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COMPLICATIONS OF OBESITY: CLINICAL AND PUBLIC HEALTH ASPECTS

U.Maxamatov

Clinical Residents **Sh.Umarov, F.Mamadaliyev, X.Kenjayeve**

Fergana Medical Institute of Public Health, Uzbekistan

Abstract: Obesity is a chronic, multifactorial disease characterized by excessive accumulation of adipose tissue that may adversely affect physical health, metabolic function, psychological well-being, and quality of life. The global prevalence of overweight and obesity has increased substantially over recent decades, making obesity one of the major public health challenges of the twenty-first century. The complications associated with obesity involve multiple organ systems and include cardiovascular diseases, arterial hypertension, type 2 diabetes mellitus, dyslipidemia, non-alcoholic fatty liver disease, osteoarthritis, respiratory disorders, reproductive dysfunction, and several types of cancer. Obesity is also associated with psychosocial problems, reduced quality of life, stigma, and social discrimination. The risk of complications generally increases with the degree and duration of excess adiposity and with the presence of associated metabolic abnormalities. Childhood and adolescent obesity is of particular concern because excess weight frequently persists into adulthood and may contribute to earlier development of noncommunicable diseases. Early identification of excessive weight gain, comprehensive risk assessment, promotion of healthy dietary patterns and physical activity, and appropriate clinical management are essential for reducing the burden of obesity-related complications. A multidisciplinary public health approach is required to prevent obesity and reduce its long-term consequences.

Keywords: obesity, overweight, complications, cardiovascular disease, type 2 diabetes mellitus, hypertension, metabolic syndrome, fatty liver disease, cancer, public health.

Introduction

Obesity is currently recognized as a chronic and relapsing disease resulting from complex interactions among genetic, biological, behavioral, environmental, socioeconomic, and commercial factors. According to the World Health Organization (WHO), obesity is defined as abnormal or excessive fat accumulation that presents a risk to health. In adults, a body mass index (BMI) of 25 kg/m² or higher is generally classified as overweight, while BMI of 30 kg/m² or higher is classified as obesity.[1,2,3,4]

The global burden of obesity has increased considerably. In 2022, approximately 2.5 billion adults worldwide were overweight, including more than 890 million people living with obesity. Approximately 16% of adults globally were living with obesity in the same year. Among children and adolescents aged 5–19 years, more than 390 million were overweight, including over 160 million living with obesity.[5,6]

The increasing prevalence of obesity is particularly concerning because excess adiposity is associated with a broad spectrum of chronic diseases. Obesity contributes to cardiovascular disease, type 2 diabetes mellitus, musculoskeletal disorders, certain cancers,

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chronic respiratory disorders, and other health problems. The risk of these conditions increases with increasing body weight and may also depend on the duration of obesity.[7,8,9]

The objective of this article is to summarize the major medical complications of obesity and to emphasize the importance of early prevention, screening, and integrated management from a public health perspective.

Materials and Methods

A narrative literature review was conducted using information from authoritative international health organizations and contemporary scientific literature concerning obesity and its complications. The analysis focused on the epidemiology, pathophysiological mechanisms, clinical consequences, and public health significance of obesity.[10,11,12]

Particular attention was given to cardiovascular, metabolic, hepatic, musculoskeletal, respiratory, oncological, reproductive, and psychosocial complications. Recommendations and epidemiological data published by the World Health Organization and other internationally recognized health institutions were considered.[13,14]

Results

1. Cardiovascular complications

Cardiovascular disease represents one of the most important complications associated with obesity. Excess adipose tissue contributes to chronic low-grade inflammation, insulin resistance, endothelial dysfunction, abnormal lipid metabolism, and increased sympathetic activity. These mechanisms may contribute to arterial hypertension, coronary heart disease, heart failure, and cerebrovascular disease.[15,16]

Obesity is associated with an increased risk of hypertension because increased body mass may increase cardiac workload and alter vascular and renal mechanisms regulating blood pressure. Dyslipidemia, including elevated triglycerides and reduced high-density lipoprotein cholesterol, may further increase cardiovascular risk.

According to WHO, cardiovascular diseases remain the leading cause of death globally, and obesity is among the modifiable risk factors contributing to cardiovascular disease.[17,18]

2. Type 2 diabetes mellitus and metabolic disorders

One of the most clinically significant complications of obesity is insulin resistance. Excess adipose tissue, particularly visceral adiposity, is metabolically active and releases various inflammatory mediators and adipokines. These changes can impair insulin signaling and glucose metabolism.

Persistent insulin resistance may progress to impaired glucose tolerance and eventually type 2 diabetes mellitus. Obesity is also closely associated with metabolic syndrome, which is characterized by a combination of abdominal obesity, elevated blood pressure, abnormal blood lipid levels, and impaired glucose regulation.

The coexistence of obesity and type 2 diabetes substantially increases the risk of cardiovascular, renal, neurological, and ophthalmological complications.[35]

3. Non-alcoholic fatty liver disease



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Obesity is strongly associated with metabolic dysfunction-associated steatotic liver disease (MASLD), previously commonly referred to as non-alcoholic fatty liver disease (NAFLD).

Excessive accumulation of fat in the liver may initially be asymptomatic. However, in some individuals it can progress to steatohepatitis, hepatic fibrosis, cirrhosis, and, in advanced cases, hepatocellular carcinoma.

The increasing prevalence of obesity and metabolic disorders has therefore contributed to the growing importance of metabolic liver disease as a public health problem.[19,20]

4. Musculoskeletal complications

Excess body weight increases mechanical loading on weight-bearing joints, particularly the knees, hips, and lower spine. Consequently, obesity is associated with a higher risk of osteoarthritis and chronic musculoskeletal pain.

Musculoskeletal complications may reduce mobility and physical activity. This can create a vicious cycle in which reduced physical activity contributes to further weight gain and worsening metabolic health.

WHO identifies osteoarthritis and other musculoskeletal disorders among important health consequences associated with overweight and obesity.[21,22]

5. Respiratory complications

Obesity may adversely affect respiratory function through mechanical restriction of the chest and diaphragm, reduced lung volumes, and changes in respiratory mechanics.

Obesity is also strongly associated with obstructive sleep apnea. Recurrent interruptions of normal breathing during sleep can contribute to daytime fatigue, impaired concentration, hypertension, and increased cardiovascular risk.

Respiratory complications may be particularly important in individuals with severe obesity and in patients with multiple comorbidities.[30,31]

6. Reproductive and pregnancy-related complications

Obesity may negatively affect reproductive health in both women and men.

In women, obesity can be associated with menstrual irregularities, ovulatory dysfunction, infertility, and an increased risk of pregnancy complications. During pregnancy, excessive maternal weight and obesity may increase the risk of gestational diabetes mellitus, hypertensive disorders of pregnancy, cesarean delivery, and other adverse outcomes.

In men, obesity may be associated with hormonal disturbances and impaired reproductive function.

Consequently, prevention and management of obesity before conception are important components of reproductive health.[32,33,34]

7. Oncological complications

Evidence indicates an association between obesity and an increased risk of several types of cancer. The cancers most consistently associated with excess body weight include endometrial, breast, colorectal, kidney, liver, and several other malignancies.



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Possible mechanisms include chronic inflammation, insulin resistance, altered insulin-like growth factor signaling, hormonal disturbances, and metabolic changes associated with excessive adipose tissue.

WHO recognizes certain cancers among the major long-term health consequences associated with overweight and obesity.[23,24]

8. Psychosocial complications

The consequences of obesity are not limited to physical health. Individuals living with obesity may experience reduced quality of life, social stigma, discrimination, anxiety, depressive symptoms, and difficulties in social and educational environments.

These effects may be particularly significant during childhood and adolescence. WHO reports that childhood and adolescent obesity is associated with psychosocial consequences, including stigma, discrimination, bullying, and effects on quality of life and school performance.

It is therefore important that healthcare professionals avoid stigmatizing language and focus on supportive, evidence-based interventions.[25,26,27]

9. Complications of obesity in children and adolescents

Childhood and adolescent obesity has become an important public health concern. According to WHO, more than 160 million children and adolescents aged 5–19 years were living with obesity in 2022.

Excess weight during childhood increases the probability of obesity persisting into adulthood. Children and adolescents with obesity have an increased risk of developing type 2 diabetes, cardiovascular disease, musculoskeletal disorders, respiratory disorders, and certain cancers later in life.

Early-life obesity is therefore important not only because of its immediate health effects but also because it can influence health trajectories across the life course.[28,29]

Discussion

The complications of obesity are interconnected rather than isolated. For example, excessive adiposity can promote insulin resistance, dyslipidemia, hypertension, and chronic inflammation. These metabolic abnormalities may collectively increase cardiovascular risk.

The duration of exposure to excess adiposity is also important. Individuals who develop obesity at a young age may experience a longer period of metabolic and mechanical stress, potentially increasing their lifetime risk of chronic disease.

The growing prevalence of obesity requires a shift from treating individual complications toward integrated prevention and management. WHO has emphasized the need for comprehensive, country-focused approaches to obesity prevention and management. The WHO Acceleration Plan to Stop Obesity highlights the need for coordinated action involving health systems, communities, food environments, physical activity, and broader policy measures.

Prevention should begin early in life. Healthy nutrition, adequate physical activity, sufficient sleep, supportive family environments, and healthy school environments can contribute to reducing excessive weight gain among children and adolescents.

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At the clinical level, individuals with obesity should be assessed not only according to BMI but also according to metabolic risk factors, waist circumference where appropriate, blood pressure, glucose metabolism, lipid profile, liver health, physical function, and associated comorbidities.

A multidisciplinary approach involving primary care physicians, nutrition specialists, endocrinologists, cardiologists, psychologists, and public health professionals may improve long-term outcomes.

Public Health Prevention

Effective prevention of obesity requires action at individual, community, and population levels.

Key public health measures include:

- promoting healthy and affordable food environments;
- increasing access to fruits, vegetables, legumes, and whole grains;
- reducing excessive consumption of sugar-sweetened beverages and highly processed foods;
- creating safe opportunities for regular physical activity;
- strengthening nutrition education in schools;
- promoting healthy lifestyles among children and adolescents;
- identifying excessive weight gain at an early stage;
- improving access to evidence-based obesity management;
- reducing weight-related stigma and discrimination;
- strengthening surveillance of obesity and its associated complications.

WHO emphasizes that obesity is influenced not only by individual behavior but also by environmental and socioeconomic factors. Therefore, population-level interventions are essential in addition to individual counseling.

Conclusion

Obesity is a major chronic disease and an important risk factor for numerous noncommunicable diseases. Its complications involve multiple organ systems and include cardiovascular disease, hypertension, type 2 diabetes mellitus, metabolic liver disease, musculoskeletal disorders, respiratory problems, reproductive dysfunction, several cancers, and psychosocial consequences.

The growing prevalence of obesity among children and adolescents is particularly concerning because excess weight may persist into adulthood and contribute to earlier development of chronic diseases.

Early detection of excessive weight gain, assessment of metabolic and cardiovascular risk, promotion of healthy nutrition and physical activity, and timely multidisciplinary management are essential components of obesity prevention and control.

From a public health perspective, reducing the burden of obesity requires coordinated interventions at the individual, family, school, healthcare, community, and policy levels. Prevention should begin early in life and continue throughout the life course.



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