



REVIEW

ALTERNATIVE MEDICINE // PUBLIC HEALTH

Disease Burden, Mechanism and Management of Obesity – Where Do We Stand?

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ARTICLE HISTORY

Received: April 1, 2020 Accepted: May 22, 2020

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ABSTRACT

The role of increased body mass index in general morbidity and mortality is well documented. This global public health issue continues to represent a major burden and threat to health systems and the population's wellbeing. Global statistics show that the prevalence of obesity has increased about three times since the mid-1970s, and an upward trend is still observed, not only in developed but also in developing countries. We used several databases, including PubMed, ProQuest, and Google Scholar, to perform a literature search and review on obesity. Keywords such as "obesity", "overweight", and "BMI" were used in combination with multiple keywords such as "mechanism", "factors", "socio-economic", "environmental", "social determinants", "management", "treatment", "non-traditional treatment", "alternative therapies", "non-pharmaceutical treatment" etc. and related phrases. According to the literature, the management of obesity is difficult due to the complex nature of this problem in terms of its course, complications, risks, and etiological factors. The role of alternative therapies in obesity management is still unclear, and further research is needed in this area. Recently introduced weight-loss and -management devices can also help in losing excess bodyweight. The present article summarizes relevant information related to obesity, collected from different regions of the world, and discusses diverse interventional approaches to treat obesity.

Keywords: obesity, overweight, BMI, behavioral factors

INTRODUCTION

The impact of increased body weight on health outcomes and the associated morbidity and mortality are well documented. Obesity (OB) is a complex community health problem connected to several physical and non-physical factors. The body mass index (BMI) is a parameter that is widely used to classify overweight (OW) and OB categories by taking weight and height into account. Historical trends and patterns demonstrate increasing OW and OB rates, especially in developed countries. It is also evident that developing countries are also

DOI: 10.2478/jim-2020-0008

affected by this public health issue and have been experiencing an upward trend of increased body weight and related health conditions in recent decades.³ Another critical health issue of concern is childhood and adolescent OW and OB, with long-term psychological and physical consequences.^{2,3} Many children with OB grow up to become obese adults and continue to suffer from the detrimental effects of OB.3 In the present paper, we explore geographically unique characteristics of OW and OB while sharing relevant data and challenges of this major public health issue. Furthermore, while presenting medical and surgical remedies of OB, we examine non-pharmaceutical and alternative approaches that can help in the management of this morbid condition. The present article summarizes relevant information from different regions of the world and discusses diverse interventional approaches to treat obesity, useful for both professionals and society.

MATERIALS AND METHODS

A careful examination of existing data published in selected regions of the world was carried out. We used several databases, including PubMed, ProQuest, and Google Scholar, to perform a literature search and review. Keywords such as "obesity", "overweight", and "BMI" were used in combination with multiple keywords such as "mechanism", "factors", "socio-economic", "environmental", "social determinants", "management", "treatment", "non-traditional treatment", "alternative therapies", "non-pharmaceutical treatment" etc. and related phrases. Abstracts were reviewed to assess the appropriateness of ar-

ticles for the topic of our literature review. We preferred articles published in the past 15 years; however, older articles were also considered if insufficient research was available on a given subtopic. For certain parts of the paper, we discussed characteristics of issues from selected geographical regions considering that the authors had current, recent, or past affiliations and experiences within these areas.

MECHANISM, PREDISPOSING FACTORS, AND MAGNITUDE OF THE PROBLEM

According to global statistics, the prevalence of OB has increased almost three times since the mid-70s.³ According to the World Health Organization (WHO), in 2016, around 52% of adults and 18% of children aged 5–19 years were overweight and obese.³ The associated mortality was higher than the one of individuals who died because of problems associated with lower than normal body weight (underweight).³ Compared to the global prevalence of 13% in 2016, 39.8% of adults were suffering from OB in the US in 2015–2016.⁴ In the last decades, the prevalence of OB presented increasing trends in all regions of the world, Europe, America, and Eastern Mediterranean regions showing the highest prevalence and exhibiting an upward trend between 2000 and 2016 (Figure 1).⁵

The mechanisms and underlying phenomena behind OW and OB have been explored before.¹⁻⁴ There is, however, variation in causes found in different cultures and regions of the world. For example, in the US, Hispanic and African-American individuals have the highest prevalence

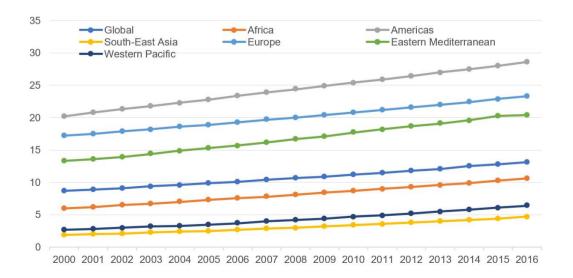


FIGURE 1. Prevalence of obesity among adults, BMI ≥ 30, age-standardized. Estimates by WHO region (2000-2016). Source: WHO, Global Health Observatory data repository⁵

of OB.⁴ Furthermore, the prevalence of OB is lower among individuals with higher educational and/or socioeconomic status.⁴ Among men, however, the lowest income groups are also less likely to have OB.⁴

Studies show that the prevalence of OW and OB has also increased among children and adults living in the Middle East.^{6,7} In the Persian Gulf region, this increase can be attributed to major changes in the population's lifestyle over the past few decades.⁶⁻⁸ In Qatar for example, the prevalence of OB has increased due to the recent industrialization and socioeconomic progress along with cultural factors, transition to a sedentary lifestyle, popularity or acceptance of fast food as a norm, and environmental factors such as extremely hot weather most of the year.⁷ In a 2012 survey, over 70% of Qatari nationals were found to be overweight and obese, with 41% having a BMI in the obese category.7 The survey also showed that around 91% of adults were not consuming enough fruits and vegetables, and 71% were not fulfilling recommended vigorous activity requirements as well.7 Furthermore, related health problems such as high blood pressure (~33%), high blood glucose or diabetes (16.7%), and hypercholesterolemia (~22%) were also alarming.7 Further analysis of this data showed that nutritional factors were impacting OB rates among young adults versus physical activity among older adults. Also, generalized and abdominal types of OB were significantly associated with diabetes among Qatari citizens.^{7,9} OW/OB is linked to the consumption of energyrich food items, and the Qatari population is consuming higher-than-recommended amounts of energy-dense food items.^{3,10,11} OW/OB prevalence is also documented to be high among children and adolescents in Qatar. 12-14

Population dynamics, especially immigration, can impact the health of migrant populations by adopting behaviors and experiencing opportunities that were not common in their country of origin. Recent immigrants to communities with high prevalence of OB can lead to the so-called healthy migrant effect. However, after residing in new countries for a longer duration of time, immigrants also tend to experience unhealthy weight gain.15 In Norway, OW/OB has been an emerging issue among immigrant populations. A study carried out in 2010 with a sample comprising of 208 Somali immigrants showed that both generalized and abdominal OB had a direct positive association with the length of residence in Norway. By gender, the prevalence of OB was higher among Somali (immigrant) female respondents vs. males, similarly to the Qatari population.^{7,16}

The challenges in OB prevention and reversal can be related to multiple factors. A 2013 article reveals that the

study participants were not able to follow healthy diet plans due to stress, depression, cravings, and social situations where they could not avoid certain foods.¹⁷ Respondents felt challenged by the cost, time, and motivation associated with maintaining healthy dietary habits.¹⁷ Adherence to physical activity was found to be difficult due to various reasons such as lack of time and motivation, or not having a partner to perform exercise with.¹⁷ Cultural norms and environmental factors can also impact the adherence to health programs; for example, a study from the Arab Gulf region showed that the main issues in sustaining healthy eating were due to unwillingness, family norms, and social gathering, where it was difficult to avoid certain food items.¹⁸ Moreover, lack of time, underlying health conditions, and extreme weather were found to represent the main challenges in performing regular exercise.¹⁸ Other factors include easy access to low-cost high-calorie food items such as fast food, limited access to healthier food items, increased screen time especially among youth, sedentary work environment, lack of information, skills, and interest in certain exercise/sports, not having support (family- or costs-related) to be physically active etc. 19-21

MANAGEMENT

OW and OB can be prevented or reduced by changing lifestyle, e.g. performing physical activities and modifying the diet by including more fruits, vegetables, or other aliments with high fiber content, and by avoiding high energy foods such as sugar and fats etc.3 Dietary modification and caloric monitoring may help in maintaining a healthy body weight. Incorporating fruits, vegetables, and whole grains in the diet along with physical activity can help in weight loss if practiced as a routine behavior. The impact of weight-loss diets, especially if followed for a shorter duration of time, is variable. Exercise can certainly help in weight loss and maintenance of a healthy weight if practiced continuously, and can play an important role in the improvement of both physical and mental wellbeing.^{3,7,22} The aim is to reduce energy intake and increase energy expenditure. In certain situations, OW and OB can be managed by using pharmaceutical agents. These medicines are usually recommended if physical activity and/or dietary measures are not efficient, and the BMI is higher than 30 or 27 with underlying medical conditions.^{23,24} Table 1 lists the types of approaches used in the management of OB based on our literature review.²²⁻²⁸

The role of alternative and herbal therapies in the reduction or prevention of OB requires further scientific exploration. Triphala, which is a combination of three plant

TABLE 1. Different types of management approaches for obesity

Non-pharmaceutical	Pharmaceutical (mechanism)	Surgical
Physical activity	Orlistat (inhibits gastric lipases)	Sleeve gastrectomy
Diet	Sibutramine (satiety, metabolic)	Laparoscopic adjustable gastric banding (LAGB)
Transcranial direct current stimulation	Diethylpropion (appetite suppressant)	Roux-en-Y gastric bypass (RYGB)
Cognitive behavioral interventions	Phentermine (appetite suppressant) Liraglutide (satiety, (GLP-1 receptor agonist) Lorcaserin (satiety)	Single anastomosis gastric bypass (SAGB) Biliopancreatic diversion/duodenal switch (BPD/DS)

species (Indian gooseberry, *Terminalia bellirica*, and *Terminalia chebula*), has shown some evidence in reducing body fat.^{29,30} In addition to decreasing body fat percentage, body weight, and energy intake in mice, it also helped lower blood cholesterol and sugar levels.^{29,30} In a 12-week randomized double-blinded placebo-controlled trial with 62 participants, the treatment group experienced a significant decline in mean weight and waist circumference.³¹

Nigella sativa (black cumin) was found to have mixed effects on OB and metabolic syndrome. Findings from 11 studies showed that Nigella sativa had some positive role in reducing body weight, BMI, and waist circumference.³² Furthermore, clinical trials have shown that it also helped in reducing blood sugar, lipids, and body weight among study participants; however, more research is needed to understand this relationship.33 Garcinia cambogia inhibits the citrate lyase enzyme and can help in reducing appetite.34 Camellia sinensis may have some role in appetite suppression, enhanced energy use, and decrease absorption of nutrients.34 Chromium picolinate is a quite common supplement known to help in glucose metabolism and food behavior, leading to possible weight loss; however, its long-term impacts on OB prevention and remission are unclear.34,35

Allison *et al.* reviewed the impact of 18 different alternative or non-traditional therapies on body weight and found that there is not enough evidence that these treatments are effective.³⁵ There is some reasonable evidence from well-designed studies suggesting that compounds containing ephedrine and caffeine may have some benefits.³⁵ Caffeine has been found to be beneficial in weight maintenance and appetite suppression in another study.³⁶ The role of alternative therapies in OB management is still unclear and further research is needed in this area.

Recently introduced weight-loss and weight-management devices can be used for patients in whom lifestyle modification approaches are not working.³⁷ Some examples of these devices are: gastric bands, gastric emptying system, and gastric balloons. Preliminary data show that

there is reasonable benefit seen among patients who have used these devices.³⁷ Body countering through noninvasive methods, such as high intensity focused ultrasound, low-level laser therapy, cryolipolysis, or radiofrequency, and invasive approaches, such as liposuction, could also be beneficial but costly alternatives.³⁴

SUMMARY AND CONCLUSIONS

Increased body weight and waist circumference are associated with several diseases and health conditions. OB has become a significant public health concern that can lead to diverse types of chronic diseases. High morbidity and mortality associated with body weight-related health issues exert tremendous economic burden on health systems and communities. The complex nature of this issue can be managed only by applying multi-dimensional well-researched strategies as provision of complex care needs can be challenging, especially in the presence of additional co-morbidities.³⁸ Programs targeted at youth can certainly help as the behavioral modification is easier if started earlier; hence, school-based programs can play an essential role in the long-term management of this issue. Incorporating recommended levels of physical activity and opting for healthier food choices in the daily routine can help reduce the incidence of chronic diseases such as heart disease, stroke, diabetes, and some cancers through reducing body weight.^{7,39-41} Since OB is associated with other chronic health problems, it may also aggravate the prognosis of patients who are suffering from the novel CO-VID-19 infection. The mechanism of this is not yet clear, as the COVID-19 infection is relatively new and has not been sufficiently studied yet; however, OB can exert increased burden on breathing mechanics and could have a negative impact on disease course. 42,43

CONFLICT OF INTEREST

Nothing to declare.

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