Journal of Endocrinology, Diabetes and Metabolic Complications (JEDMC)

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Short Communication

Obesity and Related Comorbidities: A Multifactorial Challenge in Modern Healthcare

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Citation: Motoike K (2026). Obesity and Related Comorbidities: A Multifactorial Challenge in Modern Healthcare V2(2)

Received date: July 10, 2026: Accepted date: July 22, 2026: Published date: July 30,2026

Keywords: obesity, comorbidities, insulin resistance, cardiovascular disease, hypertension, type 2 diabetes, sleep apnea, fatty liver disease, metabolic health

Abstract

Obesity is a complex, chronic, and multifactorial disease characterized by excessive or abnormal accumulation of body fat that can adversely affect health. Although body mass index (BMI) is commonly used to classify obesity, the clinical impact of obesity extends far beyond body weight. Excess adipose tissue can contribute to metabolic, cardiovascular, respiratory, musculoskeletal, gastrointestinal, and psychological complications. Common obesity-related comorbidities include type 2 diabetes mellitus, hypertension, dyslipidemia, cardiovascular disease, obstructive sleep apnea, nonalcoholic fatty liver disease, osteoarthritis, and certain cancers. The relationship between obesity and these conditions is driven by mechanisms such as insulin resistance, chronic low-grade inflammation, altered adipokine signaling, oxidative stress, and hormonal disturbances. This article discusses the major comorbidities associated with obesity, their underlying mechanisms, clinical consequences, and the importance of early recognition and comprehensive management. A multidisciplinary approach involving nutrition, physical activity, behavioral modification, pharmacotherapy, and, when appropriate, metabolic or bariatric surgery can help reduce health risks. Recognizing obesity as a chronic disease rather than simply a lifestyle issue is essential for improving prevention, treatment, and long-term health outcomes.

Introduction

Obesity has become one of the most significant public health challenges worldwide. It is influenced by an interaction of genetic, environmental, metabolic, behavioral, socioeconomic, and psychological factors. Modern lifestyles characterized by increased consumption of energy-dense foods, sedentary behavior, inadequate sleep, and prolonged screen time have contributed to rising obesity rates.

The consequences of obesity are not limited to increased body weight. Adipose tissue is metabolically active and can influence inflammation, glucose metabolism, lipid metabolism, vascular function, and hormonal regulation. Consequently, excessive adiposity may increase the likelihood of developing multiple chronic diseases simultaneously.

Obesity as a Chronic Disease

Obesity is often incorrectly viewed as simply the result of overeating or insufficient physical activity. In reality, body weight is regulated by complex interactions involving the brain, endocrine system, gastrointestinal tract, adipose tissue, genetics, and environment.

Adipose tissue stores excess energy but also produces biologically active substances known as adipokines. With excessive adiposity, particularly visceral fat accumulation, these signaling pathways can become dysregulated. This may promote chronic inflammation, insulin resistance, endothelial dysfunction, and abnormal lipid metabolism.

Major Comorbidities Associated With Obesity

1. Type 2 Diabetes Mellitus

Obesity is strongly associated with insulin resistance and type 2 diabetes mellitus. Excess visceral adipose tissue can increase the release of free fatty acids and inflammatory mediators, interfering with insulin signaling.

Initially, the pancreas may compensate by producing additional insulin. Over time, persistent insulin resistance can contribute to pancreatic beta-cell dysfunction and elevated blood glucose levels.

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Hypertension

Obesity can contribute to elevated blood pressure through several mechanisms, including increased sympathetic nervous system activity, altered kidney function, sodium retention, insulin resistance, and activation of hormonal pathways involved in blood-pressure regulation.

Dyslipidemia and Cardiovascular Disease

Obesity is frequently associated with an unfavorable lipid profile, including elevated triglycerides, reduced HDL cholesterol, and changes in LDL particle characteristics.

These metabolic abnormalities can contribute to atherosclerosis. When obesity occurs alongside hypertension, diabetes, and dyslipidemia, the cumulative cardiovascular risk can become substantially greater

Obstructive Sleep Apnea

Obstructive sleep apnea is common among individuals with obesity. Excess tissue around the neck and upper airway can contribute to airway narrowing during sleep.

Repeated episodes of airway obstruction may cause intermittent reductions in blood oxygen levels and sleep fragmentation. Untreated sleep apnea can result in daytime fatigue, impaired concentration, hypertension, and increased cardiovascular risk.

Metabolic Dysfunction-Associated Steatotic Liver Disease

Excess adiposity, particularly visceral obesity, is closely associated with accumulation of fat in the liver. Metabolic dysfunction-associated steatotic liver disease can range from simple steatosis to inflammatory liver injury and progressive fibrosis

Insulin resistance, abnormal lipid metabolism, and chronic inflammation play important roles in its development. In advanced cases, progressive liver fibrosis may increase the risk of cirrhosis and liver-related complications

Osteoarthritis and Musculoskeletal Disorders

Obesity places increased mechanical stress on weight-bearing joints, particularly the knees and hips. This can accelerate joint degeneration and contribute to osteoarthritis, pain, stiffness, and reduced mobility.

However, the relationship is not purely mechanical. Inflammatory mediators produced by adipose tissue may also contribute to joint pathology

Gastroesophageal Reflux Disease

Increased abdominal pressure associated with obesity can promote reflux of stomach contents into the esophagus. Obesity may therefore increase the likelihood of gastroesophageal reflux disease and related symptoms such as heartburn and regurgitation

Persistent reflux may cause esophageal inflammation and other complications if inadequately managed.

Reproductive and Endocrine Disorders

Obesity can interfere with reproductive hormone regulation. In women, excess adiposity may be associated with menstrual irregularities, infertility, and polycystic ovary syndrome. In men, obesity may contribute to hormonal disturbances and reduced reproductive function.

During pregnancy, obesity may increase the risk of gestational diabetes, hypertensive disorders, cesarean delivery, and other maternal or fetal complications.

Mental Health and Psychosocial Consequences

The psychological consequences of obesity can be significant. Individuals may experience social stigma, discrimination, reduced self-esteem, anxiety, depression, and impaired quality of life.

Importantly, obesity and psychological distress can influence one another. Emotional distress may contribute to changes in eating behavior or physical activity, while weight-related stigma can further worsen psychological well-being.

Conclusion

Obesity is a complex chronic disease with effects that extend across multiple organ systems. Its relationship with type 2 diabetes, hypertension, cardiovascular disease, sleep apnea, liver disease, osteoarthritis, reproductive disorders, certain cancers, and psychological conditions demonstrates why obesity should be addressed as a major component of overall health rather than solely as a matter of body size.

The most effective approach is comprehensive, patient-centered, and sustained over time. Prevention, early identification of comorbidities, appropriate medical treatment, lifestyle intervention, and advanced therapies when indicated can collectively reduce the health burden associated with obesity. Greater awareness of the interconnected nature of obesity and its complications can help healthcare professionals provide earlier intervention and improve long-term patient outcomes

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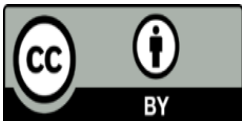

DOI:10/JEDMC/2026/018

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