Causes And Treatment for Obesity: How to Solve Obesity in Singapore?

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Abstract. Currently, the issue of obesity has been an increasingly important problem in Singapore. This research aims to explore the causes and countermeasures of obesity in Singapore. Meanwhile, it will provide relevant policy recommendations for the government. Through literature review, it is found that the main causes of obesity in Singapore include lifestyle, diet, genetic factors and so on. Among them, lifestyle is one of the most important causes of obesity, including lack of exercise, long time sitting, lack of sleep and so on. In view of these causes, this paper proposes a series of countermeasures, including healthy diet, increasing exercise, psychological intervention and so on. Among them, healthy diet is one of the important means to prevent obesity, it is recommended that people eat more vegetables and fruits, whole grains, low-fat foods and so on. Increasing exercise is also an important means to prevent obesity, and it is recommended that people get at least 30 minutes of aerobic exercise every day. At the same time, this paper also provides relevant policy suggestions for the government, including strengthening health education and limiting the advertising of high-calorie food. Among them, strengthening health education is one of the important means to prevent obesity, it is suggested that the government should strengthen the publicity and promotion of health education in public places and schools.

Keywords: Obesity, influence, intervention, treatment, causes.

1. Introduction

Obesity refers to a certain degree of obvious overweight caused by an increasingly thick fat layer [1]. Simply put, obesity is caused by excessive accumulation of triglycerides. In most of the cases, obesity is caused by four factors such as low metabolic rate, appetite factors, dietary factors, and lack of exercise. At present, the research of obesity is being deeply explored in many fields, including the causes, mechanisms, prevention and treatment of obesity, as well as the relationship between obesity and various chronic diseases [2]. In basic research, scientists are exploring the complex relationship between obesity and a variety of factors, including genetics, environment, and lifestyle. There is also a growing body of research on the link between obesity and chronic diseases such as cardiovascular disease and diabetes. However, there is a lack of researches about Singapore people's obesity and health. In fact, the research of obesity is really significant. First, obesity has shown a rapid increase worldwide, posing a serious challenge to public health [3]. Research on Singapore people's obesity can help develop effective prevention and intervention strategies to reduce obesity morbidity and mortality in Singapore. Secondly, obesity not only affects appearance, but also can lead to a variety of chronic diseases, such as diabetes, high blood pressure, cardiovascular disease and so on [4]. Considering that, the research on Singapore people's obesity can help find more effective treatments and improve Singapore patients' quality of life. Thirdly, obesity and the related diseases caused by it impose a huge economic burden on society [5].Therefore, the research on Singapore people's obesity can help reduce this burden, reducing healthcare expenditures and social costs of Singapore. Finally, as a multicultural country, Singapore is somewhat representative of its eating habits and obesity issues. Hence, the results of this research can provide useful reference for other countries and regions, promoting the research and solution of obesity problem on a global scale.

2. Literature Research Strategy

Based on Google Scholar, this paper has reviewed a wide range of literature about obesity. In the literature research process, numerous keywords, which include the cause for obesity, obesity in Singapore, how to deal with obesity, the epidemiological characteristics of obesity, obesity research, and the influence of obesity on health, have been utilized

3. Main Content

3.1. The Definition and Classification of Obesity

Obesity, in short, refers to a state in which the accumulation of body fat, especially triglycerides, is excessive, resulting in significant weight gain [6].At the same time, obesity is not only manifested as a rise in weight, but more importantly, the excessive accumulation of adipose tissue in the body, especially the increase of visceral fat and subcutaneous fat. In fact, obesity is not only an aesthetic problem, but also a chronic metabolic disease that can cause many health problems.

As a complex state of health, obesity can be defined and classified in many aspects, including physiology, pathology and lifestyle. Obesity can be classified from multiple perspectives. First of all, according to the cause, obesity can be divided into simple obesity and secondary obesity. Simple obesity refers to obesity caused by lifestyle factors such as heredity, overeating and lack of exercise [7]. People with simple obesity often do not have significant endocrine or metabolic diseases. In addition, simple obesity can be subdivided into physical obesity and overeating obesity. Physical obesity is related to an individual's innate constitution [8].For example, people with physical obesity often have slower material metabolism. Meanwhile the material synthesis speed of their bodies is usually greater than the speed of decomposition. In contrast, overeating obesity is mainly caused by excessive diet, especially excessive intake of sweets and greasy foods. Secondary obesity, which is also known as morbid obesity or symptomatic obesity, is caused by specific diseases or medications [9].Common diseases that can cause secondary obesity include hypothyroidism and polycystic ovary syndrome, and so on. Specifically, all these diseases will affect the body's metabolic processes and lead to excessive accumulation of fat.

Second, according to fat distribution, obesity can be divided into central obesity, peripheral obesity, and visceral fat accumulation obesity. Central obesity refers to the accumulation of fat mainly in the abdomen, showing a large bell [10]. This type of obesity is closely related to a variety of metabolic diseases, such as diabetes, hypertension, hyperlipidemia and so on. Peripheral obesity is a condition in which fat is distributed mainly in the extremities and buttocks [11]. Although this type of obesity is relatively harmless to health, there are still concerns about its possible health problems. Visceral fat accumulation obesity refers to the accumulation of fat mainly around the internal organs [12]. This type of obesity is closely related to metabolic syndrome, which may increase the risk of cardiovascular disease, diabetes and other diseases.

Thirdly, based on the obesity degree, obesity can also be divided into different types. Obesity degree is an important measure, which is usually expressed as a percentage of the difference between the actual weight and the standard weight [13]. Specifically, when the obesity degree is within +/- 10%, people are considered normal and moderate. When the obesity degree is more than 10%, people are overweight. In contrast, if the obesity degree is more than 20%-30%, people will be regarded as mildly obese. However, on condition that the obesity degree is more than 30% to 50%, people will be seen as moderately obese. Finally, if the obesity degree is more than 50%, it means that people are severely obese. Another commonly used measure to assess obesity degree is Body Mass Index (BMI), which is determined by people’s weight and height [14].As shown in Figure 1, there is the obesity assessment from the perspective of BMI. Although different countries and regions have slightly different criteria for BMI classification, in general, a BMI of 25 or greater means that a person is overweight and a BMI of 30 or greater means that the individual is obese.

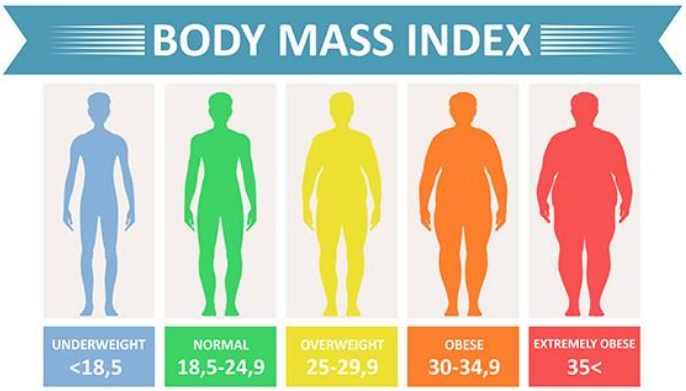

Figure 1 The BMI Assessment of Obesity [15]

3.2. The Epidemiological Characteristics of Obesity

The epidemiological characteristics of obesity mainly include the following aspects. First, obesity is a global epidemic. Obesity has become a public health problem on a global scale, affecting not only developed countries but also developing countries [16]. With economic development and lifestyle changes, the incidence of obesity is on the rise worldwide. Secondly, obesity varies by gender and age. Specifically, the incidence of obesity varies across gender and age groups. Meanwhile, the prevalence of obesity is generally higher in women than in men. In addition, the incidence of obesity is also on the rise with age. Thirdly, obesity is closely related to people's socioeconomic status. In general, the incidence of obesity is higher in people of lower socioeconomic status, which is related to factors such as poverty, education level, employment opportunities, etc. Fourthly, obesity varies geographically and ethnically. According to Singapore Population Health Survey 2020, obesity rate in 2019-2020 has increase from 8.6% in 2013 to 10.5% in 2017 [17]. In other areas, the prevalence of obesity is relatively low in some African countries, while it is relative high in North America. As shown in Figure 2, the obesity rate is different in different countries.

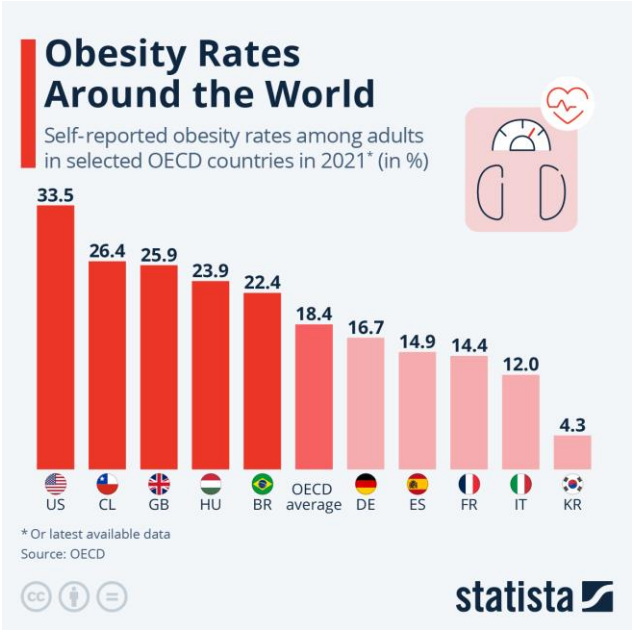

Figure 2 Obesity Rates Around the World in 2021 [18]

3.3. The Causes for Obesity

Obesity is a complex multi-factorial health problem, whose formation and development are deeply influenced by genetic factors, environmental factors, lifestyle and dietary habits. First of all, genetic factors play an important role in the development of obesity. Scientific research has found that obesity has an obvious tendency of family aggregation, which indicates that genetic factors play a non-

negligible role in the occurrence of obesity [19]. It is estimated that genetic factors contribute between 40% and 85% of the variation in obesity, but the specific genetic mechanisms are not fully understood [20].In addition, the genetic basis of obesity is complex, involving the superimposition of small effects from multiple genes that influence an individual's weight by affecting energy balance, appetite regulation, fat metabolism, and so on. Therefore, people with a family history of obesity are more at risk of obesity, but this does not mean that they will necessarily become obese, because other factors are equally important

Secondly, dietary habits are also one of the key factors leading to obesity. The amount of food people eat mainly depends on the two subjective feelings including hunger and satiety. However, the diet of modern society is often biased towards high-calorie, high-fat foods, which are more likely to trigger people's excess hunger and lead to excess energy and fat accumulation [21].In addition, poor eating habits such as overeating, partial picky eating, eating too fast will also increase the risk of obesity. On the contrary, a balanced diet, a reasonable amount of food and good eating habits help to maintain a healthy weight and posture [22].

Thirdly, lifestyle is also an important factor in obesity. In fact, unhealthy lifestyles, such as lack of exercise, long periods of sitting, irregular work and rest, can increase the risk of obesity [23]. Moderate exercise can consume excess calories and reduce fat accumulation. In contrast, lack of exercise leads to excess calories, which are then converted into fat and stored. In addition, a good sleep and rest habit is also crucial to maintaining a stable weight. Lack of sleep can interfere with the normal secretion of hormones, which affects appetite regulation and energy metabolism, and thus increases the risk of obesity [24].

Fourthly, environmental factors are also one of the main reasons for the increasing prevalence of obesity.With the rapid development of modern society, people's lifestyle has undergone great changes.For example, high-calorie, the physical activities have gradually decreased [25].Environmental endocrine disruptors such as bisphenol A and phthalic acid also have a promoting effect on obesity [26]. These substances interfere with the endocrine system of the body through estrogen-like effects, affecting fat metabolism and energy balance.

3.4. The Influence of Obesity on Health

As shown in Figure 3, there are a wide range of diseases that will be caused by obesity.The influence of obesity on health can be discussed from two aspects. First, obesity is one of the important risk factors for cardiovascular disease (CVD). Due to excessive body fat, the heart needs more blood and oxygen to maintain normal life activities, which increases the load on the heart [27].At the same time, obesity is often accompanied by hyperlipidemia, hypertension and other metabolic abnormalities, which will accelerate the process of atherosclerosis, leading to coronary artery stenosis or occlusion and resulting in coronary heart disease, angina pectoris, myocardial infarction and other cardiovascular diseases. In addition, obesity can also cause structural changes in the heart, such as left ventricular hypertrophy and ventricular diastolic dysfunction, further increasing the burden on the heart.

Figure 3 The Diseases Caused by Obesit [28]

Secondly, there is a close correlation between obesity and diabetes. Obesity is an independent risk factor for T2D, and 80 to 90 percent of people with type 2 diabetes are overweight or obese [29]. The decrease in the number of insulin receptors and the defect of receptor function in obese people will cause insulin resistance and decrease the effect of insulin in lowering blood sugar. In order to maintain normal blood sugar levels, islets secrete more insulin in compensation, which in the long run can lead to impaired islet function and causes diabetes. In addition, the adipose tissue of obese people has endocrine function, and the hormone level secreted by it is disturbed, which will also antagonize the hypoglycemic effect of insulin, thus aggravating insulin resistance [30].

3.5. The Intervention and Treatment of Obesity

The intervention and treatment of obesity is a complex and multi-dimensional process involving dietary adjustment, increased physical activity, medication, surgery, and behavioral change.

The first way lies in dietary adjustment. In fact, dietary adjustment is the basis of obesity intervention and treatment. Simply put, the core of dietary adjustment is to reduce calorie intake through reasonable dietary structure, while ensuring the various nutrients required by the body. It is generally recommended to reduce energy intake by 400-600 kcal per day based on the total energy required for basic metabolism, which can be achieved by reducing the intake of high-calorie foods, such as fried foods, sweets, sugary drinks, etc [31]. While reducing caloric intake, people should pay attention to the rationality of dietary structure. A diet low in fat, high in quality protein, high in dietary fiber and rich in vitamins is recommended. The proportion of carbohydrates, proteins and fats should be controlled respectively at around 60%-65%, 15%-20% and 25% [32].In fact, such a diet helps to maintain a balanced nutrition while promoting the breakdown and metabolism of fat. In addition, choosing low-fat, high-fiber foods is the key to weight loss. Foods such as vegetables, fruits, whole grains, lean meats, fish, and legumes are not only low in calories, but also high in dietary fiber, vitamins, and minerals, which helps people feel fuller and eat less [33].

The second way lies in increasing physical activities. The increase of physical activity is another important means of obesity intervention and treatment. Through exercise, people can improve the body's metabolic rate and increase energy consumption, so as to achieve the purpose of weight loss. Aerobic exercise is the preferred way of exercise for weight loss, which can promote the breakdown and metabolism of fat by increasing the heart rate and respiratory rate. It is recommended to get at least 150 minutes of moderate-intensity aerobic exercise per week, such as brisk walking, jogging, swimming, cycling, etc [34]. These exercises can not only lose weight, but also improve heart and lung function and enhance physical fitness. Meanwhile, strength training is also an integral part of the weight loss process. By increasing muscle mass, people can increase their basal metabolic rate, allowing the bodies to burn more energy even at rest. In addition, strength training can also shape the body and make the body more beautiful. Making a personalized exercise plan is the key to ensure the effectiveness of exercise. The exercise plan should be based on the individual's physical condition, exercise habits and weight loss goals. In addition, people should gradually increase the intensity and duration of exercise. At the same time, attention should be paid to avoid sports injuries and ensure the safety of doing sports.

The third way lies in medication. On the basis of dietary adjustments and increased physical activity, if weight loss is not effective, medication can be considered. However, it should be noted that drug treatment should be carried out under the guidance of a doctor to avoid the occurrence of drug side effects and adverse reactions. First, people can deal with obesity with appetite suppressants. Appetite suppressants can reduce food intake by suppressing the appetite center, so as to achieve the purpose of weight loss. Common appetite inhibitors include sibutramine [35]. However, it should be noted that these drugs may cause dry mouth, constipation, insomnia and other side effects. Second, metabolic regulators also have much to offer in handling obesity. Metabolic regulators can reduce body weight by promoting the breakdown and metabolism of fat. Common metabolic regulators are orlistat and so on. These drugs can inhibit the activity of gastrointestinal lipase, thereby reducing fat

absorption. Meanwhile, people also need to pay attention to the possible side effects and adverse reactions that may be caused by these drugs.

Fourthly, surgery also has much to offer in solving obesity. For patients with severe obesity and multiple complications, surgical treatment can be considered when drug and non-surgical treatment do not respond well [36].Surgical treatment reduces food intake and energy absorption by shrinking the stomach capacity or limiting the absorption of nutrients by the small intestine, thus achieving weight loss. For example, gastric bypass is very effective in treating obesity. Gastric bypass is a surgical procedure that reduces food intake and energy absorption by altering the anatomy of the gastrointestinal tract [37].The procedure reduces the capacity of the stomach and changes the flow of food, thereby reducing food intake and energy absorption. In addition, sleeve gastrectomy is also beneficial to address obesity. Sleeve gastrectomy is a surgical procedure that reduces the volume of the stomach by removing part of the stomach tissue [38]. This surgery can significantly reduce the patient's appetite and food intake, so as to achieve the purpose of weight loss. It should be noted that surgical treatment, although effective, is relatively high risk. Therefore, before choosing surgical treatment, patients should fully understand the risks and complications of surgery and make decisions under the guidance of doctors.

Finally, behavioral change also helps solve obesity. Cognitive restructuring refers to the formation of healthy eating and exercise habits by changing perceptions and attitudes about food, exercise and weight [39].For example, recognizing that weight loss is a long-term process that requires patience and persistence is a good example. In addition, stress is one of the important factors that lead to obesity. Through effective stress management techniques, such as meditation, yoga, deep breathing, etc., it is possible to relieve stress and reduce overeating behaviors caused by stress. Meanwhile, establishing a healthy diet and exercise routine is also the key to successful weight loss.

4. Discussion

Obesity is a global health problem, and Singapore is no exception. Here are some of the available research findings and conclusions on measures to address obesity in Singapore, and their implications for practice and policy. First, research shows that healthy eating habits are critical to preventing and controlling obesity. The Singapore government can promote healthy eating habits, such as urging people to increase the intake of fruits, vegetables, whole grains and protein, and reduce the intake of sugar and saturated fat. In addition, governments can restrict the sale of foods high in sugar, fat and salt through tax policies. Secondly, physical inactivity is an important factor in obesity. The Singapore government can encourage people to be more physically active. For example, Singapore government can handle obesity by building more parks and bike paths, as well as promoting a culture of walking and cycling. Thirdly, health education can help people understand the harm of obesity and the preventive measures. The Singapore Government can promote health education in schools, communities and workplaces to raise Singapore people’s health awareness. Fourth, the Singapore government could enact policies such as restricting advertising of foods high in sugar, fat and salt, encouraging companies to offer healthy foods and drinks, and strengthening regulation of the restaurant industry. In the end, unique interventions are needed because each person's physical condition and lifestyle are different. Hence, the Singapore Government needs to provide personalized health advice and guidance to help people develop a health plan that is right for them. In conclusion, the response to obesity in Singapore requires a multi-faceted effort, including the promotion of healthy eating habits, increased physical activity, health education, the development of relevant policies and the provision of personalized interventions. These measures can not only improve the health status of individuals, but also reduce the burden on society and improve the overall health level of the country.

However, there are some limitations. For example, when assessing the effectiveness of responses to obesity, the applicability of different measures in different populations needs to be taken into account. In addition, the implementation effect of intervention measures may be affected by many

factors, such as individual differences, social environment, etc. In addition, Singapore is a multicultural country, with different ethnic groups such as Chinese, Malays, Indians and more, which also means great differences in diet, lifestyle and genetic background. Therefore, the representativeness of the research sample is crucial, otherwise the results may be biased. With the deepening of the understanding of obesity, interdisciplinary cooperation will become an important trend of obesity research in the future. Experts from many disciplines, including medicine, nutrition, psychology and sociology, will work together to study the problem of obesity and propose more comprehensive and effective solutions. In addition, with the development of gene sequencing and bioinformatics technology, precision medicine will become an important direction of obesity treatment. Through the analysis of individual genetic information and lifestyle habits, more personalized and precise treatment plans can be provided for obese patients.

5. Conclusion

In conclusion, obesity can be divided into different types. In addition, the possibility of obesity is generally higher in women than in men. The prevalence of obesity in Singapore is on the rise. There are four reasons that cause obesity, which include genetic factors, environmental factors, lifestyle and dietary habits. In addition. influenced by obesity, people are more likely to be affected with cardiovascular disease and diabetes. Therefore, it is necessary to take effective measures to handle and prevent obesity. Specifically, dietary adjustment, increased physical activity, medication, and surgery all have much to offer in solving obesity. Besides, Singapore government should also spare no effort to adopt a wide range of policies to help Singapore people overcome obesity. There are many issues that need to be discussed further in the future. For example, the relationship between obesity and chronic diseases is a future research direction, which means in-depth study of the association between obesity and other chronic diseases excluding cardiovascular disease and diabetes, as well as the specific mechanism of obesity's impact on these diseases. In addition, it is also very important to study the influence of psychological factors such as stress and emotion on obesity and how to reduce the occurrence of obesity through psychological intervention in the future.

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