

Childhood obesity: Determinants, evaluation, and prevention

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ABSTRACT

Childhood obesity is a grave issue, which needs to be addressed urgently because it leads to several medical and psychosocial problems in children. High prevalence is being increasingly reported in children from developing countries as well. The combination of our genetic propensity to store fat, the ready availability of calorie dense foods, and sedentary lifestyle promotes overweight. The child's food environment at home and parental obesity are strong determinants. Urban poor in developed countries and urban rich in developing countries are both at risk. In developing countries, a number of beliefs passed down over generations are other important determinants. Evaluation includes assessing the child's lifestyle, excluding weight-promoting medication history; poor linear growth needs endocrine evaluation; genetic syndromes should be considered if there are clinical pointers. Overweight children should be evaluated for hypertension, dyslipidemia, T2DM, and NAFLD. Therapeutic lifestyle changes targeting food habits and physical activity through parental participation and social support are the cornerstones of preventing childhood obesity. Active travel and play by making the built environment more accessible, ban on 'junk' food advertising, and effective health education through active participation of clinicians, school systems, and the media will go a long way in reversing anticipated trends in childhood obesity.

Key words: Childhood obesity, determinants, evaluation, prevention

INTRODUCTION

Childhood obesity is reaching epidemic proportions and is the most prevalent chronic condition affecting health of children and adolescents worldwide. The rise in childhood obesity has been accompanied by an increase in conditions that were previously almost unheard of among children such as T2DM, dyslipidemia, hypertension, sleep apnea, and fatty liver disease. Moreover, childhood obesity is predictive of adult obesity.^[1]

CDC has published BMI charts for children. Obesity is defined as a BMI equal to or greater than 95th percentile for age and sex. Children with a BMI between 85th and 95th are defined as overweight. According to the NHANES data, approximately 17% of children and adolescents aged

2-19 years are obese. The prevalence is higher in older children, males, and certain racial and ethnic minorities. An alarming 3- to 4-fold increase has been observed in obesity prevalence in the last 4 decades. According to recent Indian data, prevalence of overweight among 14-17 year old urban children in 2006-2007 was 29% in private schools and 11.3% in government-funded schools in New Delhi.^[2]

DETERMINANTS OF CHILDHOOD OBESITY

Weight gain is the result of an imbalance between energy intake and energy output. The pathogenesis is multi-factorial and is the interplay of genetic predisposition and environmental factors. The combination of our genetic propensity to store fat, the ready availability of calorie dense foods, and sedentary lifestyle promotes overweight.

Diet A child's food environment plays a very important role. To start with, parents greatly influence a child's food choices and eating behavior.^[3] Parental obesity is an important factor in predicting adult obesity, and offspring of obese parents who themselves were obese in childhood may be at particular risk.^[4] As the child grows, aggressive advertising practices and relatively low cost of energy-dense foods

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drive him towards foods high in saturated fat, refined carbohydrates, and sweetened carbonated beverages. Students often have ready access to high-calorie foods in school cafeteria and fast food shops located nearby. Awareness about adverse effects of unhealthy nutrition is inadequate amongst schoolchildren.

Physical activity Activity patterns in children have shifted from outdoor play to indoor entertainment like television, internet, and computer games. In many developing countries, there is acute dearth of open spaces and playgrounds in schools and communities. Neighborhoods are often considered unsafe for walking and other outdoor activities. An increasing pressure on academics and reduced emphasis on physical activity in schools is another contributory factor to weight gain

Socio-economic Status (SES) The relationship between SES and weight shows interesting dichotomy. Urban poor in developed countries appear vulnerable due to poor diet and decreased physical activity; urban rich in developing countries remain at risk due to an increased affinity to the western type of lifestyle.^[5] Increased prevalence of obesity in high SES private schools could be the result of generous pocket money, availability of domestic help, and traveling to school by car.

Tradition and culture A number of beliefs have been passed down over generations, mostly in developing countries. A common myth is that a fat child is a healthy child and that most of the obesity is baby fat, which will eventually go away as the child grows. Oils, ghee, and butter are believed to be essential to impart strength and increase growth. Leftovers on plates are strongly discouraged. Adolescent girls have very low levels of physical activity as they are expected to help out with household chores instead of being involved in outdoor activities.^[6] Prenatal exposure to maternal smoking and absence or short duration of breastfeeding in infancy are some of the early-life determinants of overweight and obesity.^[7]

Secondary causes Obesity due to endocrine disorders (hypothyroidism, Cushing's syndrome, GHD, pseudohypoparathyroidism) is far less common than exogenous obesity. Genetic diseases either monogenic (leptin deficiency, MC4R mutation) or pleiotropic genetic syndromes (Prader-Willi, Bardet-Biedl) are extremely rare causes of childhood obesity. Hypothalamic defects may rarely cause obesity.

EVALUATION OF CHILDHOOD OBESITY

Assess lifestyle of the patient including caloric intake,

physical activity, and parents' weight status.

Exclude weight gain induced by drugs like glucocorticoids, oral contraceptives, atypical anti-psychotics, anti-depressants/mood stabilizers, and anti-convulsants.

Poor linear growth despite excessive weight gain is a red flag sign- rule out endocrine disorders. Growth records should be carefully reviewed in all patients with childhood obesity. IGF-1 and IGFBP-3 are normal to high in obese children without GH deficiency. Assess thyroid function tests to exclude hypothyroidism. Rule out Cushing's syndrome. Assess bone age; delayed in hypothyroidism, advanced in Cushing's, and exogenous obesity. Consider pseudohypoparathyroidism if phenotype present.

Determine the onset and progression of obesity. Hypothalamic lesions are associated with acute onset rapid weight gain. If weight gain occurs before the age of 2 years consider the possibility of a genetic defect in the leptin-signaling pathway. Tests include leptin levels (normally high in obese patients without a leptin deficiency) and MC4R sequencing. If obesity is associated with developmental delay, dysmorphic features, hypogonadism, consider genetic syndromes. Appropriate genetic tests are available for Prader-Willi, Bardet-Biedl, etc.

Acanthosis nigricans, symptoms of obstructive sleep apnea, early or delayed puberty, and PCO should be assessed. Depression and low self-esteem should be excluded. All obese children should have blood pressure measured and treated according to age-appropriate algorithms.^[8] ADA recommends screening for T2DM in asymptomatic adolescents if they are overweight.^[9] Assess fasting lipids if there is a positive family history for CVD or dyslipidemia. Universal fasting lipid screen is recommended for obese children aged 9 and up.^[8] ALT should be assessed for NAFLD.

PREVENTION OF CHILDHOOD OBESITY

The child and family should be counseled on appropriate nutritional and physical activity goals. The weight-management programs can be conducted individually or in groups. Participation in a group can be stimulating for children and re-assuring to parents. It is vital to create long-term behavioral changes, which can last a lifetime and also address behavioral issues such as bullying and emotional eating.

The Endocrine Society of US recommends actions for childhood obesity prevention.^[10] Breast-feeding should be continued for a minimum of 6 months. Consumption

of calorie-dense, nutrient-poor foods (e.g. sweetened beverages, fruit juices, and calorie-dense snacks) should be avoided. Portion control, reduced saturated dietary fat for children older than 2 years, increased intake of dietary fiber, fruits and vegetables, and timely meals particularly breakfast to avoid constant “grazing” during the day are strongly recommended. Other recommendations include 60 min of daily moderate to vigorous physical activity. Screen time should be limited to 1–2 h per day (American Academy of Pediatrics). Clinicians should participate in efforts to educate children, parents, schools, and community in general about healthy lifestyle. Education of parents including parental role-modeling is pivotal. School systems should provide health education courses and ensure that only nutritionally sound food and drinks are available in the school environment. Regulatory policies should be designed to decrease the exposure of children to the promotion of unhealthy food choices. Organizations should try to provide areas for safe walking, recreational activity, and athletic events.

Orlistat is the only medication approved by USFDA for treatment of obesity in adolescents aged 12 years and older; lifestyle modification, however, should be maintained throughout the pharmacologic treatment.

The Royal College of Pediatrics and Child Health in its April 2012 position statement stresses on achieving a cultural shift to reduce childhood obesity. It emphasizes on the importance of parents’ lifestyles, universal free school meals following nutritional standards, active travel and play by making the built environment more accessible, ban on ‘junk’ food advertising and increased tax on foods high in salt, sugar, and fat.

To conclude, childhood obesity is a grave issue that needs to be addressed urgently. High prevalence of overweight and obesity is being increasingly reported in children from developing countries. Therapeutic lifestyle changes targeting food habits and physical activity

through parental participation and social support are the cornerstones of preventing childhood obesity. High-risk screening and effective health education programs are urgently needed.

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