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Obesity as a Growing Public Health Problem

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Abstract

Obesity is one of the most important reasons for reduced life expectancy within the “modern” world. The prevalence of overweight and obesity continues to increase both in developing and in developed countries. It is common in every age group, from pediatric to geriatric individuals, which serve as our future and heritage in the universe. It was clearly seen in reported studies around the world that overweight and obesity are still growing epidemic health problems. It is well known that obesity results in impaired health and premature death. Obesity does not only impair the physical and mental health of people but also impairs economic wealth of most communities. The heavy burden of treatment cost and reductions in effective labor power leads to financial losses all over the world. Obesity has a higher morbidity rate than diseases emanating from underweight. Primarily, we have to find a reasonable and sustainable solution to this problem, in order to reach the longer life expectancy and more qualified life span in the twenty-first century. The policy makers in health services and health professionals in medicine have important roles to prevent and cure this “contemporary” epidemic. Additionally, the most crucial step for people is to get rid of the prevailing inertia and take personal responsibility for their health development.

Keywords: obesity, overweight, prevalence, public health, survey

1. Introduction

1.1. What is obesity and its health-related and economic consequences?

As far as we know, there was no obesity problem in the early age of life on Earth while the human being had lived as a hunter and gatherer. Unfortunately, improvements in agriculture, food processing, marketing, rural, and urban planning with low physical activity patterns, resulted in an “obese world” over time. The body weight is regulated by various physiological

mechanisms that maintain the balance between energy intake and energy expenditure. Obesity occurs when the body consumes more calories than it burns, through overeating and underexercising [1]. Obesity could be defined as a final picture of abnormal, excessive fat accumulation in the body because of increased feeding and decreased physical activity [2]. When the body weight exceeds 20% above what is considered normal, according to standard age, height, and weight tables, it is defined as obesity [3]. Obesity is not only a cosmetic concern, but it is also a complex disorder, which increases the risk of impaired health. According to various studies, overweight and obesity are important contributing factors for the development a variety of mental and physical disorders [4, 5]. Excess bodyweight is the sixth most important risk factor contributing to the overall burden of disease, worldwide [6]. The obese individuals incur an elevated risk from all-cause mortality. It has been reported that obesity is the fifth leading risk factor for global deaths. The mortality rate from all causes in the obese population is at least 20% higher, compared to the normal-weighted society [7]. Information has been provided showing that obesity lead to several disorders including type 2 diabetes mellitus, high blood pressure, cardiovascular diseases, stroke, kidney disease, breathing problems, sleep apnea, osteoarthritis, malignancy, mental problems (such as clinical depression), anxiety, and eventually impaired health in general [8–11]. Since obesity tends to exert a global impact on inflammation, it increases the risk of many cancer types, such as breast, colon, endometrial, kidney, gallbladder, and liver cancers [12]. It has clearly been shown that obesity results in lowered quality of life, as well as a higher risk of premature death [5]. Overall quality of life could be diminished due to disability, depression, and social isolation of the obese person, besides impaired physical health. It has been proven that obesity markedly reduces life expectancy [13]. The severe consequences of obesity for physical health and emotional well-being already emerge in childhood [14], and it is well known that childhood obesity is the most serious public health problem, as children are more likely to become obese adults in their future life. Furthermore, it has been shown that overweight and obesity developed in childhood confers significant impact on both physical and psychological health in the future [1, 14, 15]. Overweight and obese children will also be exposed to higher risk of disability and premature death [16]. A vicious circle has been shown in children who are overfed, as they become overeating adults [15].

The childhood obesity has also been linked to cardiovascular disease risk during adulthood. This is compounded by the risk related to chronic hyperglycemia exposure in youth with type 2 diabetes mellitus [17]. The World Health Organization (WHO) reported that children in low- and middle-income countries are more vulnerable to inadequate prenatal, infant- and young-child nutritional states. And, at the same time, these kids are exposed to high-fat, high-sugar, high-salt, energy-dense, micronutrient-poor foods, which tend to be lower in cost and also lower in nutrient quality [18]. These dietary patterns, in conjunction with lower levels of physical activity, result in a sharp increase in childhood obesity, while undernutrition issues remain unsolved [18]. The obesity and overweight conditions are also pervasive among elderly people. It has been reported that obesity is also the problem of wealthy people. However, obesity now inversely affects the poor and uneducated people. It has been reported in several studies that obesity is higher in low social classes, amongst those on a low educational level, and within ethnic minority groups [7, 18]. WHO reported

that children in developing countries incur a risk of obesity and inadequate nutrition, simultaneously [18]. The obesity and overweight are also pervasive among elderly people. The prevalence of obesity is rising progressively among older age groups [19], and it is well known that main complications of obesity in elderly people is the metabolic syndrome (with glucose intolerance, hypertension, and cardiovascular disease) [20, 21]. It is therefore not surprising that obesity increases the risk of heart failure in elderly. Other serious consequences of obesity in elderly people are the several cancer types, Alzheimer's disease, pulmonary dysfunction, osteoarthritis, obstructive sleep apnea syndrome, and functional inactivity [20, 22, 23]. It has been proven that inactivity, (mostly depending on obesity), aging, and comorbidity reduced quality of life are commonly leading to frailty and premature death in elderly people [3, 24]. The other dark side of obesity is the economy. It is obvious that obesity leads to many health problems, which can cost millions to treat.

Obese individuals are likely to have more medical and health problems [1]. Moreover, these reduce personal economic productivity, due to impaired health. It was reported that obese individuals have medical expenses that were approximately 30% greater than their normal weight peers [25]. Obesity is considered a top public health concern, due to the high level of morbidity and mortality in the United States [26]. It was reported that medical costs for obesity accounted for 40% of the healthcare budget in 2006. The medical care costs of obesity in the United States were estimated to be \$147 billion in 2008. The annual nationwide productive costs of obesity-related absenteeism range between \$3.38 billion (\$79 per obese individual) and \$6.38 billion (\$132 per obese individual). Obesity affects 34% of children in the United States. For the pediatric healthcare delivery system, expenses were \$179 per year higher in obese children versus children with a normal body mass index (BMI) [24]. Recently, it was reported that direct medical cost of overweight and obesity combined is approximately 5.0–10% of the United States healthcare spending [27]. The actual cost of obesity and related morbidity in developing countries have not been reported in any detail to date, but it is clear that prevalence of childhood and adulthood obesity is increasing in low-income countries, which lead to heavy treatment burden in their domestic budget.

1.2. Prevalence of overweight and obesity

Obesity threatens public health more than communicable diseases in the present world. Overweight and obesity cause death in more people than those being underweight. The increased prevalence of obesity has occurred in the United States during the last 30 years [27], and according to WHO, the worldwide prevalence of obesity, more than doubled between 1980 and 2014 [18]. In 2014, more than 1.9 billion adults, 18 years and older, were overweight. Of these, over 600 million were obese [28]. Historically, at the beginning of the era, obesity was only the problem of rich people and the affluent countries. However, obesity is now dramatically increased in lower and middle-income countries. Rural-urban comparisons and migration studies provide evidence for an effect of modernization in increasing the prevalence of obesity [7]. Fifty percent of the adults are overweight and obese in many countries [15]. The "WHO-MONICA" study revealed markedly different prevalence patterns within Europe, ranging from 7% in Swedish men to 45% in women from Lithuania [28]. It was asserted, in a

research report from China, that 55.6% of the population express central obesity [10]. Obesity prevalence in the United States ranged from 29 to 50% [28, 29], and around the world, rates of obesity are on the rise—since 1980, the global obesity rate has nearly doubled, and there are now over 200 million obese men and nearly 300 million obese women. However, the Japanese population is exempted from these trends [28].

Overweight and obesity affect every age group around the world. The National “Health and Nutrition Examination Survey” in the United States has reported that the prevalence of obesity is on the increase in all the pediatric age groups, in males and females, and in various ethnic and racial groups [1]. World Health Organization (WHO) reported that 39% of adults were overweight in the year 2014, especially in the urban area [18]. The more disturbing situation is that the 42 million children under the age of five were overweight or obese in the year 2013 [18]. The childhood overweight and obesity in developing countries have been 30% higher than in the developed countries [18], and childhood obesity has reached epidemic levels in developed countries! Twenty-five percent of children in the United States are overweight and 11% are obese [18, 30, 31]. Although there is a paucity of data on the prevalence of childhood obesity in developing countries, the worldwide prevalence of pediatric obesity has increased several-fold in recent years [18].

1.3. What is the common reason?

There is no single cause for overweight and obesity. The mechanism of obesity development is not fully understood, and it is believed to be a disorder with multiple causes. In the human body, excess energy is stored as fat in the adipose tissue, in order to be used in case of an energy deficit. Formerly, the focus on adipose tissue and adipogenesis (which means the development of fat cells) has been on obesity. The molecular and biological studies in adipose tissue have displayed unpredictable results. But, the negative image of adipose tissue has been turned around with the discovery of its crucial role in immune responses, glucose homeostasis, as well as thyroid biology and reproductive functions [32]. During the past two decades, it has been recognized that adipose tissue, which contains both white and brown adipocyte, is regulating energy balance and substrate metabolism [33, 34]. The white adipose tissue (WAT) is storing energy as triglycerides and is chiefly responsible for the obesity due to excess energy storage [35].

The regulation of energy intake and expenditure is a homeostatic process. Adipocytes secrete bioactive proteins, such as leptin, adiponectin, visfatin, omentin, tumor necrosis factor- α (TNF- α), cytokines, resistin, and retinol-binding protein 4, responsible for the regulation of overall energy homeostasis [32]. Therefore, obesity may be regarded as an inflammatory reaction in the human body, and consequently, WAT is mainly associated with obesity. The circulating inflammation-related adipokines are usually increased, as the adipose tissue expands [33]. However, the brown adipose tissue (BAT), which surrounds the hearth and large vessels during infancy, serve as important “furnaces” burning energy in the human body [35]. The amount of BAT decreases in adulthood as humans mature and can now only be found within white fat pads as scattered cells. The brown adipocytes are multilocular and contain less lipid than white adipocytes [32, 35], and BAT exerts a very important role in the regulation of energy

turnover by increasing when the environment turns cold, as well as with catecholamine discharge [36]. This knowledge points to the fact that various factors may serve as internal and external “regulators” in either combatting or preserving obesity. Environmental factors, lifestyle preferences, emotional problems, and cultural environment play pivotal roles externally in the rising prevalence of obesity worldwide [15]. However, one fundamental cause of overweight and obesity is an energy imbalance between consumed and expended calories. Once overweight, then obesity takes place, when the body consumes more calories than it burns. Factors, such as inactivity, unhealthy diet, eating habits, family lifestyle, metabolism, and genetics play important roles in the development of overweight and obesity [1]. It was reported that over the 90% of obesity causes are idiopathic and <10% are associated with genetic and hormonal causes [1]. Various countries, from America to Europe, from the Middle East to North Africa, have reported that obesity is a major health issue [29–31, 37, 38]. It was documented that every country (from developed to developing) has own particular contributing factors to obesity, including the fast food chains, adopting western like eating, traditionally lack of exercises and more. However, they have reported that *low educational and socioeconomic level* as a common point.

1.4. What can be done?

The studies have shown that understanding the biology of adipogenesis might lead to an effective solution treating the obesity epidemic. Researchers are specifically asserting that a manipulation of adipocyte biology, via enhancement of leptin and adiponectin synthesis, would be a sounder strategy combatting the obesity epidemic [32]. They reported that reactivation of BAT in adult humans is a potentially viable solution for successfully treating the obesity epidemic [32]. Almost all researchers agree that prevention is the key strategy for controlling the current epidemic of obesity. However, obesity prevention is one of the greatest public health challenges in the twenty-first century. The International Obesity Task Force (IOTF) has been working with this purpose for a long time [18]. Although 50% of the adults are overweight and obese in many countries, obesity and overweight are preventable and curable [7, 18]. It is well known that heavy children incur an increased risk of being overweight adults, and it is harder for them to reduce excessive weight, once it becomes established [39]. For this reason, prevention of obesity, especially in the low age group, is the key strategy for controlling this epidemic problem. The weight control must be constituted in early childhood [15]. Prevention may include primary prevention of overweight or obesity, secondary prevention or prevention of weight regains following weight loss, and avoidance of more weight increase in obese persons unable to lose weight [15]. There is no doubt that the primary prevention is the main strategy for controlling this growing public health problem. Supportive environments and communities are fundamental in shaping people’s choices and preventing obesity [15]. However, the clinical and epidemiological evidence demonstrated that lifestyle factors, like physical activity and nutrition, should be efficient to some degree to prevent and treat overweight and obesity in the adult population [2, 8]. As part of the intervention strategies and staff in early life, parents should be primarily enlightened for the results of their act on their children. Management of obesity in children differs from adults and focusing on the prevention of weight gain is more important rather than weight loss during childhood.

Effective health service should be established for the top priority groups, i.e., the children and adolescents. As the prevalence of overweight and obesity is higher in low-income and uneducated people, the educational program should be implemented by institutions like schools and the media. Obesity and its comorbidities necessitate careful clinical assessment to identify underlying factors to allow coherent management. Effective long-term weight loss depends on permanent changes in dietary quality, energy intake, and activity [6]. There is no concern about personal responsibility being crucial for ongoing healthy life. For this reason, WHO describes the actions to support healthy diets and regular physical activity. WHO suggests that people should limit energy intake from total fats and sugars and increase consumption of fruits and vegetables, as well as legumes, whole grains, and nuts, at an individual level. People can engage in regular physical activity (60 min a day for children and 150 min per week for adults) [18]. WHO also emphasizes that individual responsibility can only have its full effect where people have access to a healthy lifestyle. Therefore, at the societal level, it is important to support individuals through sustained political commitment. It is clear that the responsibility could be awakened with enhanced knowledge. The awareness derived from information may force people to take responsibility with their life. All weight management strategies need to educate people about healthy lifestyle. Weight management, to be achieved chiefly by behavior techniques that focus on lifestyle, includes dietary measures and physical activity. The public health policies should be established to prevent and avoid overweight and obesity in every age group. With this purpose, the policy makers in public health services should build sustainable strategies for a healthy environment for physical activity and non-processed (raw) food for healthy diet. WHO has developed the "Global Action Plan for the prevention and control of noncommunicable diseases 2013–2020." The countries commit to advance the implementation of the WHO Global Strategy on Diet, Physical Activity and Health, including, where appropriate, through the introduction of policies and actions aimed at promoting healthy diets and increasing physical activity in the entire population [18]. The government's role in obesity has largely focused on interventions and policies, such as national surveillance, obesity education and awareness, grant-based food subsidy programs, zoning for food access, school-based nutrition programs, dietary guidelines, nutrition labeling, and food marketing and pricing policies. Over the last 50 years, the childhood obesity problem has caught researcher's attention. Although they agree that prevention is basic, one still needs to understand why childhood obesity is a common problem, from east to west, and poverty to affluent countries around the world. Moreover, the low and middle-income countries experience a double burden of diseases derived from malnutrition and western like fast-food nutrition, simultaneously. To prevent the epidemic and find a sustainable solution for the childhood obesity problem primarily, it should be understood why children develop obesity. There is no doubt that unexpected changes in society's way of living affect children's lifestyle and well-being deeply. What are the changes in adult life, regarding the facilitation of reducing the incidence of obesity in their children? In order to shed some light on the problem in question, researchers, policy makers, doctors, healthcare providers, and finally, the whole society must think again on societal norms and man's way of living. The lifestyle of human beings changed fundamentally in the twenty-first century, due to developing technology, agricultural changes, food processing, and marketing. The most striking change in human

behavior is getting too familiar with a lifestyle ruled by technology. As a result, the essential chain between production and consumption disappeared. People's behavior about consumption without sound skepticism reflects on their children. Children's nature is prone to activity. Everybody has observed his or her unlimited energy. However, this "modern" way of living has repressed the "life energy" of children and turned it into "virtual energy". A new approach is required for combatting the childhood epidemic obesity problem, since the present problem is environmental and not genetic. The frequency of "obesity" gene expression has not increased in the population, but the children's environment has changed. Combatting the childhood obesity epidemic can be achieved with changing in societal norms. Children are hermeneutical entities like adults, and they need durable role models in their lives. Therefore, preventing the childhood obesity depends on the prevention of adulthood obesity. Society must be reconstructed and rid themselves of the vicious circle of overeating, overconsuming, inactivity, technology, impaired biorhythms, sleepiness, and finally meaningless activities. People will have to retrieve a sound purpose and meaning in their lives. There are two possible ways of fighting the obesity epidemic; reforming social norms or modifying people's organ/cellular phenotypes, introducing a predefined diet and exercise program.

2. Conclusion

Lifestyle preferences, cultural environment, education, socioeconomic level, and environmental factors, play pivotal roles in the rising prevalence of obesity worldwide. It is important to emphasize that all of the given causes for the increased levels of obesity are predicated. It is essential to build sustainable strategies for a healthy lifestyle. The most crucial step for people is to take personal responsibility for their health. There is no doubt that the primary prevention is the main strategy for controlling this growing public health problem.

3. Key points

- Overweight and obesity cause death of more people than underweight and communicable diseases.
- Overweight and obesity reduce life expectancy.
- Overweight and obesity impair health and reduce quality of life.
- More than half of the population in the world is overweight and obese.
- The worldwide prevalence of obesity more than doubled between 1980 and 2014.
- Obesity in children is a major health concern in the developed world.
- Almost a quarter of children around the world are overweight and obese.
- Forty-two million children under the age of five are overweight or obese.

- Obesity affects 34% of children in the United States.
- Overweight and obese children are being overweight and obese when becoming adults.
- The prevalence of overweight and obesity is higher in poor and uneducated people.
- Education is the most important step for challenging obesity.
- Primary prevention is essential for challenge obesity.
- The policy makers in health services, and health professionals in medicine, play important roles in preventing and curing this “contemporary” epidemic.
- People should take personal responsibility for their health development.
- Combatting the childhood obesity epidemic can be achieved by changing social norms.
- Obesity is preventable.

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