Lifestyle Modification in Long-Term Management of Chronic Diseases

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1 Introduction

Nowadays, unfortunately, obesity has been viewed as a cosmetic issue rather than a chronic disease; furthermore, health insurance systems do not include the costs of obesity treatment except if it is associated with a chronic disease such as hypertension and diabetes [1]. Obesity could be defined as an excess amount of energy intake and fat storage through overnutrition and adopting sedentary lifestyle [2, 3]. It can be caused by a combination of several factors including cultural and environmental factors, such as elevated energy diet, low levels of physical activity, eating disorders, and increased portion size. These factors can cause a fundamental change in the structure of adipose tissue leading to "hypertrophy and hyperplasia of adipocytes, inflammation" as well as it causes a change in the secretion of adipokines, which is a biologically active protein that can cause severe impact on the metabolism of glucose and lipids [3, 4]. A study found in UAE indicated that factors that may attribute to low levels of activities are mainly due to the hot climate that can reach up to 45° C in the summer, in addition to the cultural norms that can restrict female outdoor physical activities [5].

2 Obesity and Chronic Diseases

Obesity considers being the main cause of morbidity and mortality [6–8]. With increased duration of obesity, many forms of cancer may develop, as strong relationship is found between the increased duration of obesity and the incidence of

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developing other forms of cancer including postmenopausal breast cancer, colon, endometrial, and kidney cancer. In fact, obesity duration can be an indicator or an independent factor of type 2 diabetes and cardiovascular diseases, since obesity can cause a change in biological mechanisms which poses individual in a higher risk of developing hypertension and insulin resistance [2, 9, 10]. Hypertension is defined as having blood pressure exceeding 140/90 mmHg. In this case, hypertension can result in severe health outcomes, and it is called silent killer since it is not accompanied by symptoms; thus if it is untreated it can prompt heart attack and kidney and heart failure. Moreover, diabetic patients are more prone to develop nervous system diseases, dental problems, and loss of vision [6].

Obesity can lead to osteoarthritis which is a chronic disease responsible for the breaking down of the joint's cartilage causing pain and stiffness and hence difficulty in the movement of the joint. This happens because high body weight causes more stress in the joints [6, 11]. Another study showed that people who were obese in their childhood exhibit greater risk of developing cardiovascular diseases, which is associated with hypertension and dyslipidemia in their adulthood, unlike people who had normal weights as a child [12]. Obesity is a chronic disease and it affects all people regardless of their age. Childhood obesity can show early signs of cardiovascular dysfunction, arterial stiffness, and alter the myocardial structure as a result of excess adiposity [12]. In fact, fat distribution is found to be the main factor to predict cardiovascular disease as studies revealed. People with higher central obesity (also called upper body obesity measured by waist circumference) are more prone to develop cardiovascular diseases and metabolic syndrome [1, 3, 13].

As a consequence, obese people tend to have lower life expectancy and higher drug expenditure because of obesity-related diseases, meaning that the effect of obesity is not only limited to affect human health, but it also extends to higher costs in the healthcare sector. It is estimated in Europe that approximately 7% of total healthcare costs account for obesity-related diseases [3, 10]. Studies showed that obese people may face some discrimination in terms of employment, as they are seen to be less productive and less motivated in the workplace [14]. Several studies stated that obese people tend to have higher rate of absence because of sick leaves, as a result they receive discrimination because of the missing days which lead to low performance in the workplace. Moreover, employers often prevent employing obese people to avoid health insurance and other health-related expenses [14, 15]. In fact, most of the health insurance companies ignore the fact that including bariatric surgery in the insurance is economically sustainable, because of the increased number of obese people and the growing demand for surgical intervention and after-care [16].

3 Obesity Management and Prevention

Management of obesity should start from childhood since childhood obesity is the main sign of adult obesity [5, 8, 9]. Long-term follow-up and frequent measurements of weight and height are important to detect any dramatic changes in the body weight and to quantify the exposure level of obesity and overweight.

These parameters would also help in measuring the corresponding health effects of obesity-related diseases [9]. The application of effective strategies may help in reducing obesity-related diseases and help to sustain finance of the healthcare sector through lowering medical expenses [10]. For example, 10% reduction in total body weight resulted in decreasing the risk of developing diabetes and help to maintain blood pressure and reduce the insulin resistance [1, 7]. In addition, diabetes prevention program claimed that lifestyle modification and intervention can produce weight loss with an average of 7% at 6 months and 4.9% at 3 years; this moderate weight loss was successful enough to reduce the risk of developing diabetes by 58%. Another study with five thousand people with type 2 diabetes showed significant improvements in sleep apnea, urinary incontinence, and kidney disease. Moreover, weight loss can lead to psychological improvements as obese patients experience more depression, stress, and poor self-esteem than people with normal weight; however, the effects of these symptoms can be reduced with weight loss particularly through improved body image and reduced anxiety [2, 17].

As it is mentioned earlier, childhood obesity is a major predictor of adulthood obesity, so it is cost-effective to control obesity in early ages [5, 8, 9]. In childhood obesity management, the involvement of the parents is very important as they are considered as a risk factor for childhood obesity, but it is a challenge because some parents may be aware of their child's overweight but they are not aware enough about health consequences to be involved in the obesity management program [18, 19]. Parent's socioeconomic status (SES) can be an example of risk factors that contribute to obesity development. SES is measured by the level of education, income, and occupation. Several studies have shown that higher education level results in lower childhood obesity. Moreover, inverse relationship between the occupation and obesity was found, as the average BMI for professional workers were 25.9 and 27.2 for unskilled manual occupational workers, similar relationships were found with income, as obesity was inversely related to the income [19]. Another study sought to determine factors that may influence parent's decision in joining obesity management programs. Their results showed that parents were largely influenced by their failed attempts to control their children's weight and their children's emotions. Enhancing parent's awareness must be the first step in addressing the issue of childhood obesity in order to encourage them to join obesity management programs. However, this step might not be sufficient by itself, as health professionals must include activities and strategies for long-term follow-up. Finally, parent's awareness could not directly push parents to join obesity program but it can help the parent to take action toward this issue [18].

4 Obesity Treatment

4.1 Lifestyle Modification Programs

There is a growing body of literature that recognizes the importance of obesity treatment with a combination of several approaches rather than a single approach [7, 8]. The words lifestyle modification programs (LMP), behavioral treatment, or weight

control always used alternately [20]. Those terms incorporate three main principles which are diet, exercise, and behavioral therapy (i.e., basically set of standers and strategies to modify eating behavior and exercise) [8, 17]. Often LMPs intended to enable patients to lose 1–2 lb/week bringing about 5–10% weight reduction by a half year, through controlled energy intake (500–1000 kcal/day) and this aim could be obtained by reducing portion size and sugar, eradicating fat, and increasing body energy consumption by physical activity [17, 20, 21].

In addition, the program emphasizes practices such as record keeping of physical activity and food intake, self-monitoring, stress control, and social support to achieve weight reduction [20, 22]. It has been suggested that school-based lifestyle intervention program is effective for obesity prevention. A study done in China to assess the effectiveness of school-based lifestyle intervention program further support the idea of obesity prevention on early onset, especially children who were involved in the program exhibit healthy behaviors as well as knowledge about obesity and its health outcomes, in contrast to the control group, the intervention group were able to lose weight more than 0.5 kg/m^2 BMI [23]. Obtaining family support can be facilitated through school-based intervention programs. It is important to get participant's family engagement in which parents or guardians enrolled in classes on how to adopt healthy lifestyle and behavioral changes at the level of the household. In addition, they are assigned to specific tasks and activities which needs to be done by the parents and children regarding healthy lifestyle and obesity prevention. Moreover, including fun events in the curriculum can also help to gain children's attraction as well as help to increase awareness, for example, arranging short writing, painting, and stage drama competition regarding the risk associated with obesity can help to increase awareness among school children [23, 24].

4.2 Three Main Components of Lifestyle Modification Programs

4.2.1 Diet Intervention

This component focuses on energy or calorie deficiency made basically through restricted food intake, where patients were assigned to a specific calorie objective in order to achieve 500–1000 kcal deficiency from their baseline of food calorie intake, hence they are likely to produce a weight loss of a 1–2 lb/week [17]. The assigned caloric intake is different from person to another, depending on their weights. For instance, patients with more than 200 lb are encouraged to consume 1500–1800 kcal/day, while patients under 200 are recommended to 1000–1500 kcal/day [17].

Despite the fact that there are many studies to prove that weight reduction is fundamentally related to controlled caloric intake rather than micronutrient composition of the eating routine, behavioral programs recommend patients to reduce fat intake (i.e., less than 30% of calories from fat) to accomplish caloric objectives [17]. Unfortunately, commercial diets such as ad-libitum, very low calorie, low glycemic

index, protein and meal replacement diets are becoming more common, the main problem of these diets lies on its short-term effect on weight loss and sometimes these diets might be harmful without proper monitoring. The most critical thing in weight management programs is the adherence to a healthy lifestyle for weight loss maintenance, which cannot be accomplished with the commercial diets [22]. In fact, a moderate caloric restriction can be more effective in weight maintenance as it is easier for obese patients to adhere [22]. However, energy restriction alone can be an effective method in weight loss but its effect in weight loss maintenance is short-term; a number of studies showed that less than 5% of individuals were able to lose weight by only energy restriction for 2 years [2].

4.2.2 Physical Activity

Physical activity can enhance the effect of diet interventions in weight loss management because it increases the energy expenditure causing a reduction in energy consumption of the body [22]. It has a major role in weight maintenance and adherence to weight loss strategies, because exercise can reduce individual's stress and depression, thus it makes some improvements in the mood [2]. The program supports gradual increments in physical activity by using moderate force exercises, for example, quick walking. The duration of the exercise is important to achieve the desired weight loss. In order to sense the impact of physical activity on body weight, it is recommended to start with 50 min/week, with a gradual increase to 150/week. In addition, longer duration of physical activity (200–250 min/week) can contribute to the maintenance of the weight loss [17]. Researchers have found that the problem of being inactive started from childhood, a longitudinal study of 5 years follow-up from childhood to adolescence, the study found that physically active children were active as adults, while inactive children exhibit low physical activity as adults [19]. Physical activity can be assessed and measured based on four dimensions, which include type, intensity, frequency, and duration.

Each of those measurements requires direct observation, surveys reported from self or proxy, accelerometer, and monitoring heart rate. For instance, a questionnaire can provide enough information to assess all measures of physical activity while accelerometer can measure only intensity, duration, and frequency [19]. Moderate intensity of physical activity like walking as 30 min/day can reduce cardiovascular risk factors by 30–50%, in another simple form daily 5–10 min of stair climbing which can be equivalent to 30 min walking [25].

4.2.3 Behavioral Changes

Most of the behavioral changes programs help to make patients adhere to the healthy behaviors through specific strategies. Self-monitoring, record keeping of weight, and physical activity are the main components of behavioral weight loss programs; additional strategies include stimulus control, which is a way of keeping high-calorie

food out of reach and making sure that healthy option and low-calorie foods are available [17]. The cornerstones of behavioral change program are self-monitoring and record keeping help individuals to understand better about the relationship between their eating behavior and weight loss, thus allowing them to adjust their eating and physical activity behaviors [17, 26]. Adherence to controlled caloric intake can be facilitated through frequent and consistent self-monitoring, investigated the effectiveness of frequent and consistent self-monitoring, the study found that individuals who self-monitored were able to maintain their weight changes better than those with less frequent and consistent self-monitoring [26]. Understanding the motives behind joining weight loss programs is important because poor adherence to weight loss programs is associated with a lack of self-motivation which has been viewed as a predictor of successful treatment, this can help healthcare professionals to relate the associated psychological needs with obesity intervention programs [15]. In academic medical centers, behavioral programs are usually performed in a group of 10–20 participants or individually, participants are enrolled in 60–90 min sessions often 16–24 weeks, which is arranged by a dietician, psychologist, or exercise specialist. Although individual treatment is expensive, it has been shown that it is less effective in terms achieving weight loss, because group care treatment provides the suitable environment that provides empathy, motivation, and social support which can promote a competitive environment between the participants [17, 20].

4.2.4 Pharmacotherapy

Weight loss cannot be obtained with only anti-obesity drugs, which is viewed as a "rescue strategy." Anti-obesity drugs, in fact, can enhance weight loss when it is used in a combination with behavioral change [17, 22]. Pharmacotherapy is recommended to an obese patient with body mass index (BMI) above 30 kg/m^2 and overweight people who suffer from obesity-related diseases such as hypertension and type 2 diabetes [7, 27]. An example of an anti-obesity drug which has been widely used and approved by FDA in 2003 is Orlistat, which restricts intestinal and pancreatic lipase and thus it prevents about 30% of triglycerides absorption by gastrointestinal [8, 22]. Orlistat can have a mild to moderate side effects on the intestinal (i.e., frequent stools due to unabsorbed fats) and abdominal pain and diarrhea. However, these side effects can be reduced by decreasing dietary fat intake and increasing the portion of natural dietary fibers [8]. Based on clinical trials, many studies have concluded that Orlistat can help in weight reduction in a combination with diet, exercise, and behavioral change. McDiffie, the first who studied Orlistat in American obese adolescence, observed a significant weight loss and decrease in cholesterol, lipoprotein, and fasting blood glucose in 3–6 months, compared with the baseline weight; Orlistat group lost 6.3–5.4 kg with a decrease in BMI approximately 4.1–2.9 kg/m^2 in contrast to the controlled group who gained weight (4.2–6.5 kg) with increase in BMI by 0.1 kg/m^2. Since the level of plasma fat-soluble vitamin is noticed to be decreased with Orlistat group, which is of particular concern affecting child growth, FDA suggested Orlistat must be accompanied with multivitamins and it is only recommended for adolescent [8].

4.2.5 Surgical Intervention

Typically, surgical interventions are used when obese patients fail to achieve weight loss with traditional methods of weight management. Surgical interventions have been viewed as the best option to treat very obese patients with greater risk [22, 28]. According to the National Institute for Health and Clinical excellence, surgical intervention is recommended when the BMI of an individual exceeds 50 and sometimes when it is more than 35 if the individual is suffering from serious comorbidities.

Bariatric surgery is classified into two basic categories depending on its mechanism of weight loss such as malabsorptive (which has a higher risk of mortality) and restrictive procedures [22]. Although malabsorptive procedure exposes obese patients to risk, it can cause a significant and rapid health improvement in serious metabolic comorbidities which are associated with very obese patients; therefore, the malabsorptive procedure seems to outweigh the effect of severe obesity that causes serious comorbidities [11, 22]. Bariatric surgery is not a long-term method for weight loss unless it is used in a combination with a long-term behavioral change; it requires weight loss maintenance, long-term follow-up, and adopting a healthy lifestyle. It is important to remember that the aim of the surgery must not only be weight loss and reducing the risk of comorbidities, but also improving psychological function which is an important step to ensure the adherence to a healthy lifestyle in long-term [11, 17].

Bioenterics intragastric balloon (BIB) is considered as a safe, nonsurgical and non-pharmacological option for obesity treatment, it is reversible and can be done several times. The main function of this method is to induce satiety through slowing down gastric emptiness and partially filling the stomach. An average of 12–13 kg of weight loss can be achieved by BIB treatment within 6 months. However, the short-term effect of this method must be considered, it must be remembered that after the removal of the BIB the probability of weight regain is high and it is a critical issue to consider, it has been reported that most of the patients who lose weight during the treatment have regained it after its removal [7, 8]. Therefore, many studies support the idea that one single treatment or step toward obesity management is not sufficient to address such a complex chronic disease [7, 28, 29]. Thus, a combination of long-term behavioral modification is recommended after the BIB removal in order to support the long-term weight maintenance and to avoid weight regain [7, 29].

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