Childhood Obesity

Causes, Consequences, and Management

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KEYWORDS

• Childhood • Adolescent • Obesity • Cardiometabolic risk • Lifestyle interventions • Prevention

KEY POINTS

- Routine body mass index (BMI) screening of children on age-appropriate growth charts is necessary to identify those requiring further assessment.
- Central adiposity is associated with increased risk for type 2 diabetes (T2DM), dyslipidemia, hypertension, sleep-disordered breathing, nonalcoholic fatty liver disease, and polycystic ovarian syndrome (PCOS).
- Family-centered behavior therapy should focus on small goals to improve nutritional intake and physical activity and reduce sedentary behaviors.
- Studies demonstrate modest weight loss of 5% to 10% with improvement in cardiometabolic parameters.
- Psychosocial stressors and comorbidities may make behavior change difficult; empathetic counseling using techniques such as motivational interviewing may be useful adjuncts to therapy.
- Prevention strategies must be implemented across various domains, as children are influenced in the context of their families, cultures, communities, and on a broader population level.

BACKGROUND

Obesity prevalence has increased during the past decades in children and adolescents, leading to a significant current and future health burden.[1] In North America, approximately one-third of children are either overweight or obese.[2,3] Although the overall proportion of children with obesity may be plateauing, the rates of severe obesity in children continue to rise, particularly in very young children.[2–5] Furthermore,

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the incidence of overweight/obesity for children younger than 5 years in low- and middle-income countries is higher than the rates of wasting.[6] As obesity tends to track into adulthood, especially for those with the most severe degrees of obesity and in older age groups, prevention and intervention strategies should begin at the earliest age possible.[7]

Overweight and obesity in children are assessed clinically by calculation of BMI, obtained by dividing weight (in kilograms) by height squared (square meters). BMI values can be plotted on age- and sex-specific growth charts. Several definitions of pediatric obesity exist, as defined by growth charts compiled by the Centers for Disease Control (CDC), the World Health Organization (WHO), and the International Obesity Task Force.[8] Most commonly, overweight is defined as BMI 85th to 95th percentile (CDC) or 85th to 97th percentile (WHO) and obesity as greater than or equal to 95th percentile (CDC) or greater than or equal to 97th percentile (WHO).[9,10]

ETIOLOGY/RISK FACTORS

Childhood obesity is a complex condition, influenced by genetics, nutritional intake, level of physical activity, and social and physical environment factors.[11,12] Rare pathologic causes may also lead to rapid weight gain; however, in most children, there is no single underlying cause. Red flags for pathologic obesity that may warrant further investigation include rapid onset of weight gain, very early age of onset, obesity discordant with parent weights, hypogonadism, short stature/poor linear growth, and association of dysmorphic features or developmental delay.[13,14]

Environmental Factors

Intrauterine and postnatal factors

Substantial evidence from epidemiologic and experimental animal studies suggest that fetal and early postnatal environmental exposures impact significantly on the development of obesity, diabetes, and heart disease.[15] The "developmental origins of health and disease (DOHaD)" hypothesis posits a stimulus or insult to an organism during a critical period of development can alter gene expression via epigenetic modifications. For example, being either small or large for gestational age is associated with an increased risk of developing childhood obesity.[12] Prenatal exposure to gestational diabetes mellitus (hyperglycemia, hyperinsulinemia), maternal smoking, and high maternal adiposity are correlated with increased incidence of childhood obesity, independent of birth size.[12,16] A systematic review found a strong increased risk of overweight and obesity in individuals delivered by cesarean section.[17] Outcomes related to mode of delivery and obesity may be due to accumulation of differing bacteria in the gut (the microbiome), which influences inflammation, nutrient ingestion, and immune system development in the infant.[18]

Exclusive breast-feeding in the first 6 months correlates with a lower incidence of childhood obesity in cohort studies, although a large randomized clinical trial promoting breast-feeding failed to show a protective effect at age 6.5 years.[19,20] Rapid weight gain in the first few months of life, in addition to an earlier age of BMI rebound (the physiologic increase in slope of the BMI curve normally occurring at age 5–7 years), is also associated with higher rates of childhood obesity and adult cardiometabolic risk.[21,22]

Nutrition/Feeding behaviors

Several dietary factors including higher caloric food intake during infancy, introduction of solid foods before 6 months of age, higher consumption of sweetened drinks (juice, soda), increased fast food consumption, eating while watching television (TV), skipping breakfast, reduced family meal times eating together, and lower daily milk, fruit,