



OBESITY: A REAL GLOBAL HEALTH CONCERN

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ABSTRACT

Obesity, also known as the new world syndrome, is a fast emerging health problem, multi-factorial in nature and is associated with various significant diseases like hypertension and other cardiovascular diseases, type-2 diabetes, obstructive sleep apneas, osteoarthritis and few cancers. The management of obesity requires a range of strategies for individuals with existing obesity and also for those who are at high risk of developing obesity. This short review highlights the role of lifestyle modification which has now become the initial approach for the management of obesity, overweight and many other associated diseases.

INTRODUCTION

Obesity is characterized by the accumulation of excess adipose tissue/body fat to the extent that it may cause a negative effect on health, thus making it a complex medical condition and not just a cosmetic concern. With its incidence increasing it is among the most talked about and pressing issue of public health worldwide in the 21st century. The World Health Organization (WHO), in the year 2014, estimated that there are more than 600 million obese adults out of total 1.9 billion adults (more than 18 years of age) who are overweight (World Health Organization. Fact Sheet Number 31) [1], with most of these people in the developed world. The prevalence of obesity has doubled between 1980 and 2014 and is now becoming an increasing problem of low and middle income countries too, causing an impact on the healthcare system in these countries (World Health Organization. Fact Sheet Number 311) [1]. Obesity is associated with increased incidence of various non-communicable diseases like type-2 diabetes, cardiovascular disease (stroke and heart disease), obstructive sleep apnea, cancer (endometrial, breast, and colon), and osteoarthritis (Redinger, Guh et al) [2,3]. Modest amount of weight loss can improve and/or prevent the health problems associated with obesity. The lifestyle modification is the most important initial step in losing weight. Prescription medications or weight-loss

surgery may provide an additional option in the later stages for treating obesity (National Institutes of Health) [4].

What defines obesity?

Overweight and obesity are defined by the WHO as an abnormal or excessive fat accumulation that may impair health (World Health Organization. Fact Sheet Number 311) [1]. Body mass index (BMI) is an index of weight-for-height that is used to classify overweight and obesity in adults because it is simple to calculate and thus also being used for epidemiological research. BMI is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2).

As per the WHO (Table 1):

- A BMI greater than or equal to 25 is overweight,
- A BMI greater than or equal to 30 is obese.

BMI provides the useful population-level measure of overweight and obesity, as it is the same for both sexes and for all ages of adults. The drawback being that it may not correspond to the same degree of fatness in different individuals.

Waist circumference

It is measured in overweight and obese adults to assess for abdominal obesity addition to measuring BMI. A



waist circumference of ≥ 40 in (102 cm) for men and ≥ 35 in (88 cm) for women are considered elevated and indicates increased risk of metabolic diseases (Andersson) [5]. Waist circumference measurement is not required in patients with BMI ≥ 35 kg/m², as individuals with this BMI will also have an elevated waist circumference and are at a high risk from their adiposity.

Etiology:

Obesity is an expression of many different groups of conditions having various causes each of which can lead to obesity. It involves complex links between the genetic, metabolic and neural frameworks together with behavior, physical activity, food habits and socio-cultural factors (Redinger, National Institutes of Health) [2,4]. The principal cause of obesity and overweight is an energy imbalance between calories consumed and calories expended leading to accumulation of excessive and abnormal fat (Redinger, National Institutes of Health) [2,4].

Genetic considerations

Research has shown that genes do play a role in obesity and it runs in family (Andersson) [5]. Bardet-Biedl syndrome and Prader-Willi syndrome are examples of the genetic cause of obesity. The genetic factor and behavior of the individual may both be needed for a person to be overweight. In some cases, multiple genes may be involved.

Environmental factors

The environmental factors play a crucial role in the development of obesity by unmasking genetic or metabolic susceptibilities of the individual. These factors act by increasing the energy intake with a concomitant decrease in energy expenditure, thus predisposing the individual to obesity. Over the last decades there has been an increase in physical inactivity due to the increasingly sedentary nature of many forms of work, change in mode of transportation, and increasing urbanization making obesity a lifestyle disorder. Also, there has been an increase in consumption of energy-dense foods which are also rich in fat content.

Diseases and drugs

Some illnesses may also cause obesity or weight gain like Cushing's disease and polycystic ovary syndrome. Some of the drugs such as corticosteroids and antidepressants may cause weight gain.

Obesity-associated diseases and risk factors (Redinger, Guh et al) [2,3]:

Cardiovascular diseases (CVD)

- Hypertension
- Coronary heart disease
- Cerebrovascular disease

- Varicose veins
- Deep venous thrombosis

Respiratory disorders

Obstructive sleep apnea, obesity hypoventilation syndrome, increased work of breathing giving rise to dyspnea, increased ventilation-perfusion mismatch due to basal atelectasis of the lungs.

Metabolic disorders

- Hyperlipidemia
- Diabetes mellitus
- Insulin resistance
- Menstrual irregularities

Management: The lifestyle modification

The goal of treatment of obesity is to prevent and/or reverse the complications arising due to obesity (National Institutes of Health, Jensen et al) [4,6]. Weight loss of 5-10% body weight has been shown to significantly reduce the health risks associated with obesity (National Institutes of Health, Jensen et al) [4,6], which can be achieved by the lifestyle modifications which now have become the cornerstone of the treatment not only for obesity but also for other major non-communicable diseases like diabetes mellitus and hypertension. This requires a multidisciplinary approach by the physician and the nutritionist and may also include a behavior therapy expert (Jensen et al) [6].

It is recommended that people with a BMI = 30 kg/m², or those with a BMI of 25.0–29.9 kg/m² with two or more disease risk factors, must adhere to lifestyle modification to lose weight. The lifestyle modifications include- dietary modifications/interventions, exercise, and behavior therapy (Jensen et al) [6]. Some patients may eventually require the addition of pharmacological therapy or Bariatric surgery, the appropriate application and indications for which keep changing. Goals of weight reduction: The most important start is to set a goal when discussing a weight loss program with an individual patient. These include:

- a. An initial weight reduction goal set at five to seven percent of body weight is most of the time realistic for individuals. The clinician identifies and reviews the individual's realistic weight loss goal (Foster et al) [7].
- b. Aim to prevent any further weight gain and keeping body weight stable, which is within five pounds of its current level.
- c. A reduction of five percent of initial body weight and maintenance of this gives good medical results and can reduce risk factors for cardiovascular disease, such as hypertension, dyslipidemia, and diabetes mellitus (Jensen et al, Douketis et al, Knowler et al) [6,8,9].



Dietary interventions

The rate of weight reduction is directly linked to the difference between the individual's energy intake and energy requirements. Diet in obesity is designed so as to create a negative energy balance (i.e., calories ingested < calories expended) by reducing the calorie intake below the daily requirements which vary according to sex, weight, and level of physical activity of the individual (Jensen et al, Heymsfield et al) [6,10]. It has been postulated that approximately 22 kcal/kg is required to maintain a kilogram of body weight in a normal adult. Thus an average deficit of 500 kcal/day results in an initial weight loss of approximately 0.5 kg/week (1 lb/week). However, after three to six months of weight loss, energy expenditure adaptations occur, which slow the body weight response to a given change in energy intake, thereby decreasing the ongoing weight loss (Hall et al) [11].

Types of diet

The diet therapy is aimed at reducing the total number of calories consumed and the emphasis is also on the degree of compliance/adherence to the diet, irrespective of the macronutrient composition (Del Corral et al, Alhassan et al, Pagoto et al) [12-14]. The various types of diet are (Freedman et al, Melanson et al) [15,16]:

1) Conventional diets- diets with energy requirements more than 800 kcal/day [15]: These are grouped into the following –

- a. Balanced low-calorie diets/portion-controlled diets
- b. Low-carbohydrate diets: Designed to create a deficit of 500–1,000 kcal/day, thus aiming a weight loss of 0.5–1 kg/week.
- Very-low-calorie diets - Diets with calorie levels between 200 and 800 kcal/day is termed 'very-low-calorie diets', while those below 200 kcal/day are called starvation diets. They result in rapid weight loss (recommended in patients with significant weight related morbidities) and are usually initiated under supervision of a trained nutritionist/physician due the potential health complications.
- c. Low-fat diets- recommend a decrease in the daily intake of fat to 30 percent of the total energy intake or less.
- d. Mediterranean diet- this diet contains high level of monounsaturated fat, moderate consumption of alcohol (mainly wine), high intake of fruits, vegetables, legumes, and grains; a moderate consumption of milk and dairy products (mostly cheese) and a relatively low intake of meat and meat products.

2) Fad diets- diets that include unusual combination of foods or eating sequences. Though being popular they are for a short time period as most of them are not sustainable in the long-term (Mullin) [17].

3) Commercial weight loss diets/programs.

Exercise/Physical activity

The calories consumed in physical activity/exercise are an important factor in determining the calorie expenditure and directly relates to the degree of weight loss. The various components of energy expenditure are resting (basal)-energy expenditure (REE) (for example- heat production for maintenance of body temperature, maintenance of ionic gradients across cells, and resting cardiac and respiratory function), diet-induced thermogenesis, and physical activity (Westerterp) [18].

The various data have repeatedly shown an association between higher levels of physical activity and lower rates of many chronic diseases (Jensen et al, Lee et al 2012, Sattelmair et al, Fogelholm) [6,19-21]. The patient is initially assessed to determine the degree/level and type of physical activity he/she can undergo safely without seriously compromising the health. It not only helps in weight loss, but is also equally helpful in maintenance of weight, and other lifestyle disorder diseases like hypertension, diabetes mellitus, hyperlipidemia and even depression (Jensen et al, Fogelholm, Donnelly et al) [6,21,22].

The exercise includes the components of strengthening, endurance and flexibility. It has been recommended that physical activity with moderate intensity be done for 150 to 250 minutes per week to produce a modest weight loss, like brisk walking for 30 minutes daily for five days per week (Jensen et al, Donnelly et al, Lee et al 2010) [6,22,23].

Behavior Therapy

Behavior therapy is a key component in treating the obese and the overweight with an aim to help the patients develop long term principles and techniques to adhere a balance between the nutrition and the physical activity.

The goal of behavioral therapy is to help patients make long-term changes in their eating behavior by modifying and monitoring their food intake, modifying their physical activity, and controlling stimuli in the environment that trigger eating.

The major elements of behavioral therapy include: self-monitoring of diet and activity (Peterson et al, Wilson et al) [24, 25], stimulus control, slowing eating, setting goals, nutrition education and meal planning (the patients are instructed to read food labels, measure portion sizes, and record their food intake as soon as possible after eating), social support, cognitive restructuring and problem solving (Jenson et al, Peterson et al, Wilson et al) [6,24,25].



Table 1. Definitions of Obesity

BMI (kg/m ²)	WHO Classification	BMI: 40-49.9kg/m ² morbidly obese BMI: >50kg/m ² super obese
<18.5	Underweight	
18.5-24.9	Normal weight	
25.0-29.9	Overweight	
30.0-34.9	Class I obesity	
35.0-39.9	Class II obesity	
>40.0	Class III obesity Commonly called severe or morbid obesity	

CONCLUSIONS

Obesity is not only a physical condition but is a preventable disease and one of the preventable causes of mortality. A good understanding of the etiological factors in an individual provides the basis for rational interventions to prevent and treat this major public health problem. Lifestyle modifications are the initial treatment for obesity, which can result in weight loss of 5 to 10% of the body weight, thus decreasing the incidence of many co-

morbid condition associated with obesity. The increasing awareness and with the ongoing research to tackle the obesity, we can expect that the coming years will bring better understanding and treatment for the obese.

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CONFLICT OF INTEREST: NIL

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