

# Obesity Epidemic and Liver Disease in Children

**Eyad Altamimi**

Jordan University of Science and Technology, Jordan

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## Abstract

Obesity defined as abnormal or excessive fat accumulation in the body exhibiting health risk. It represents the most serious public health challenge facing health authorities worldwide. Children are not spared; on the contrary, childhood obesity is on the rise. Direct body fat percentage estimation is very difficult. Body Mass Index (BMI) is an acceptable marker, where the ratio of the weight to the height is measured. Although BMI can indicate weight problem, it does not differentiate between fat or lean mass. Coupling BMI with other adiposity assessment tool in children like skinfold thickness might improve the precision of BMI. Obesity is a chronic disorder. Obese children are at increased risk of being obese adults. Obesity can adversely affect almost every organ in the body. Liver and gallbladder involvement are the main gastrointestinal diseases. Obesity represents the greatest risk factor for pediatric Non-Alcoholic Fatty Liver Disease (NAFLD). It is already demonstrated that positive correlation exists between abdominal fat and NAFLD. NAFLD is the most common cause of elevated liver enzymes in children. It might progress into liver cirrhosis and even hepatocellular carcinoma. Prevention of obesity and early intervention through gradual and sustained weight loss are the main strategies to prevent such deleterious complications. The prevalence of childhood obesity has reached epidemic proportions in the US and many other parts of the world. With obesity comes a variety of adverse health outcomes and metabolic complications. The liver in particular seems to be significantly impacted by fat deposition in the presence of obesity. In this article we discuss several aspects of childhood obesity from epidemiology and associated metabolic complications, to management strategies and therapy with particular attention to the impact of obesity on the liver resulting in non-alcoholic or metabolic fatty liver disease. The deleterious effects of obesity on the liver and health overall can be significantly impacted by a culture that fosters sustained nutritional improvement and regular physical activity. Here we summarize the current evidence supporting pharmacologic, behavioral and dietary interventions for the management of obesity and fatty liver disease in children. Children have natural weight fluctuations as they grow, and so defining overweight in youth requires standardized growth charts that account for sex and age. Currently, for children aged

2–18 years, overweight is defined as a BMI > 85th percentile and obesity is BMI > 95th percentile adjusted for sex and age. In children younger than 2 years, a weight-for-length value greater than 95th percentile for age and sex is categorized as overweight. There are no normative data for BMI in this age group. Recent data from the 2009–2010 National Health and Nutrition Examination Survey (NHANES) revealed that 31.8% of children aged 2–19 years were overweight or obese and 16.9% of children were obese. The prevalence of obesity in children has increased three fold from the 1960s and 1970s.

Currently, the American Academy of Pediatrics recommends yearly evaluation of weight status using BMI measurement and assessment of dietary and exercise patterns to provide opportunities to intervene on poor dietary habits and sedentary behavior. Given that the medical consequences of obesity can involve every organ system, a thorough history and physical is paramount in the evaluation of overweight and obese children. Important considerations in the family history include the presence of obesity related disorders and parental obesity. Genetic factors have a strong influence on the development of conditions such as type 2 diabetes mellitus and cardiovascular disease in childhood. Sleep apnea can occur in severely obese adolescents and usually presents with night-time snoring and daytime somnolence. Obese children should also be questioned on the presence of wheezing and shortness of breath as asthma appears to be more common in this group as well. The American Diabetes Association currently recommends that overweight children (>85th percentile BMI) with any two of the following risk factors be screened for type 2 diabetes mellitus: family history of type 2 diabetes, 2) of Native American, African American, Hispanic American or Asian/South Pacific Islander ethnic background, or have signs of insulin resistance or conditions associated with insulin resistance. Screening should start at age 10 years or at the onset of puberty if it occurs younger, and should be performed every two years. Currently, there are no evidence-based guidelines on when and how to best screen for NAFLD in children. However, an AAP expert committee has suggested AST and ALT be measured biannually for children with BMI > 95th percentile and those with BMI 85th to 94th percentile with at least one other risk factor. Screening for many of the psychological comorbidities of obesity can be accomplished using the HEEADSSS exam, which most pediatricians employ in every adolescent visit. This is a series of questions regarding Home

environment, Education and Employment, Eating, Activities, Drugs, Sexuality, Suicide/depression and Safety designed to identify adolescents having difficulties in any of these areas during this high-risk developmental period. Medical causes of obesity in childhood are rare, however many pediatricians find themselves needing to address these causes because of parental concern. Hypothyroidism is among the more common causes of weight gain (acquired hypothyroidism has a prevalence of about 1.2% of children in the US). However, children with this disorder typically have a drop off in their linear growth and a decline in academic performance. Primary Cushing's syndrome is another rare cause of obesity in childhood. However, these children also typically have short stature. Finally, there are some

genetic syndromes associated with obesity, such as Prader-Willi syndrome. These children typically have developmental delay and other medical conditions which precede the obesity. The diagnosis of pediatric NAFLD is commonly made after elevated serum aminotransferases are found during a routine check-up. Many centers have adopted a screening program for NAFLD in high-risk subjects, particularly in those presenting with features of the metabolic syndrome. Liver biopsy, the current gold standard for the diagnosis of NAFLD, is the only way to distinguish between NASH and isolated hepatic steatosis, determine the severity of liver damage and the presence and extent of fibrosis, as well as to rule out other diseases.