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Fighting obesity: Non-pharmacological interventions

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SUMMARY

The abnormal or excessive fat accumulation that impairs health is one of the criteria that fulfills obesity. According to epidemiological data, obesity has become a worldwide public health problem that in turn would trigger additional pathologies such as cardiorespiratory dysfunctions, cancer, gastrointestinal disturbances, depression, sleep disorders, just to mention a few. Then, the search for a therapeutical intervention aimed to prevent and manage obesity has been the focus of study during the last years. As one can assume, the increased prevalence of obesity has translated to search of efficient pharmaceuticals designed to manage this health issue. However, to further complicate the scenario, scientific literature has described that obesity is the result of interaction between multiple events. Therefore, pharmacological approaches have faced a serious challenge for develop the adequate treatment. Here, we argue that a wide range of non-pharmacological/invasive techniques can be used to manage obesity, such as diets, cognitive behavioral interventions, exercise and transcranial direct current stimulation. Combining these techniques may allow improving quality of life of obese patients.

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1. Introduction

Obesity is health world-wide problem that has been defined as excessive accumulation of fat in the body. Classification of normal, overweight or obese patients include several anthropometric criteria, such as body mass index (BMI) which categorizes patients as obese if this anthropometric measurement is greater than 30 kg/m^2 (Fig. 1) [1].

In addition, it has been reported that obesity is considered as an epidemy in several countries, including the United States of America [2–4] causing multiple health problems such as cancer, heart diseases, depression, sleep disorders, among other issues [5–8]. On the other hand, the etiology of obesity is complex and involves different elements such as diet, socioeconomic status, family influence, cultural aspects, lifestyle, etc [9–12]. For

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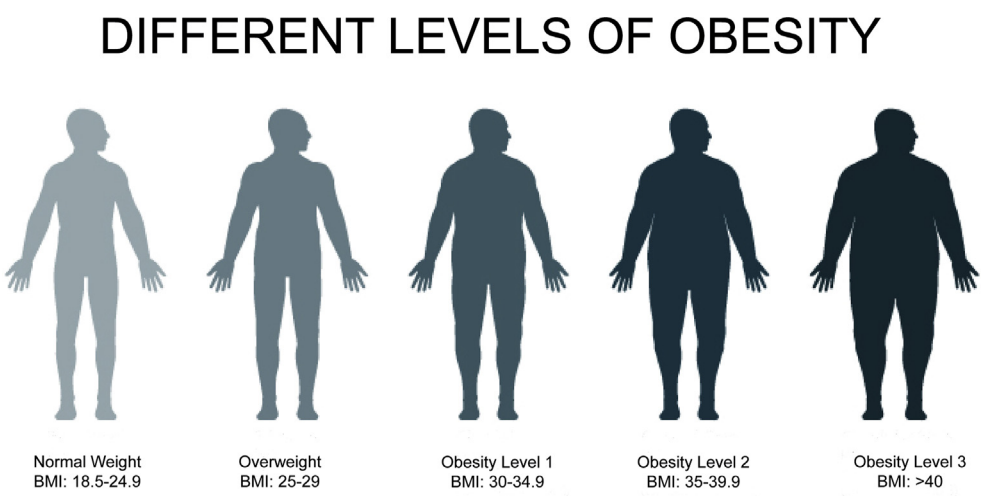

Fig. 1. Classification of normal, overweight or obese patients by using body mass index (BMI) criteria. According to standardized diagnostical procedures, patient fulfills obese profile if BMI is greater than 30 kg/m^2.

example, in terms of biochemistry, recent reports have demonstrated that endocrine-disrupting compounds named "obesogens" are also linked to weight gain [13,14]. Moreover, gut microbiota has been suggested as a critical element in the development of obesity [15–17].

Taking together, the management of obesity requires a multidisciplinary approach. In the midst of a plethora of therapeutic intervention for obesity, pharmacological intervention is one of the most proposed approaches [18–21]. However, it has been demonstrated that many patients are still unable to reach clinically meaningful improvements. Thus, additional therapeutic interventions should be considered for preventive and modifiable obesity.

2. Obesity

Obesity is a medical condition that the World Health Organization defines as abnormal or excessive fat accumulation that may impair health [1]. Patients are generally considered obese when body mass index (BMI) is over 30 kg/m^2 [22]. Moreover, obesity is a risk factor for diabetes type 2, hypertension, dyslipidemia and other cardiovascular diseases, as well as cancer, obstructive sleep apnea and psychological problems, just to mention a few health disturbances [23,24]. The literature suggest that energy imbalance between calories consumed and calories expended plays a critical role in genesis of obesity as well as genetic or endocrine conditions and certain drugs also are linked with obesity [2].

3. Non-pharmacological interventions for obesity

3.1. Diets

Strategies to treat obesity have been focused on lifestyle significant modifications, including diets [25,26]. In this regard, diets enriched with vegetables and fruit consumption over a long-term period represent a positive outcome regarding health benefits [27–31]. However, several weight-management diets have limited positive results [32,33].

3.2. Cognitive-behavioral interventions against obesity

Beyond identification of the multiple overlapping factors of obesity, one indisputable variable that contributes to the etiology of this disorder is the lifestyle [34,35]. Although is widely assumed that obesity might be addressed by solid foundations of healthy behaviors, healthy eating guidelines are in most of the cases unknown in general population [36]. As one can assume, the defiance for understanding the underpinnings of development of unhealthy behaviors will provide invaluable support for behavior interventions. By promoting health behaviors, such as choosing fruit and vegetables over processed foods, significant advances in behavior changes could be achieved. Several behavioral approaches have been effective for treating health issues, for example the Theory of Planned Behavior [37,38]. In this regard, Hamiltion and coworkers (2013) showed that according to this approach, elements which influence mothers' decisions about their child's adequate physical activity [34]. In sum, this intervention suggests that different roles of psychosocial factors exert critical relevance in mothers' decisions regarding their child engages in active lifestyle behaviors. The design of interventions aiming to reduce the consumption of unhealthy foods, apart from hypocaloric diets, should also promote health behaviors aimed to strengthen a balanced lifestyle.

3.3. Exercise as treatment in obesity

The recent findings conclude that physical exercise has significant effects on both physical and psychological health [39,40]. In this regard, physical exercise done voluntarily or being prescribed can be used as a treatment for obesity. Here, we would like to clarify some terms used in this review. Budde et al. [41] proposed definitions to differentiate physical activity from exercise and fitness. The terms "exercise"' and "training" are both defined as a structured, planned and repetitive progress to maintain or achieve physical fitness, although training is understood as a more chronic type of exercise [42]. The components that aim at the maintenance or achievement of physical fitness are related to health: For example, cardiorespiratory endurance or body composition, as well as strength and muscular flexibility [43]. Physical activity, in contrast, is defined as bodily movement which results in energy expenditure, but not with the goal of achieving or maintaining physical fitness [44].

The overall goal of exercise in the treatment or prevention of obesity is weight loss. To approach this goal, the Institute of Medicine of The National Academies of Science published the recommendation to undertake 60 min of moderate intensity

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