



Navigating the Intricacies of Obesity: A Comprehensive Review of Its Complications

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ABSTRACT:

Introduction: Obesity, recognized as a global epidemic by the World Health Organization, is a complex syndrome that results from an imbalance between energy intake and expenditure. It is closely associated with numerous health complications, including type 2 diabetes, cardiovascular diseases, hypertension, and certain types of cancer. Beyond its physical health impacts, obesity also affects psychosocial well-being, leading to stigma and emotional challenges.

Objectives: The primary objective of this study is to comprehensively examine the health impacts of obesity, focusing on its association with metabolic disorders, cardiovascular diseases, and psychological challenges. Additionally, the study aims to evaluate the effectiveness of various intervention strategies, including lifestyle modifications and medical treatments, in managing obesity and reducing its associated health risks. Through this analysis, the study seeks to contribute to a deeper understanding of obesity's multifaceted effects and promote a holistic approach to its management.

Methods: This study explores the comprehensive health impacts of obesity by reviewing data from clinical studies and public health databases. The research focuses on understanding the link between obesity and its associated medical conditions. Additionally, various intervention strategies, including lifestyle changes and medical treatments, are evaluated for their effectiveness in managing obesity and reducing related health risks.

Results: The findings reveal that obesity is strongly linked to increased risks of metabolic disorders, cardiovascular diseases, and other health issues such as gastrointestinal problems and gallstones. The psychological effects of obesity, including exposure to societal stigma and reduced quality of life, are also significant. The discussion emphasizes the importance of a multifaceted approach to obesity management, combining lifestyle interventions with regular health check-ups and medical support to address both physical and psychological aspects of the condition.

Conclusions: Addressing obesity requires a holistic approach that includes early detection, lifestyle modifications, and potential medical interventions. Such an approach not only reduces the risk of severe health complications but also enhances overall well-being, helping individuals achieve healthier, more balanced lives.

1. Introduction

Obesity, an intricate health concern characterized by an excessive accumulation of body fat, is a multifaceted condition intertwining with a vast array of health complications. It is caused due to alteration in lipid metabolic processes including lipogenesis and lipolysis [1]. This comprehensive review focuses the complex

interplay between obesity and its numerous implications for both physical and psychological well-being. Exploring its connections to diseases such as type 2 diabetes, heart conditions, high cholesterol, and various cancers, this study unravels the intricate relationships between obesity and its associated health risks. Not confined to its physical impacts, obesity significantly influences psychological health, subjecting individuals to



societal prejudices and stereotypes that impact emotional well-being and social interactions

The review encapsulates the multifaceted nature of obesity, its intricate relationship with various health conditions, and its profound influence on psychological health. It highlights the imperative need for a holistic approach in managing obesity, underlining the significance of lifestyle changes and potential medical interventions in mitigating its extensive complications. Emphasizing the importance of early detection, regular check-ups, and healthcare professional consultations, this review is a comprehensive guide to understanding and addressing the challenges posed by obesity for a healthier and more fulfilling life.

The evidence linking obesity to mortality is well-documented and substantial. Various studies and meta-analyses consistently highlight the strong correlation between obesity and increased mortality rates. Recent Research demonstrates that obesity significantly raises the risk of premature death and is associated with a higher likelihood of mortality from various causes, particularly chronic diseases.

Numerous large-scale studies have indicated that obesity is a crucial risk factor for mortality from conditions such as cardiovascular diseases, type 2 diabetes, certain cancers, respiratory disorders, and more. The impact of obesity on mortality is often multifaceted, influencing a range of health complications that can ultimately contribute to an increased risk of death [2].

For instance, obesity is intricately linked to cardiovascular diseases, which remain one of the leading causes of mortality worldwide. It contributes to conditions like atherosclerosis, hypertension, and heart disease, significantly increasing the risk of fatal cardiovascular events like heart attacks and strokes.

Additionally, obesity heightens the risk of developing type 2 diabetes, which itself is a significant contributor to mortality rates due to complications like kidney disease, neuropathy, and cardiovascular issues.

Cancers linked to obesity, such as those of the breast, colon, endometrium, and kidney, are associated with higher mortality rates, often due to the more aggressive nature of these cancers in obese individuals [3].

Research on the impact of obesity on mortality emphasizes the need for proactive approaches to manage

and reduce obesity. Lifestyle modifications, such as a balanced diet and regular exercise, are crucial in reducing the associated health risks, improving overall health, and potentially decreasing mortality rates linked to obesity-related conditions.

The evidence highlighting the connection between obesity and mortality underscores the importance of public health initiatives and individual efforts aimed at obesity prevention and management to reduce the burden of chronic diseases and premature death.

2. Complications related to obesity

Obesity and Type-2 diabetes

Obesity is a significant risk factor for the development of type 2 diabetes. The excess body weight, particularly around the abdomen, can lead to insulin resistance, where the body's cells become less responsive to insulin. This resistance can ultimately result in high blood sugar levels, leading to the onset of type 2 diabetes[4]. Additionally, obesity contributes to the release of inflammatory substances that can further disrupt insulin's effectiveness, exacerbating the risk of diabetes. Managing obesity through lifestyle changes, such as a healthy diet, regular exercise, and, if necessary, medical intervention, is crucial in reducing the risk of developing type 2 diabetes and improving overall metabolic health. This proactive approach not only decreases the likelihood of diabetes but also supports better overall well-being.

Obesity and Cholesterol

Obesity and high cholesterol are intricately linked health issues that often coexist, forming a dangerous tandem. Obesity, characterized by an excess accumulation of body fat, significantly increases the risk of elevated cholesterol levels. When a person is obese, especially around the abdominal region, it can lead to an imbalance in the body's lipid profile, causing an increase in low-density lipoprotein (LDL) cholesterol, often referred to as "bad cholesterol." Simultaneously, obesity can lower high-density lipoprotein (HDL) cholesterol levels, which is considered "good cholesterol." This dysregulation in cholesterol levels can result in the buildup of fatty deposits in the arteries, increasing the risk of atherosclerosis, heart disease, and other cardiovascular complications. Body mass index (BMI) > 30 was linked to significant alterations in LCAT and CETP activities as well as changes in HDL composition, including an



increase in pro-inflammatory HDL serum amyloid a content and a decrease in apolipoprotein A-I, cholesterol, and phospholipid content [5]. Managing obesity through a combination of dietary modifications, physical activity, and medical intervention can be instrumental in addressing these dual health concerns and reducing the associated risks.

Obesity and dyslipidemia

Obesity is closely linked to dyslipidemia, an abnormal level of lipids (fats) in the blood. The substantial correlation between obesity and atherogenic dyslipidemia, a condition marked by low levels of high-density lipoprotein (HDL) cholesterol and elevated triglycerides, raises the risk of coronary heart disease [6]. Excess body weight, particularly around the abdomen, contributes to dyslipidemia by altering the body's lipid profile. It often leads to elevated levels of triglycerides and low-density lipoprotein (LDL) cholesterol, while reducing high-density lipoprotein (HDL) cholesterol. These imbalances increase the risk of heart disease and other cardiovascular complications. Addressing obesity plays a significant role in supporting better cardiovascular health and lowering the risk of related complications. Regular health check-ups and consultations with healthcare professionals are essential in managing dyslipidemia related to obesity.

Obesity and hypertension

Hypertension, or high blood pressure, is a significant and common complication of obesity. The additional weight in obesity requires increased blood flow and oxygen to sustain the body, placing added stress on the cardiovascular system. As fat accumulates, especially around the abdomen, it can trigger hormonal and chemical imbalances, leading to inflammation and a disruption in the body's blood pressure regulation. This results in increased pressure on the arterial walls, causing hypertension. Over time, this heightened pressure can damage the blood vessels and organs, increasing the risk of heart disease, stroke, and other cardiovascular issues [7]. Obesity prevalence, pathogenesis, and morbidity are intimately associated with hypertension. The most promising treatment for this patient population's high blood pressure and consequent organ damage is surgical weight loss [8].

Obesity and Insomnia

Obesity is intricately linked with the development and exacerbation of insomnia, a sleep disorder characterized by difficulties in falling asleep or staying asleep. Physiologically, excess weight can lead to conditions such as sleep apnea, where breathing pauses during sleep, disrupting the sleep cycle and causing frequent awakenings. The physical discomfort caused by obesity, such as joint pain or acid reflux, can also interfere with sleep. Additionally, hormonal imbalances related to obesity may affect the body's circadian rhythms, making it harder to maintain a regular sleep-wake cycle. People who slept fewer than seven hours a night on a regular basis were more likely than those who slept more to develop obesity and had higher average body mass indices. Research revealed that ghrelin, salt retention, inflammatory markers, leptin, and insulin sensitivity were all elevated in response to experimental sleep restriction [9]. Addressing obesity through weight management, lifestyle changes, and, if necessary, medical intervention, can significantly improve sleep patterns and mitigate the impact of insomnia.

Obesity and Heart disease

Obesity significantly increases the risk of heart disease. The excess body weight associated with obesity often leads to the development of other risk factors for heart disease, such as high blood pressure, high cholesterol, and diabetes. Additionally, obesity contributes to the accumulation of plaque in the arteries, a condition called atherosclerosis, which can restrict blood flow to the heart and increase the risk of heart attacks. Both obesity and insulin resistance are strong indicators of the risk of coronary heart disease (CHD), and the risk of type 2 diabetes and CHD is increased by insulin resistance, regardless of the degree of obesity [10].

Obesity and Cancer

Obesity is linked to an increased risk of developing several types of cancer. The excess body fat associated with obesity can trigger chronic inflammation, hormonal imbalances, and an altered immune response, which collectively contribute to the development of certain cancers. Obesity is linked to 4-8% of all cancer cases. A number of serious cancers, including as post-menopausal breast, colorectal, endometrial, renal, esophageal, pancreatic, liver, and gallbladder cancer, are associated with obesity. A person with excess body fat has a about 17% higher chance of dying from cancer. Adipokine secretion, anabolic and sex hormones, extracellular



matrix remodelling, immune dysregulation, chronic inflammation, and altered fatty acid metabolism are all involved in the poorly understood relationship between obesity and the risk of developing cancer and its recurrence [11].

Obesity and GI Abnormalities

Obesity can lead to various gastrointestinal (GI) abnormalities. The excess weight, particularly around the abdomen, can contribute to conditions like gastroesophageal reflux disease (GERD) due to increased pressure on the stomach, leading to acid reflux and heartburn. Moreover, obesity can impact gut motility and the balance of gut bacteria, leading to issues such as constipation or diarrhoea. Most investigations indicated that obesity was associated with increased proximal gut transit, increased small intestine contractility, and decreased distal gut transit. Slower distal small intestine transit can result from altered CCK sensitivity caused by leptin resistance in obesity. Additionally, there is evidence that obese patients absorb nutrients more efficiently and that their bodies have adapted to a high-fat diet by reducing the transit of glucose [12]. Managing obesity can improve GI health and alleviate related issues, contributing to an overall improvement in well-being.

Obesity and Pulmonary abnormalities

Obesity can have a significant impact on pulmonary function and contribute to various abnormalities in the respiratory system. Excess body weight, especially in the chest and abdomen, can restrict lung expansion and reduce the ability of the lungs to fully inflate, leading to decreased lung volumes and impaired breathing capacity. This can result in conditions like obesity hypoventilation syndrome (OHS) or obstructive sleep apnea, where breathing becomes disrupted during sleep due to the compression of airways. Moreover, obesity-related inflammation and changes in the mechanics of breathing can exacerbate conditions such as asthma or chronic obstructive pulmonary disease (COPD). A higher body mass index (BMI) leads to greater airway hyperresponsiveness, airway flow restriction, and negative effects on both static and dynamic lung volumes. The risk of respiratory tract infections, pulmonary hypertension, pulmonary embolism, and the consequent hypoxic respiratory failure and ventilatory failure is increased with obesity [13].

Obesity and metabolic syndrome

Metabolic syndrome is marked by reversible risk factors—low HDL-cholesterol, high triglycerides, elevated blood pressure, and fasting plasma glucose. These factors, tied to weight gain and central fat accumulation, signify a heightened risk for cardiovascular disease and type 2 diabetes[14]. The excess body weight, especially around the abdomen, leads to insulin resistance, where the body's cells don't respond effectively to insulin. This resistance, coupled with other factors like high blood pressure, elevated blood sugar, and abnormal cholesterol levels, creates a higher risk for developing metabolic syndrome. Addressing obesity helps in improving insulin sensitivity and other metabolic parameters, thereby reducing the risk of associated complications and supporting better overall health.

Obesity and kidney disorder

Obesity significantly contributes to the development and progression of kidney disease. The excess body weight associated with obesity places increased stress on the kidneys. Over time, this can lead to several complications, including the development of chronic kidney disease (CKD). Obesity significantly affects kidney health, drawing attention due to its link to End-Stage Kidney Disease (ESKD). BMI, the second key marker for ESKD after proteinuria, is closely tied to Chronic Kidney Disease (CKD). The connection arises from obesity's common associations with hypertension, metabolic syndrome, and diabetes. These conditions, prevalent in obesity, contribute to kidney damage [15]. The kidneys, responsible for filtering waste and excess fluids from the body, face added strain due to the higher metabolic demands and increased blood flow associated with obesity. This can lead to damage and inflammation in the kidneys, impairing their function. Furthermore, obesity-related metabolic changes and the release of certain hormones and inflammatory factors can directly impact kidney health.

Obesity and osteoarthritis

Obesity and osteoarthritis share a strong and interconnected relationship. Osteoarthritis is a degenerative joint condition characterized by the breakdown of cartilage and the development of pain, stiffness, and reduced joint mobility.. Managing obese individuals with osteoarthritis often involves a key



strategy: achieving a weight loss of at least 10%, combined with regular exercise. This approach is considered fundamental and has shown remarkable benefits, leading to substantial improvements in symptoms, pain relief, physical function, and overall health-related quality of life for individuals with osteoarthritis. Furthermore, adipose tissue, which is active metabolically, releases inflammatory substances that can contribute to the inflammation and degradation of joint tissues [16].

Obesity and Pregnancy complication

Obesity during pregnancy can lead to various complications that impact both the mother and the developing fetus. It increases the risk of gestational diabetes, preclampsia (high blood pressure during pregnancy), and blood clotting disorders. Additionally, obese pregnant individuals are more likely to have difficulties during labor and delivery, including an increased likelihood of needing a cesarean section [17]. The excess weight can also impact the baby's health, leading to a higher risk of congenital abnormalities, preterm birth, and macrosomia (large birth weight), which can pose challenges during delivery.

Obesity and Stroke

Obesity significantly increases the risk of stroke, a serious medical condition characterized by a sudden disruption in blood supply to the brain. Many studies indicate that obese and overweight individuals who suffer from strokes tend to experience lower mortality rates and improved functional outcomes compared to those with normal weight or underweight. This phenomenon is commonly referred to as the "obesity paradox" in stroke cases [18]. Excess weight contributes to the development of conditions such as high blood pressure, diabetes, and high cholesterol, all of which are independent risk factors for stroke. Additionally, obesity can lead to inflammation and the dysfunction of blood vessels, making them more prone to blockages or ruptures that can trigger a stroke.

Obesity and surgical complications

Obesity presents a unique set of challenges and increased risks when undergoing surgery. The added body weight can make surgeries more complex, as it can impact anaesthesia, prolong surgical times, and increase the risk of various complications. Obese individuals often have higher rates of postoperative infections, wound healing

issues, blood clots, and respiratory problems. Obese individuals undergoing surgery often face additional challenges, including a higher prevalence of concurrent health conditions, an elevated risk of wound infections, greater intraoperative blood loss, and a lengthier duration of the surgical procedure [19]. The excess weight can also make it harder for surgeons to access the surgical site and can complicate the healing process post-surgery. In some cases, specific equipment might be required to accommodate the patient's size.

Obesity and urinary stress incontinence

Obesity is a significant risk factor for urinary stress incontinence, a condition where there is an involuntary loss of urine during physical activities that increase abdominal pressure, such as coughing, sneezing, or exercising. The excess weight in obesity puts added pressure on the pelvic floor muscles and the bladder. Over time, this can weaken the pelvic floor support, leading to a reduced ability to control the release of urine, particularly during moments of increased abdominal pressure [20]. Addressing obesity through weight management and targeted exercises that strengthen the pelvic floor can significantly reduce the severity of urinary stress incontinence, improving the quality of life for individuals affected.

Obesity and Gallstones

Obesity is a known risk factor for the development of gallstones. The excess body weight in obesity can lead to an imbalance in the body's cholesterol levels, which may result in the formation of gallstones. Additionally, obesity is associated with decreased gallbladder emptying and alterations in bile composition, which can further contribute to the formation of gallstones [21].

Obesity and fatigue

Obesity is associated with increased levels of fatigue, sleep disturbances, and reduced satisfaction with overall health, functioning, and vitality [22]. The additional weight places extra stress on the body, which can lead to various physical discomforts, such as joint pain, muscle fatigue, and difficulty with movement.

Obesity and restricted mobility

Obesity can significantly impact an individual's mobility. The excess weight added strain on joints, particularly in weight-bearing areas like the knees and hips, leading to discomfort and reduced flexibility. It can also affect



balance and make certain movements more challenging. Over time, obesity-related joint problems and decreased endurance may limit physical activity, further exacerbating restricted mobility [23].

Obesity and Psychosocial Problems

Obesity can bring about various psychosocial challenges. Individuals grappling with obesity might face societal stigma, discrimination, and negative stereotypes, leading to lowered self-esteem, body image issues, and even depression or anxiety [24]. The emotional toll of these experiences can further impact relationships and social interactions..

3. Discussion

In conclusion, obesity is a complex and multifaceted health issue with far-reaching implications for both physical and psychological well-being. It is not merely a matter of excess body weight but a condition that intertwines with a multitude of health concerns. The interplay between obesity and these various complications underscores the importance of addressing weight management as a crucial aspect of overall health and disease prevention.

Obesity acts as a significant precursor to numerous health conditions, including type 2 diabetes, high cholesterol, hypertension, heart disease, and various types of cancer. It places a burden on the body's metabolic systems, leading to insulin resistance and altering lipid profiles. Moreover, obesity affects the cardiovascular system, leading to hypertension, atherosclerosis, and an increased risk of stroke and heart disease. It also contributes to the development of gallstones, gastrointestinal abnormalities, and urinary stress incontinence.

Beyond the physical ramifications, obesity carries profound psychosocial consequences. Individuals with obesity often face societal prejudices, discrimination, and negative stereotypes, which can severely impact their self-esteem and emotional well-being. The psychological toll extends to relationships and social interactions, adding an extra layer of complexity to the challenges faced by those dealing with obesity.

The comprehensive approach to managing obesity involves lifestyle changes, such as a balanced diet and regular exercise, as well as potential medical interventions. This proactive strategy not only reduces

the risk of obesity-related complications but also supports better overall health and well-being. It is essential to recognize the importance of early detection, regular health check-ups, and consultations with healthcare professionals to address these multifaceted issues effectively.

While the review provides a broad overview of obesity-related complications, it is limited by its reliance on existing studies, which may not encompass the latest research or emerging treatment modalities. Moreover, the generalization of findings across diverse populations could overlook individual differences in the manifestation and management of obesity.

In the context of today's escalating obesity epidemic, the findings of this review are especially relevant. They highlight the urgency of developing and implementing effective prevention and intervention strategies tailored to the needs of different populations. Addressing obesity is not just about reducing disease burden but also about enhancing overall quality of life, making it a public health priority in contemporary society.

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