A Review of the Prevention and Medical Management of Childhood Obesity

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KEYWORDS

• Childhood obesity • Prevention plus • Motivational interviewing
• Cardiometabolic risks • Metformin • Behavioral interventions

KEY POINTS

- Revised classification will include higher degrees of obesity that are associated with increased prevalence of cardiometabolic risk factors, such as type 2 diabetes, dyslipidemia, and hypertension.
- Current recommendations for the prevention of childhood obesity with focus on family-based lifestyle modifications include balanced nutrition, increased physical activity, limited screen time, and healthy sleep patterns.
- Complications and comorbidities of childhood obesity are assessed for with appropriate screening modalities and indications for subspecialty referral.
- The 4-staged treatment model of childhood obesity, which includes prevention plus, structured weight management, comprehensive multidisciplinary intervention, and tertiary care intervention, is reviewed.

INTRODUCTION

Between 2011 and 2014, 17% of US children ages 2 to 19 years met criteria for obesity and 5.8% for extreme obesity.[1] The prevention and treatment of childhood obesity remain public health priorities. Multiple complex factors lead to overweight and obesity in childhood and thereby influence recommendations for management. Although a comprehensive discussion is beyond the scope of this article, it is important to understand the external factors that shape patient behaviors and decision-making.[2,3] The six-Cs is a useful ecological model that recognizes that both environmental and genetic influences contribute to the development of childhood obesity and includes the cell, child, clan, community, country, and culture.[2] The cell represents genetic influences and biological factors that predispose toward

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obesity. The child sphere includes personal and behavioral characteristics, such as self-regulation, media exposure, and sleep. The clan refers to the family unit and includes parenting styles, responsive feeding practices, and household routines.[2,3] The community encompasses a broad scope, including peers, schools, childcare, access to healthy food, and safe places to play. Country involves public policies that influence access to healthy nutrition and physical activity, such as in schools and other community institutions. Finally, culture refers to overarching cultural and societal norms concerning nutrition and physical activity.[2,3]

In this ecological context, childhood obesity prevention strategies and family-based multidisciplinary comprehensive behavioral treatment of obesity engage children and their families to make healthy behavioral changes within their control. Clinical collaboration with community programs and resources improves access to healthy foods and safe places to play.[4] Support for public health initiatives and public policies can improve funding for evidence-based prevention strategies while also securing reimbursement for the treatment of childhood obesity.

DIAGNOSIS AND DEFINITIONS OF PEDIATRIC OVERWEIGHT AND OBESITY

Overweight and obesity are defined by using the body mass index (BMI; the weight in kilograms divided by the square of the height in meters) and the Centers for Disease Control and Prevention growth charts for age and sex-specific BMI for children older than 2 years of age. The BMI should be calculated and plotted at least annually during well child visits and/or sick visits.[5] During childhood growth, the range of normal BMI changes with age. An adiposity nadir typically occurs between ages 4 to 6, followed by adiposity rebound and subsequent increase in BMI through adolescence.[6] For this reason, standardized BMI percentiles for age and sex are used, rather than absolute BMI values, to define overweight and obesity in children in contrast to the adult population.

Overweight is classified if the BMI is greater than or equal to 85th percentile but less than 95th percentile for age and sex. Obesity is classified if the BMI is greater than or equal to 95th percentile for age and sex. Definitions vary to some extent with regard to classifying higher degrees of obesity (**Table 1**).[1,5,7]

An Endocrine Society Clinical Practice Guideline published in March 2017 recommends classifying children as obese if the BMI is greater than or equal to 95th percentile for age and sex and as extremely obese if the BMI is greater than or equal to 120% of the 95th percentile for age and sex or greater than or equal to 35 kg/m^2; however, it does not further classify extreme obesity.[5] Other groups categorize extreme obesity using class II and class III obesity to resemble adult classifications.[7,8] Recent

Table 1
Classification of overweight and obesity in childhood

Overweight	BMI is ≥85th percentile but <95th percentile for age and sex
Obesity	
Class I	BMI is ≥95th percentile for age and sex
Extreme Obesity	
Class II obesity	BMI is ≥120% of the 95th percentile for age and sex or ≥35 kg/m^2, whichever is lower
Class III obesity	BMI is ≥140% of the 95th percentile for age and sex or ≥40 kg/m^2, whichever is lower

Data from Refs.[1,5,7]