



Obesity and Chronic Diseases: A Global Health Concern

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ABSTRACT

Obesity has emerged as a critical global health concern, with significant implications for chronic diseases worldwide. This review paper provides an overview of the complex relationship between obesity and chronic diseases, highlighting the global impact of this growing public health crisis. By synthesizing existing literature, we examine the prevalence, determinants, physiological mechanisms, and economic burden associated with obesity-related chronic diseases.

The review emphasizes the alarming rise in obesity rates globally and its correlation with the development and progression of chronic conditions, including cardiovascular disease, type 2 diabetes, certain cancers, and musculoskeletal disorders. Socio-economic, cultural, and environmental factors contributing to the obesity epidemic are explored, along with behavioral factors such as sedentary lifestyle and unhealthy dietary patterns.

Furthermore, the review analyzes the physiological mechanisms underlying the link between obesity and chronic diseases, encompassing chronic low-grade inflammation, insulin resistance, dyslipidemia, and adipokine dysregulation. The interplay between these factors is elucidated to provide a comprehensive understanding of the pathophysiology connecting obesity to chronic conditions.

The economic burden of obesity and its associated chronic diseases is discussed, highlighting the costs of prevention, treatment, and management. Current strategies and interventions targeting obesity and chronic diseases at individual, community, and policy levels are also reviewed.

In conclusion, this review underscores the urgent need for comprehensive approaches to address obesity as a global health concern. By understanding its determinants, physiological mechanisms, and economic implications, effective strategies can be developed to prevent and manage obesity, leading to improved public health outcomes and reduced strain on healthcare systems worldwide.

Keywords: Obesity, Chronic diseases, Global health, Public health, Insulin resistance, Cardiovascular diseases, Type 2 Diabetes, Education, Public health initiatives.

Introduction

-Definition of obesity and its global prevalence

Obesity is a medical condition characterized by an excess accumulation of body fat, which can have negative effects on health. It is typically assessed using the body mass index (BMI) calculation, which compares a person's weight to their height.

The global prevalence of obesity has been steadily increasing over the years, becoming a major public health issue. The World Health Organization (WHO) estimates that in 2016, more than 1.9 billion adults worldwide were overweight, with over 650 million classified as obese.

Obesity rates vary across regions and countries, with higher rates generally found in high-income countries. However, there has been a notable rise in obesity prevalence in low- and middle-income countries due to changing lifestyles, urbanization, and dietary patterns.

Obesity is associated with various health risks and complications, including cardiovascular diseases, type 2 diabetes, certain cancers, musculoskeletal disorders, and respiratory problems. It also has detrimental effects on mental health and overall quality of life.

Childhood obesity is another growing concern, with over 340 million children and adolescents aged 5-19 estimated to be overweight or obese in 2019. Childhood obesity often persists into adulthood and increases the risk of developing chronic health conditions.

The economic impact of obesity is substantial, as it strains healthcare systems and leads to increased healthcare costs. Additionally, obesity can affect work productivity and result in reduced work capacity.

Efforts to address obesity focus on promoting healthy lifestyles, encouraging physical activity, improving nutrition, and raising awareness about the associated health risks. Public health campaigns, policy interventions, and community-based initiatives are crucial in combating the global obesity epidemic.

-Overview of the link between obesity and chronic diseases

Obesity is closely linked to the development of chronic diseases, significantly impacting overall health. The connection between obesity and chronic diseases can be summarized as follows:

1. Cardiovascular Diseases: Obesity increases the risk of heart disease, high blood pressure, stroke, and coronary artery disease. Excess body fat strains the heart, raises blood pressure, and contributes to the formation of arterial plaque.
2. Type 2 Diabetes: Obesity is a major risk factor for developing type 2 diabetes. Adipose tissue releases hormones and inflammatory substances that can lead to insulin resistance, impairing the body's ability to regulate blood sugar levels.
3. Certain Cancers: Obesity is associated with an increased risk of various cancers, including breast, colorectal, endometrial, kidney, and pancreatic cancers. The mechanisms involve hormonal imbalances, chronic inflammation, and insulin resistance.
4. Respiratory Disorders: Obesity contributes to respiratory problems such as sleep apnea and asthma. Excess weight can restrict airway function, leading to breathing difficulties and decreased lung capacity.
5. Musculoskeletal Disorders: Obesity puts strain on the joints, increasing the risk of musculoskeletal conditions such as osteoarthritis. The excess weight exacerbates inflammation and accelerates joint degeneration.
6. Mental Health Issues: Obesity is linked to mental health problems, including depression, anxiety, and low self-esteem. Psychological factors, societal stigma, and hormonal imbalances associated with obesity contribute to these issues.

Addressing obesity through lifestyle modifications, including adopting a balanced diet, regular physical activity, and weight management, is crucial for reducing the risk of chronic diseases and improving overall health outcomes. Preventing and treating obesity is essential to mitigate the burden of chronic diseases globally.

-Importance of public health efforts in addressing obesity and its associated risks

Public health efforts play a crucial role in addressing obesity and its associated risks. Obesity has become a global epidemic, leading to numerous health problems such as heart disease, diabetes, certain cancers, and mental health issues. Public health initiatives are essential for several reasons.

Firstly, public health campaigns raise awareness about the health risks of obesity and promote healthy lifestyle choices. They educate individuals on the importance of balanced nutrition, regular physical activity, and weight management, fostering healthier behaviors.

Secondly, public health efforts aim to create supportive environments that facilitate healthy choices. This includes initiatives like improving access to affordable, nutritious food, promoting physical activity through urban planning and infrastructure, and implementing policies that regulate the marketing of unhealthy foods to children.

Furthermore, public health initiatives focus on prevention, as prevention is more effective and cost-efficient than treating obesity-related diseases. By implementing policies that promote healthy eating and active living from childhood to adulthood, public health efforts can significantly reduce the prevalence of obesity and its associated risks.

Ultimately, public health efforts are crucial in addressing obesity as they work to empower individuals, create supportive environments, and prevent obesity-related diseases, leading to improved overall health and well-being in populations.

Understanding Obesity

-Definition of obesity: Body Mass Index (BMI) classification

Obesity is a medical condition characterized by excessive body fat accumulation, resulting in adverse effects on health. Body Mass Index (BMI) is a commonly used classification system to determine obesity. BMI is calculated by dividing a person's weight in kilograms by the square of their height in meters. The resulting value is then categorized into different BMI ranges. According to the World Health Organization (WHO), the BMI classifications for adults are as follows: a BMI below 18.5 is considered underweight, a BMI between 18.5 and 24.9 is considered normal weight, a BMI between 25 and 29.9 is classified as overweight, and a BMI of 30 or above is categorized as obese. However, it's important to note that BMI is a general measure and does not account for individual variations in body composition or muscle mass.

-Factors contributing to obesity

Obesity is a complex condition influenced by a variety of factors, including genetics, environment, behavior, and socioeconomic factors. Here are some key factors contributing to obesity:

1. **Genetics:** Certain genetic factors can predispose individuals to obesity by influencing metabolism, fat storage, and appetite regulation. However, genetics alone cannot explain the rapid increase in obesity rates, suggesting that environmental and lifestyle factors also play significant roles.
2. **Environment:** Our modern environment promotes sedentary lifestyles and easy access to calorie-dense, processed foods. Factors such as the availability and affordability of unhealthy food options, portion sizes, and the prevalence of sedentary behaviors like prolonged screen time contribute to overeating and low physical activity levels.
3. **Diet:** Poor dietary choices, such as consuming high-calorie, low-nutrient foods that are rich in sugars, unhealthy fats, and processed ingredients, contribute to weight gain. High intake of sugary beverages and fast food, along with low consumption of fruits, vegetables, and whole grains, are common dietary factors associated with obesity.
4. **Physical Inactivity:** Modern lifestyles, including desk jobs, reliance on vehicles for transportation, and increased screen time for entertainment, have led to decreased physical activity levels. Insufficient exercise and sedentary behaviors contribute to energy imbalance and weight gain.
5. **Socioeconomic Factors:** Socioeconomic status can influence obesity risk. Limited access to affordable, nutritious foods in low-income communities, food deserts, and the higher cost of healthier options can contribute to poor dietary choices. Additionally, educational opportunities, cultural norms, and social influences can affect lifestyle choices related to diet and physical activity.
6. **Psychological Factors:** Emotional and psychological factors, such as stress, depression, and certain eating disorders, can contribute to overeating and weight gain.

It's important to understand that these factors interact and influence each other, and addressing obesity requires comprehensive strategies that encompass multiple levels, including individual, community, and policy interventions.

-Health implications of obesity

Obesity has significant health implications and is associated with a range of detrimental effects on physical and mental well-being. Here are some key health implications of obesity:

1. **Chronic Diseases:** Obesity is a major risk factor for chronic conditions such as cardiovascular disease, including hypertension, heart disease, and stroke. It is also closely linked to the development of type 2 diabetes, certain types of cancer (e.g., breast, colorectal, and kidney), and musculoskeletal disorders like osteoarthritis.
2. **Metabolic Syndrome:** Obesity often leads to the development of metabolic syndrome, a cluster of conditions that includes high blood pressure, high blood sugar levels, abnormal cholesterol levels, and excess abdominal fat. Metabolic syndrome increases the risk of heart disease, stroke, and type 2 diabetes.
3. **Respiratory Issues:** Obesity can contribute to respiratory problems like sleep apnea, a condition in which breathing repeatedly stops and starts during sleep. Obesity-related asthma, characterized by reduced lung function and increased asthma severity, is also common.
4. **Psychological and Emotional Effects:** Obesity is associated with psychological and emotional consequences, including low self-esteem, depression, anxiety, and body dissatisfaction. These effects can have a significant impact on overall mental well-being and quality of life.
5. **Reduced Quality of Life:** Obesity can impair physical functioning, mobility, and overall quality of life. It may limit participation in daily activities, lead to social isolation, and negatively affect relationships and career opportunities.
6. **Increased Mortality Risk:** Obesity is linked to an increased risk of premature death. It is estimated to contribute to a significant number of preventable deaths worldwide, primarily due to its association with chronic diseases.

Addressing obesity through prevention and management is essential for improving individual and population health. Strategies such as promoting healthy eating habits, encouraging regular physical activity, providing support for weight management, and creating environments that facilitate healthy choices can help mitigate the health implications of obesity and improve overall well-being.

Obesity and Chronic Diseases

-Diabetes

1. **Obesity as a major risk factor for type 2 diabetes:** Obesity is one of the most significant risk factors for developing type 2 diabetes. Excess body fat, particularly abdominal fat, contributes to insulin resistance, a condition in which the body's cells become less responsive to the effects of insulin. This impairs the ability of insulin to regulate blood sugar levels, leading to elevated glucose levels and the development of diabetes.
2. **Mechanisms linking obesity and insulin resistance:** Several mechanisms connect obesity and insulin resistance. Adipose tissue, or fat cells, release pro-inflammatory molecules called adipokines, which can interfere with insulin signaling. Increased levels of free fatty acids in obesity can also disrupt insulin action in tissues. Additionally, obesity is associated with chronic low-grade inflammation, which further contributes to insulin resistance. The accumulation of fat in liver cells (non-alcoholic fatty liver disease) is another consequence of obesity that can contribute to insulin resistance.

3. Long-term complications of diabetes and their impact on health: Poorly managed or uncontrolled diabetes can lead to various long-term complications, affecting multiple organs and systems. These complications include:

Cardiovascular complications, Diabetic nephropathy, Diabetic retinopathy, Neuropathy, Foot complications, Increased infection risk.

These complications highlight the importance of effective diabetes management, including blood sugar control, regular monitoring, and lifestyle modifications, to minimize the impact on health and reduce the risk of complications.

-Cardiovascular Diseases

1. Obesity as a significant risk factor for heart disease and hypertension: Obesity is a major risk factor for the development of heart disease, including coronary artery disease, heart attacks, and heart failure. Excess body weight, particularly abdominal obesity, is associated with an increased risk of hypertension (high blood pressure). Obesity-related factors such as insulin resistance, inflammation, and dyslipidemia contribute to the development and progression of cardiovascular diseases.

2. Atherosclerosis and the role of obesity in its development: Atherosclerosis is the buildup of plaque inside arteries, narrowing and hardening them, leading to reduced blood flow. Obesity promotes the development of atherosclerosis through various mechanisms. Excess adipose tissue releases inflammatory substances that can damage the inner lining of blood vessels, triggering the formation of plaques. Obesity is also linked to dyslipidemia, characterized by high levels of triglycerides and low-density lipoprotein cholesterol (LDL-C), which can contribute to plaque formation. Additionally, obesity is associated with insulin resistance, which promotes the deposition of fat and cholesterol in arterial walls, accelerating atherosclerosis progression.

3. Obesity-related cardiovascular complications and mortality risk: Obesity increases the risk of various cardiovascular complications. These include:

a) Hypertension: Obesity is strongly associated with high blood pressure, which strains the heart and blood vessels, increasing the risk of heart disease, stroke, and kidney disease.

b) Coronary artery disease (CAD): Excess weight and obesity contribute to the development of CAD, which occurs when the coronary arteries that supply the heart with blood become narrowed or blocked due to atherosclerosis. CAD can lead to heart attacks and heart failure.

c) Heart failure: Obesity is a significant risk factor for heart failure, a condition where the heart cannot pump enough blood to meet the body's needs.

d) Arrhythmias: Obesity is associated with an increased risk of atrial fibrillation, a common heart rhythm disorder that can lead to complications like stroke and heart failure.

e) Increased mortality risk: Obesity significantly increases the risk of premature death from cardiovascular diseases. It is also associated with a higher risk of complications following cardiovascular events such as heart attacks and strokes.

Addressing obesity through lifestyle modifications, including weight loss, regular physical activity, and a healthy diet, is crucial in reducing the risk of obesity-related cardiovascular complications and improving long-term outcomes. Additionally, managing other cardiovascular risk factors like blood pressure, cholesterol levels, and blood sugar control is essential for individuals with obesity.

-Certain Cancers

1. Obesity-related cancers: Obesity is associated with an increased risk of several types of cancers. Some of the most common obesity-related cancers include breast cancer (especially in postmenopausal women), colorectal cancer, endometrial cancer, kidney cancer, ovarian cancer, pancreatic cancer, and esophageal cancer. There is also evidence linking obesity to an increased risk of liver, gallbladder, prostate, and certain types of hematological cancers.

2. Mechanisms linking obesity to cancer development: The exact mechanisms linking obesity to cancer development are complex and not fully understood. However, several pathways have been identified. Obesity is associated with chronic low-grade inflammation, elevated levels of insulin and insulin-like growth factors, and increased production of certain hormones (e.g., estrogen) that can promote tumor growth. Additionally, adipose tissue produces adipokines and cytokines that can contribute to cancer cell proliferation, angiogenesis (formation of new blood vessels to support tumor growth), and metastasis (spread of cancer to other parts of the body).

3. Importance of weight management in cancer prevention and treatment: Weight management plays a crucial role in cancer prevention and treatment. Maintaining a healthy weight through a balanced diet and regular physical activity can help reduce the risk of developing obesity-related cancers. For individuals who have already been diagnosed with cancer, weight management becomes equally important. Obesity during cancer treatment is associated with poorer outcomes, increased treatment toxicity, and higher risks of cancer recurrence and mortality. Weight loss and maintenance of a healthy weight can improve treatment outcomes, enhance quality of life, and reduce the risk of cancer recurrence. It is essential for cancer patients to work closely with healthcare professionals to develop personalized weight management plans that consider their specific cancer type, treatment regimen, and overall health status.

Overall, weight management plays a significant role in both cancer prevention and the management of cancer treatment, highlighting the importance of adopting a healthy lifestyle to reduce the risk of obesity-related cancers and improve outcomes for individuals diagnosed with cancer.

Public Health Approaches to Address Obesity

Public health approaches to address obesity involve a multi-faceted and comprehensive strategy that targets various levels, including individuals, communities, and policies. Here are some key public health approaches:

1. **Health Education and Awareness:** Public health campaigns play a crucial role in raising awareness about the health risks of obesity and promoting healthy lifestyle choices. These campaigns provide information on nutrition, physical activity, and weight management, empowering individuals to make informed decisions about their health.
2. **Promoting Healthy Environments:** Public health efforts aim to create supportive environments that make healthy choices accessible and affordable. This includes initiatives such as improving access to nutritious foods, promoting physical activity through urban planning and infrastructure, and increasing availability of safe recreational spaces.
3. **Policy Interventions:** Public health policies can have a significant impact on obesity prevention and control. Examples include regulations on marketing unhealthy foods to children, implementing food labeling requirements, promoting nutrition standards in schools and workplaces, and imposing taxes on sugary beverages.
4. **Community-Based Programs:** Public health initiatives engage communities in promoting healthy behaviors. These programs can include community gardens, cooking classes, physical activity programs, and support groups, fostering a sense of community and providing resources for individuals to make healthier choices.
5. **Collaboration with Stakeholders:** Public health organizations collaborate with various stakeholders, including healthcare providers, schools, workplaces, food industry, and community organizations, to implement coordinated efforts in addressing obesity. These collaborations enhance the effectiveness and reach of interventions.
6. **Research and Surveillance:** Public health agencies conduct research and surveillance to monitor obesity trends, understand the underlying causes, and evaluate the impact of interventions. This data informs the development of evidence-based strategies and policies.

By employing these public health approaches, it is possible to create a supportive environment, promote healthy behaviors, and prevent obesity-related diseases, leading to improved population health and well-being.

Evaluation and Future Directions

Obesity and chronic diseases have become a significant global health concern in recent decades. The rise in obesity rates and the associated increase in chronic diseases such as diabetes, cardiovascular disease, and certain types of cancer have led to a considerable burden on individuals, communities, and healthcare systems worldwide. In this evaluation, we will discuss the current state of obesity and chronic diseases, examine their impact on global health, and explore future directions for addressing this pressing issue.

-Current State of Obesity and Chronic Diseases

Obesity: Obesity rates have been steadily increasing worldwide, affecting both developed and developing countries. Factors contributing to the rise in obesity include sedentary lifestyles, unhealthy diets, and environmental factors such as the availability of high-calorie processed foods. The World Health Organization (WHO) reports that in 2020, over 1.9 billion adults were overweight, and more than 650 million were obese.

Chronic Diseases: Obesity is strongly linked to the development of chronic diseases such as type 2 diabetes, cardiovascular disease, stroke, certain cancers, and musculoskeletal disorders. These diseases not only reduce quality of life but also increase healthcare costs and mortality rates. According to the Global Burden of Disease study, non-communicable diseases, including those related to obesity, accounted for 73% of all deaths globally in 2019.

-Impact on Global Health

Economic Burden: The economic impact of obesity and chronic diseases is substantial. The costs associated with healthcare services, medications, and lost productivity due to illness pose a significant burden on individuals, families, and healthcare systems. It is estimated that the global economic impact of obesity alone is around \$2 trillion annually.

Health Inequalities: Obesity and chronic diseases disproportionately affect low-income populations, creating health disparities. Limited access to healthy food options, safe environments for physical activity, and quality healthcare services contribute to these inequalities. Addressing these disparities is crucial to achieving health equity and improving overall global health outcomes.

-Future Directions for Addressing Obesity and Chronic Diseases

Prevention Strategies: Implementing evidence-based prevention strategies is crucial in tackling obesity and chronic diseases. This includes promoting healthy diets, increasing physical activity, and reducing sedentary behaviors. Public health campaigns, education programs, and policy changes aimed at creating supportive environments for healthy lifestyles can play a pivotal role.

Multisectoral Collaboration: Addressing obesity and chronic diseases requires collaboration across multiple sectors, including healthcare, education, urban planning, and food industries. Governments, policymakers, healthcare professionals, community organizations, and individuals must work together to implement comprehensive approaches that target the underlying causes of obesity and chronic diseases.

Research and Innovation: Continued research and innovation are vital for understanding the complex factors contributing to obesity and chronic diseases and developing effective interventions. This includes studying the impact of genetics, the built environment, social determinants of health, and behavioral factors. Additionally, exploring new technologies and interventions can help improve prevention, diagnosis, and treatment strategies.

Health Policy and Regulation: Governments should prioritize the development and implementation of evidence-based health policies and regulations to address obesity and chronic diseases. This can include measures such as taxation on unhealthy foods, restrictions on food marketing to children, and mandatory nutrition labeling. Policy interventions can create a supportive environment for individuals to make healthier choices.

In conclusion, obesity and chronic diseases pose significant challenges to global health. Addressing this concern requires a multifaceted approach that encompasses prevention strategies, multisectoral collaboration, research and innovation, and effective health policies and regulations. By working together on a global scale, we can make progress in reducing the burden of obesity and chronic diseases and improving overall population health.

Conclusion

In conclusion, obesity and chronic diseases represent a critical global health concern that requires immediate attention. The rising prevalence of obesity and its association with chronic diseases have profound implications for individuals, communities, and healthcare systems worldwide. The economic burden, health inequalities, and impact on mortality rates highlight the urgency of addressing this issue.

To combat obesity and chronic diseases, a comprehensive and multifaceted approach is necessary. Prevention strategies that promote healthy lifestyles, multisectoral collaboration, research and innovation, and effective health policies and regulations are key components of a successful response. By implementing evidence-based interventions, creating supportive environments, and addressing social determinants of health, we can make significant progress in reducing the prevalence of obesity and chronic diseases.

It is essential for governments, policymakers, healthcare professionals, community organizations, and individuals to work together to tackle this global health concern. By prioritizing prevention, improving access to healthy food options and physical activity, and promoting health equity, we can mitigate the impact of obesity and chronic diseases and improve the overall well-being of populations worldwide.

While the road ahead may be challenging, the potential benefits of addressing obesity and chronic diseases are substantial. By investing in preventive measures and fostering a culture of health, we can create a future where obesity rates decline, chronic diseases are better managed, and global health outcomes improve for generations to come.

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