EPIDEMIOLOGY AND RISK FACTORS OF OBESITY

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Abstract. *Obesity is a complex multifactorial disease that accumulated excess body fat leads to negative effects on health. Obesity continues to accelerate resulting in an unprecedented epidemic that shows no significant signs of slowing down any time soon. Raised body mass index (BMI) is a risk factor for noncommunicable diseases such as diabetes, cardiovascular diseases, and musculoskeletal disorders, resulting in dramatic decrease of life quality and expectancy. The main cause of obesity is long-term energy imbalance between consumed calories and expended calories. This review summarizes the global trends in obesity with a special focus on the pathogenesis of obesity from genetic factors to epigenetic factors, from social environmental factors to microenvironment factors.*

Keywords: *obesity, epidemiology, body mass index, leptin.*

ЭПИДЕМИОЛОГИЯ И ФАКТОРЫ РИСКА ОЖИРЕНИЯ

Аннотация. *Ожирение — это сложное многофакторное заболевание, при котором накопление избыточного жира в организме приводит к негативным последствиям для здоровья. Ожирение продолжает ускоряться, что приводит к беспрецедентной эпидемии, которая не показывает существенных признаков замедления в ближайшее время. Повышенный индекс массы тела (ИМТ) является фактором риска неинфекционных заболеваний, таких как диабет, сердечно-сосудистые заболевания и заболевания опорно-двигательного аппарата, что приводит к резкому снижению качества жизни и продолжительности жизни. Основной причиной ожирения является долгосрочный энергетический дисбаланс между потребляемыми и расходуемыми калориями. В этом обзоре обобщены мировые тенденции в области ожирения с особым акцентом на патогенез ожирения от генетических факторов до эпигенетических факторов, от факторов социальной среды до факторов микросреды.*

Ключевые слова*: ожирение, эпидемиология, индекс массы тела, лептин.*

Obesity is a state of excess adipose tissue mass. Although often viewed as equivalent to increased body weight, this need not be the case—lean but very muscular individuals may be overweight by numerical standards without having increased adiposity. Body weights are distributed continuously in populations, so that choice of a medically meaning ul distinction between lean and obese is somewhat arbitrary.

Obesity is therefore de ned by assessing its linkage to morbidity or mortality. The prevalence of obesity is increasing rapidly in most of the industrialized world. Children and adolescents also are becoming more obese, indicating that the current trends will accelerate over time. Obesity is associated with an increased risk of multiple health problems, including hypertension, type 2 diabetes, dyslipidemia, obstructive sleep apnea, nonalcoholic fatty liver disease, degenerative joint disease, and some malignancies. Thus, it is important or physicians to identify, evaluate, and treat patients or obesity and associated comorbid conditions. There has been a significant global increase in obesity rate during the last 50 years.

Obesity is defined as when a person has a body mass index [BMI (kg/m2), dividing a person's weight by the square of their height] greater than or equal to 30, overweight is defined as a BMI of 25.0-29.9. Being overweight or obesity is linked with more deaths than being underweight and is a more common global occurrence than being underweight. Obesity increases the likelihood of various diseases and conditions which are linked to increased mortality. These include Type 2 diabetes mellitus (T2DM), cardiovascular diseases (CVD), metabolic syndrome (MetS), chronic kidney disease (CKD), hyperlipidemia, hypertension, nonalcoholic fatty liver disease (NAFLD), certain types of cancer, obstructive sleep apnea, osteoarthritis, and depression.

Treating these conditions can place an additional load on healthcare systems: for example, it is estimated that obese have a 30% higher medical cost than those with a normal BMI. As related total health-care costs double every decade, treating the consequences of obesity poses an expensive challenge for patients.

Epidemiology: 2017 global nutrition report showed that 2 billion adults are overweight/obese and 41 million children are overweight worldwide. In the last three decades, obesity increased globally; unexpectedly, it is also rising in low- and middleincome countries due to uncontrolled urbanization and nutrition transition (shifting dietary habit from traditional to westernized diet). The global prevalence of overweight in children aged less than five years was increased modestly. The trend of overweight was heterogeneous in low- and middle-income countries. Meanwhile, the prevalence of obesity in children aged 2–4 years has increased moderately. In 1975, children with obesity aged 5–19 years were relatively rare, but it becomes highly prevalent in 2016. In the majority of European countries, the prevalence was increased from 10% to 40% in the last 10 years, and specifically in England, it increased more than threefolds.

Obesity is further classified into three severity levels: class I (BMI 30.0-34.9), class II (BMI 35.0-39.9) and class III (BMI $\geq$ 40.0). However, large individual differences exist in the percent body fat for the given BMI value, which can be attributed to sex, ethnicity and age.

Excess fat deposition in the abdominal region is termed ‘abdominal obesity’ and is associated with greater health risks. The definition and measurement guidelines of abdominal obesity differed from WHO, IDF (International Diabetes Federation) to AHA (American Heart Association). However, there is no international standard suitable for all countries or regions.

The prevalence of excessive weight gain has doubled worldwide since 1980, and about a third of the global population has been determined to be obese or overweight. Obesity rate has dramatically enhanced in both male and female, and across all ages, with proportionally higher prevalence in older persons and women.

While this trend is present globally, absolute prevalence rates vary across regions, countries, and ethnicities. The prevalence of obesity also varies with socioeconomic status, with slower rates of BMI increase in high-income and some middle-income countries. While obesity was once considered a problem of high-income countries, the incidence rates of obese or overweight children in high-income countries, including the United States, Sweden, Denmark, Norway, France, Australia and Japan, have decreased or plateaued since the early 2000s. In low- and middle-income countries, rates of overweight and obesity are rising especially in urban areas. In China, one study based on 12,543 participants monitored over 22 years revealed that the prevalence of age-adjusted obesity rose from 2.15% to 13.99% in both sexes, going from 2.78 to 13.22% in female and from 1.46 to 14.99% in male, respectively. The overweight rate of African children under 5 years old has increased by 24% since 2000. As of 2019, almost half of the Asian children under 5 years old were obese or overweight. WHO datasets from sub-Sarahan Africa reveal that prevalence of overweight and obese in adults and stunting, underweight, and wasting in children are inversely associated.

As of the latest available data, in 2016, 21.8% of adult women and 16.1% of adult men in Uzbekistan were classified as obese, defined as having a Body Mass Index (BMI) of 30 or higher.

Between 1997 and 2016, male obesity prevalence in Uzbekistan increased from 6.9% to 13.8%. This rising trend is concerning, as obesity is a major independent risk factor for ischemic heart diseases, which are the leading cause of death in Uzbekistan.

While specific data for 2024 are not yet available, the upward trend in obesity prevalence suggests that the rates may have continued to increase. The World Obesity Federation's Global Obesity Observatory assigns Uzbekistan a national obesity risk score of 7 out of 10, indicating a high risk based on factors such as obesity prevalence, rate of increase, and likelihood of meeting the 2025 target.

Etiology and risk factors of obesity: Although the molecular pathways regulating energy balance are beginning to be illuminated, the causes of obesity remain elusive.

In part, this reflects the act that obesity is a heterogeneous group of disorders. At one level, the pathophysiology of obesity seems simple: a chronic excess of nutrient intake relative to the level of energy expenditure. However, due to the complexity of the neuroendocrine and metabolic systems that regulate energy intake, storage, and expenditure, it has been di cult to quantitate all the relevant parameters (e.g., food intake and energy expenditure) over time in human subjects. Obesity is a complex, multifactorial condition resulting from an imbalance between calorie intake and expenditure. The main causes include:

1. Energy Imbalance – Consuming more calories than the body burns leads to fat accumulation.

2. Genetic Factors – Certain genes influence metabolism, fat storage, and appetite regulation.

3. Hormonal and Metabolic Disorders – Conditions like hypothyroidism, Cushing's syndrome, and polycystic ovary syndrome (PCOS) contribute to weight gain.

4. Medications – Some drugs, such as corticosteroids, antidepressants, and antipsychotics, can cause weight gain.

5. Psychological Factors – Emotional eating, stress, and depression can lead to overeating and obesity.

6. Gut Microbiota – The composition of gut bacteria may influence metabolism and fat storage.

7. Environmental and Social Factors – Easy access to high-calorie foods and sedentary lifestyles contribute significantly.

Risk Factors for Obesity:

1. Genetic Predisposition – Family history of obesity increases the likelihood.

2. Dietary Habits – High intake of processed foods, sugary drinks, and fast food promotes weight gain.

3. Physical Inactivity – A sedentary lifestyle, including prolonged screen time and lack of exercise, leads to weight accumulation.

4. Socioeconomic Status – Lower income and education levels may limit access to healthy food and exercise opportunities.

5. Sleep Deprivation – Poor sleep affects hunger hormones (leptin and ghrelin), leading to increased appetite.

6. Age – Metabolism slows down with age, making weight gain easier.

7. Medical Conditions – Diseases like diabetes and arthritis can reduce mobility and promote obesity.

8. Smoking Cessation – Some people gain weight after quitting smoking due to increased appetite.

Sociodemographic Factors: Different literature studies explicitly identified sociodemographic factors that were highly correlated with obesity, for example, older age, married (marital status), low wealth index, urban residency, being female, learning in private schools, easy accessibility of junk and fired or energy-dense foods and packed animal source foods due to free trade policy, rural to urban migration, replacement of local agribusiness with food retail, higher education level, and being pregnant. In contrary to the previous findings, a study conducted among French women shows that having a higher income, a higher occupational class, and a higher educational level and having hot water at home reduce the occurrence of obesity although the pathophysiology of hot water at home and obesity occurrence was not yet studied.

Behavioral Factors (Feeding Habit and Life Style): Many literature studies extensively identified that either irregular physical exercise or physical inactiveness, watching television or prolonged screen time, short sleep duration or shift work, stress, obesogenic environment (urbanization and industrialization), smoking, and frequent use of a taxi for transportation were determinant factors for overweight/obesity.

Genetic Factors: Evidence revealed that a family history of obesity and different genetically arranged genes were a risk for obesity. Genome-wide association studies (GWAS) identified that more than 250 genes/loci were associated with obesity. Of these genes, the fat mass- and obesity-associated gene (FTO) showed an important role for development of the obesity and type 2 diabetes. A study conducted among adults explicitly recognizes the correlation between these genes and a higher body mass index (BMI), fat mass index (FMI), and leptin concentrations. Almost all studies included in this review use cross-sectional study design, and majority of those studies assess obesity with the WHO standard.

Conclusion: Globally, obesity is becoming a public health problem in the general population. Various determinants were reported by different scholars even though there are inconsistencies. Different biomarkers of obesity were identified for the prediction of obesity.

Even though researchers speculate the factors, biomarkers, consequences, and prevention mechanisms, there is a lack of aggregate and purified data in the area of obesity.

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