

# BODY COMPOSITION AND CHILDREN'S HEALTH RESEARCH OVERVIEW

Significant preventable health risks are associated with childhood obesity (too much body fat), lack of body fat, and eating disorders. This is a complicated and fast growing problem in the United States. Twenty-five percent of U.S. youth are now considered overweight, double the percentage 30 years ago.<sup>1</sup> At the same time a recent study of 3rd through 6th graders found as many as 70% believing they were fat with 15% meeting the diagnostic standards for eating disorders.<sup>2</sup>

Unhealthy body composition has an immediate and long-term negative impact on children. Adult diseases, such as NIDDM and CVD, are now increasingly showing up in our youth. Socialization and early learning patterns are effected negatively and can last a lifetime. Adolescent obesity itself usually continues into adulthood perpetuating the high risk for many preventable diseases.<sup>8,16</sup> Following is a summary of research being done in order to understand the impact of obesity and eating disorders on children and adolescents.

## Conditions Related to Obesity and Eating Disorders Among Children

Pulmonary	Type 2 Diabetes (NIDDM)	Orthopedic Complications
Asthma	Insulin Resistance	Blount's Disease
Sleep Apnea	Hyperandrogenemia	Slipped Capital epiphyses
Sleep Disorders	Hyperinsulinemia	Psychosocial Effects/Stigma
Pickwickian Syndrome	Menstrual Abnormalities	Eating Disorders
Cardiovascular Risk Factors	Gall Bladder Disease	Anorexia Nervosa
Hypertension	Liver Steatosis/Steatohepatitis	Bulimia
Dyslipidemia	Liver Fibrosis/Cirrhosis	Binge Eating
Syndrome X	Neurocognitive Deficits	Body Image Disorder

### Type 2 Diabetes (NIDDM) and Hyperinsulinemia

The United States has seen NIDDM increase 30% in a short time period.<sup>3</sup> This disease accounted for about a third of diabetes diagnosis in 1994 among 10-19 year olds.<sup>4</sup> Obesity increases the risk of developing type 2 diabetes and complicates its management. Obese children and adolescents are 12.6 times more likely than non-obese to have higher fasting blood insulin levels (Hyperinsulinemia) a risk factor for diabetes.<sup>3</sup>

### Asthma

Asthma is significantly higher in children and adolescents who are overweight.<sup>5</sup>

### Sleep Disorders

Sleep-associated breathing disorders such as apnea, hypopnea, excessive nighttime arousals, or abnormalities in gas exchange have been associated with obesity. One study reported 30% of obese subjects having sleep apnea and another 30% showing abnormal sleep patterns. Another study found 94% of obese subjects demonstrating abnormal sleep patterns. Preliminary results indicate that obese children with obstructive sleep apnea demonstrate clinically significant deficits in learning and memory compared to obese children without apnea.<sup>5,9,13</sup>

### Hypertension

Hypertension is 9 times more frequent among obese children than non-obese. High systolic blood pressure is 4.5 times more likely and high diastolic pressure 2.4 times more likely among obese children.<sup>6</sup> Approximately 20-30% of obese children ages 5 – 11 years have hypertension. Hyperinsulinemia, which affects sodium retention and is a cause of hypertension, is 12.6 times more likely in obese children.<sup>3</sup> When both obese and non-obese adolescents were shifted from a high salt to a low salt diet, a significantly larger decrease in blood pressure observed among obese compared to a non-significant change among non-obese adolescents.<sup>5</sup>

### Abnormal Cholesterol Levels (dyslipidemia)

In the Bogalusa Heart Study, overweight during adolescence was associated with a 2.4 times increase in the prevalence of total cholesterol values above 240mg/dl, a 3 times increase in LDL values below 160 mg/dl and an 8 times increase in HDL levels below 35 mg/dl in adults aged 27-31.<sup>5</sup>

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## Syndrome X

Obese children and adolescents are at high risk for Syndrome X, a clustering of risk factors for cardiovascular disease. It is characterized by dyslipidemia, hyperinsulinemia, hypertension, and insulin resistance.<sup>7</sup>

## Menstrual Abnormalities

Menstrual abnormalities in obese children are common. Early menarche is observed in obese girls. Late or absent menstruation is also associated with obesity. Approximately 40-60% of adult women with polycystic ovary syndrome are overweight or obese. The prevalence of PCO in adolescents is unknown, however, hormonal patterns typical of PCO are being increasingly described in obese children. Body fat that is too low can result in Amenorrhea.<sup>6,11,12</sup>

## Gall Bladder Disease

Obesity accounts for 8 to 33% of gallstones observed in children. Childhood obesity accounts for the majority of gallstones in children without other underlying medical conditions such as hemolytic disease, congenital heart disease or prolonged nutritional support.<sup>5</sup> Obese individuals have increased biliary excretion of cholesterol resulting in an increased likelihood of gallstone formation.<sup>10</sup>

## Orthopedic Complications

Obesity causes many orthopedic complications. 30% to 50% of patients with slipped capital epiphyses and bilateral slipped capital epiphyses are obese. In a study of Blount's disease (severe bowing of the legs) approximately 80% of patients were obese.<sup>8</sup>

## Eating Disorders and Weight Control Behavior

Emphasis on weight is everywhere in US society. As the medical profession takes steps to help obese children it is important to realize and monitor the effect on all children weight consciousness may be having. When children in the 3rd – 6th grades were surveyed, 70% believed they were fat, 45% wanted to be thinner, 37% had tried to lose weight and almost 7% met criteria for anorexia nervosa. 15% of those surveyed met the diagnostic standards for eating disorders.<sup>2</sup>

## Psychosocial Effects and Stigma

Obesity may cause inappropriate expectations and adverse socialization because the child looks old for their age.<sup>13</sup> Overweight children and adolescents report negative assumptions made about them by others due to early maturation and height increases, including being inactive or lazy, being strong and tougher than others, not having feelings and being unclean.<sup>8,13</sup> Body Image Disorder is seen in adolescents, usually spurred on by peer and parental criticism about weight. Its impact lasts long into adulthood.<sup>14</sup>

## Cumulative Effects On Learning

The negative health and psychosocial effects of obesity have been shown to have a significant impact on learning, social skills and socio-economic status over time.<sup>5,9,15</sup>

## Measurement and Tracking

There are numerous methods for determining and tracking body fat in the treatment of obesity. BMI is often used to diagnose obesity by approximating body fat levels. In adults a BMI greater than 30 indicates clinical obesity, however, there are no international standards for healthy body fat ranges for children yet. BMI may not be reliable tool for everyone, including children. Tanita BIA is also a well researched, accurate, easy to use, method of measuring and tracking body fat in children. Research results are available on request.

## References

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