherapy with lifestyle intervention is superior to lifestyle intervention alone in achieving clinically meaningful weight loss (≥5% weight loss) in patients with overweight and obesity. This superior efficacy at 1 year was seen with several FDA-approved long-term pharmacotherapies, such as orlistat, lorcaserin, phentermine/topiramate, naltrexone/bupropion, and liraglutide, when used as adjunctive therapy along with lifestyle intervention. The weight-management pharmacotherapies approved by the FDA are generally indicated for patients with obesity (BMI ≥30 kg/m2) or patients who are overweight (BMI ≥27 kg/m2) with increased complications associated with obesity (e.g., T2DM, hypertension, dyslipidemia). In general, according to product labeling, if no clinical improvements are seen with a weight-management pharmacotherapy within 12 weeks, patients are recommended to consider either changing the pharmacotherapy or increasing the dose (12).

Phentermine, the most widely prescribed weight-management medication in the United States, is a low-cost sympathomimetic amine that was approved by the Food and Drug Administration (FDA) in 1959 for short-term use (≤3 months). The availability of five newer FDAapproved medications for weight management, along with complexities surrounding the prescribing of phentermine, has led some professional groups to discourage long-term use of phentermine (15).

For a number of reasons, physicians do not use weight-loss medications to the extent that one might expect, given the scale of the obesity problem. First, patients are often disappointedby moderate weight loss. Dissatisfaction with the results, coupled with requirements to pay a substantial portion of costs, may lead to short-term rather than long-term

use. Also, some practitioners appear to have lingering concerns about medication safety and may be awaiting the outcome of FDA-mandated cardiovascular disease trials. Finally, weight regain is common after termination of drug treatment (16).

Surgical treatment (bariatric surgeries)

Roux-en-Y gastric bypass (RYGB) is considered the gold standard for weight loss surgery. It involves dividing the stomach to create a small gastric pouch in the upper fundus, which is anastomosed to a Roux limb of jejunum that bypasses 75 to 150 cm of small bowel, resulting in bypass of the majority of the stomach, the entire duodenum, and most of the jejunum, thereby restricting food and limiting absorption. The procedure combines restrictive and malabsorptive mechanisms and produces a median loss of 31.5% of initial weight at 3 years. The Swedish Obese Subjects (SOS) study revealed a sustained approximately 25% reduction at 10 years. Complications of RYGB include anastomotic leakage, acute gastric dilatation, ulceration, nutritional deficiencies, and the dumping syndrome. Thirty-day mortality rates are approximately 0.2%, with other serious complication rates of approximately 5% (17).

Sleeve gastrectomy (SG) was introduced in the United States in 2007 but is now the nation’s most commonly performed bariatric surgery. It involves removing approximately 75% of the stomach, thus bypassing the gastric fundus and body. In addition to its restrictive properties, SG accelerates gastric emptying and dramatically reduces ghrelin levels (18).

Adjustable gastric banding (AGB) is the least invasive surgical procedure and involves placing an inflatable silicone band around the fundus of the stomach creating a small pouch. Saline can be added or removed through a subcutaneous port to adjust the diameter of the band.

This is a restrictive procedure, with no changes in gut anatomy or hormones. AGB results in median weight loss of approximately 15.9% of initial weight at 3 years. Complications include band erosions, slippage, port problems, wound infections, and acid reflux, often requiring a revision or repeat surgery. The mortality rate for surgery is close to zero (19).

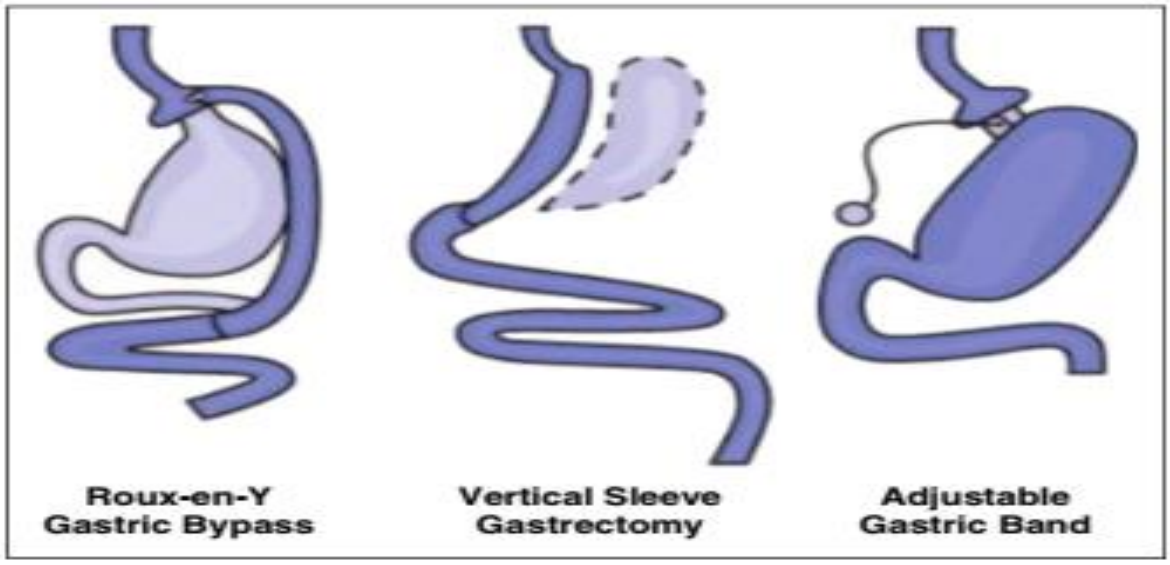

Figure 2. Types of bariatric surgeries

Conclusion

Obesity could be considered the problem of the era. It need huge campaigns about the seriousness of the problem and the potential benefits of weight loss. The authorities should take this problem seriously in order to improve the general health and to decrease the burden of both of the obesity and the related medical issues (cardiovascular diseases, DM etc.,).

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