

## Overweight/Obesity in Children and Adolescents

a report by

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Obesity is defined as an excess of the normal body fat mass. In general terms, this means that a child has too much fat content in his body for his height, sex, and age. Genetics and environmental factors are thought to influence the development and the maintenance of this fat content. During childhood and adolescence, classification into under-, normal-, and overweight status is usually made by measuring the body mass index (BMI) and then determining the percentile area according to age and gender. To assess body fat mass, more sophisticated methods, such as bioimpedance on dual energy X-ray absorptiometry (DEXA), are necessary.

### Prevalence

The Childhood Obesity Working Group of the International Obesity TaskForce (IOTF) has proposed criteria based on concepts that have been established for adults.<sup>1</sup> Pooled international data were obtained for BMI from six large nationally representative cross-sectional surveys have been used and cut-off points for overweight (BMI-value >25) and obesity (BMI-value >30) from two to 18 years of age.<sup>2</sup> Epidemiological studies show secular trends for increasing obesity and persistence of adolescent obesity into adulthood.<sup>3-5</sup> The World Health Organization (WHO) stated that: "Overweight and obesity represent a rapidly growing threat to the health of populations and an increasing number of countries worldwide".<sup>6</sup> Worldwide, about 10% of school-age children (5–17 years) are overweight (3% are obese); in America, about 33% (8% obese); and in Europe, 20% (4% obese).<sup>1</sup>

The prevalence of excess weight among children is increasing in both developed and developing countries. The burden upon health services is high, with the rates in EU countries rising annually: an additional 1% of all children become overweight each year.<sup>1</sup> There are associations between obesity and parental education level,<sup>7</sup> low social class,<sup>8,9</sup> low socioeconomic family status, and family background.<sup>10,11</sup>

### Medical Factors

Obese children and adolescents have a high risk developing the so-called 'metabolic syndrome', which is

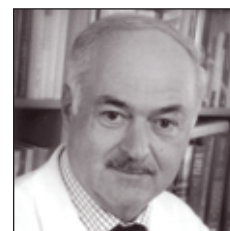
characterized by obesity, insulin resistance, hypertension, hypertriglyceridemia, and low high-density lipoprotein (HDL) cholesterol.<sup>12</sup> The accompanying diseases of childhood obesity include: respiratory diseases (e.g. sleep apnea), orthopedic disorders, neurological disorders, gastrointestinal disorders (e.g. steatosis hepatitis), endocrine disorders (insulin resistance, type II diabetes), or heart diseases (e.g. hypertension, dyslipidemia). For morbidly obese children (BMI >99.5), more comorbidities are expected (see *Table 1*).

### Psychological Comorbidities

Overweight in childhood can lead to severe psychological problems. Several studies have looked at aspects of psychological factors and obesity, but the results have been diverse.<sup>13-15</sup> Obesity can have psychological causes, but more importantly it has psychological consequences for children.

There is no clear structure for an obesity-personality. It seems that in clinical-based studies there is an association between obesity and depression, but in epidemiological studies these associations appear weak or inconsistent.<sup>16,17</sup> Studies have found that overweight adolescents had a higher prevalence of depressive symptoms.<sup>18,19</sup> Multiple studies also suggest that obesity may lead to lower self-esteem among adolescents. One study showed that nine- to 10-year-old obese children had worsening self-esteem over a four-year period, resulting in elevated levels of sadness, nervousness, and loneliness.<sup>20</sup> A higher BMI in teenage girls is associated with lower global self-worth, reduced levels of physical appearance self-esteem, close friendship self-esteem, and behavioral conduct self-esteem.<sup>14</sup>

The social stigmatization associated with obesity is believed to engender chronic embarrassment, shame, and guilt, all of which may lead to affective disorders. Overweight adolescents are less likely to marry as adults (compared with average-weight adolescents), obese girls complete less schooling, and have lower household income as adults.<sup>10</sup> The stigmatization of obesity is apparent in pre-adolescent ratings of popularity of thin and fat stereotypical figures.<sup>21</sup>



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**Table 1: Characteristics for Morbid Obesity in Children**

<b>Clinical</b>	<b>Metabolic consequences</b>
BMI > 99.5 percentile	Impaired glucose tolerance/insulin resistance
Body fat mass >30%	Dyslipoproteinemia (VLDL↑, HDL↓)
Striae distensae/rubrae	Hyperuricemia
High energy addition: most >3500kcal/d	Steatosis hepatitis
Hypertension	Homocystein ↑
Psychiatric disorders/depression	C-reactive protein (CRP) ↑
Problems with physical activity	Adipocyte-derived
Family accumulation	Cytokines ↑
	Vascular disease (IMT)
	Peptides ↑

BMI = Body mass index, VLDL = Very low-density lipoprotein, HDL = High-density lipoprotein, IMT = Intima media thickness

### Guidelines for Treatment

Treatment of obesity has to focus on a multidiscipline approach. Accordingly, guidelines are based on the crucial point of multidisciplinary.<sup>22</sup> The IOTF published 'Obesity in Children and Young People—A Crisis in Public Health', a report to the WHO. In the guidelines for treatment the following aims were underlined:

intervention for healthy eating, for healthy lifestyle and active prevention of diseases.<sup>1</sup> The primary aim is to support children and parents in their fairly long-term change to a healthy diet and lifestyle. They should learn a modified handling of their food intake, which means a varied, low-fat diet, and an active lifestyle.

For the treatment of obesity in childhood a combination of behavioral, dietetic, and motivational-oriented measures are recommended. A meta-analysis of 39 randomized clinical studies worldwide showed that behavioral-treatment programs could have positive short- and long-term results.<sup>23</sup> In terms of 'state of the art' thinking, there are five fields in treatment of obese children/adolescents (see Table 2).

### Conclusion

Although the Cochrane review listed worldwide 10 complex prevention programs, these measures have not shown to be effective in counteracting increasing incidence of overweight youngsters. However, prevention is the only realistic solution. Prevention

**Table 2: Current 'State-of-the-art' Thinking in the Treatment of Obese Children/Adolescents**

Medical treatment	<p>Primary aim of the medical treatment is to avoid obesity-related diseases or to treat concomitant factors timely.</p> <p>The following should be continuously performed: monitor height, weight, BMI, blood pressure, on-going determination of laboratory parameters (cholesterol, triglyceride, HDL, LDL, VLDL, electrolytes, uric acid, GOT, GPT, apolipoprotein A1 and B, Fe, hematology and differential blood count, vitamin B12, folic acid), measurements of the vascular parameters, and assessment of criteria in cases of suspected polycystic ovarian syndrome in girls. A detailed family anamnesis (weight, height, cholesterol, blood pressure, DM, MI, hyperuricemia, apoplexia, peripheral arterial occlusive disease, etc.) concludes the examination.</p>
Nutritional treatment	<p>Dietetic basics, a conscious dealing with food and an adequate separation of meals cover the main areas of the counseling.</p> <p>Types of nutrients (macro- and micronutrients), energy supply and consumption, macronutrients are illustrated by practical examples and illustrative material (nutrition pyramid). To implement the training, cooking instructions should be offered, designed to show that low-calorie food and enjoyment are not contradictory.<sup>24</sup></p> <p>The dietetic medical counseling has to be regarded as transmission of information, support and assistance, with the aim of changing former eating habits into low-fat, fruit- and vegetable-rich ones. A daily diet protocol to assess eating habits is a central element of the treatment.</p>
Psychological	<p>Treatment of obesity in childhood is a long-term and perhaps lifelong therapy. Family members should be included and treatment feasible aims should be aspired to.<sup>25-27</sup></p> <p>The primary goal is to discover, together with the child/teenager, individual behavioral patterns that have led to excessive intake of food. Distinct conflict management helps to cope with potential problematic situations.</p> <p>The patients are instructed to study new behavioral manners and are supported in the realization of a conversion of health-specific behavior. An individual counseling plan should be based on living habits. Important strategies include attempts to promote self-control, self-consciousness and self-confidence, social interaction, and positive coping strategies.</p>
Physical activity treatment	<p>Physical therapy helps the obese children/teenagers to achieve better feeling and understanding of their bodies. They should gain an enjoyment from sports. Accordingly, trainers should be responsive to the individual needs of each child. No excessive demands.<sup>28</sup></p> <p>Children could be motivated to keep a calendar in order to write down all activity and sport sessions. This calendar gives an overview on duration, type, and diversity of activities and can be effectively used in psychological counseling.</p>
Family treatment	<p>With regard to treatment of childhood obesity, the inclusion of close family members is an important parameter for success.<sup>29</sup></p> <p>Education of the parents should lead to the establishment of a home environment where healthy food is presented, an active lifestyle is executed and obesity-promoting factors are minimized (e.g. watching television).</p> <p>Positive encouragement from parents helps the child stay motivated for all challenges.</p>

BMI = Body mass index, HDL = High-density lipoprotein, LDL = Low-density lipoprotein, VLDL = Very low-density lipoprotein, GOT = Glutamyl oxaloacetic transaminase, GPT = Glutamyl pyruvic transaminase, DM = Diabetes mellitus, MI = Myocardial infarction

programs should include the following factors:

- active identification of at-risk children;
- continued controls;
- long-term treatment (years);
- diet-education for children and parents with the aim of enlightenment regarding diet, physical activity, and behavior; and
- prevention in kindergartens, schools, institutions. ■

## References

1. International Obesity Task Force. *Obesity: preventing, and managing the global Childhood epidemic: Report of WHO consultation on obesity, 3–5 June 1998, Geneva, 1998.*
2. Cole TM, et al., “Establishing a standard definition for child overweight and obesity worldwide: International survey”, *BMJ* (2000);320: pp. 1240–1243.
3. Deckelbaum RJ, Williams CL, “Childhood obesity: the health issue”, *Obes Res* (2001);9: pp. 239S–243S.
4. Ebbeling C, Pawlak D, Ludwig D, “Childhood obesity: public-health crisis, common sense cure”, *Lancet* (2002);360: pp. 473–482.
5. Lobstein T, Frelut M, “Prevalence of overweight among children in Europe”, *Obes Rev* (2003);4: pp. 195–200.
6. World Health Organisation, “Obesity: preventing and managing the global epidemic”, *Report to the WHO Consultation, WHO Technical Report Series 894, Geneva, 2000.*
7. Sherman JB, et al., “Factors associated with obesity in preschool children”, *Ann NY Acad Sci* (1993);699: pp. 287–288.
8. Lissau-Lund-Sorensen I, Sorensen TI, “Prospective study of the influence of social factors in childhood on risk of overweight in young adulthood”, *Int J Obes Relat Metab Disord* (1992);16: pp. 169–175.
9. Sargent JD, Blanchflower DG, “Obesity and stature in adolescence and earnings in young adulthood. Analysis of a British birth cohort”, *Arch Pediatr Adolesc Med* (1994);148: pp. 681–687.
10. Gortmaker SL, et al., “Social and economic consequences of overweight in adolescence and young adulthood”, *N Engl J Med* (1993);29: pp. 1008–1012.
11. Braddon FE, “Onset of obesity on a 36 year birth cohort study”, *Br Med J (Clin Res Ed)* (1986);293: pp. 299–303.
12. Weiss R, et al., “Obesity and the metabolic syndrome in children and adolescents”, *N Engl J Med* (2004);350: pp. 2362–2374.
13. Klesges RC, et al., “Relationship between psychological functioning and body fat in preschool children: a longitudinal investigation”, *J Consult Clin Psychol* (1992);60: pp. 793–796.
14. French SA, et al., “Self-esteem and change in body mass index over 3 years in a cohort of adolescents”, *Obes Res* (1996);4: pp. 27–33.
15. Wells JC, et al., “Investigation of the relationship between infant temperament and later body composition”, *Int J Obes Relat Metab Disord* (1997);21: pp. 400–406.
16. Carpenter KM, et al., “Relationship between obesity and DSM-IV major depression disorder, suicide ideation, and attempts”, *Am J Public Health* (2000);90: pp. 251–257.
17. Britz B, et al., “Rates of psychiatric disorders in a clinical study group of adolescents with extreme obesity and in obese adolescents ascertained via a population based study”, *Int J Obes Relat Metab Disord* (2000);24: pp. 1707–1714.
18. Erickson SR, et al., “Are overweight children unhappy?”, *Arch Pediatr Adolesc Med* (2000);154: pp. 931–935.
19. Pine DS, et al., “The association between childhood depression and adulthood body mass index”, *Pediatrics* (2001);107(5): pp. 1049–1056.
20. Strauss RS, “Childhood and self-esteem”, *Pediatrics* (2000);105: pp. 1.
21. Hill AJ, Silver E, “Fat, friendless and unhealthy: 9 year old children’s perception of body shape stereotypes”, *Int J Obes Relat Metab Disord* (1995);19: pp. 423–430.
22. Pietrobelli, et al., “From birth to adolescence: Vienna 2005 European Childhood Obesity Group International Workshop”, *Int J Obes (Lond)* (2005);29: pp. 1–6.
23. Epstein L, Roemmich J, Raynor H, “Behavioral therapy in the treatment of pediatric obesity”, *Pediatr Clin North Am* (2001);48(4): pp. 981–993.
24. Caroli M, Burniat W, “Dietary Management”, Burniat W (ed.), *Child and Adolescent Obesity* (2001), Cambridge: University Press, pp. 282–306.
25. Barlow SE, Dietz WH, “Obesity evaluation and treatment: Expert committee recommendations”, *Pediatrics* (1998);29: pp. 102
26. Epstein L, et al., “Treatment of pediatric obesity”, *Pediatrics* (1998);101: pp. 554–570.
27. Flodmark CE, “Management of the obese child using psychological-based treatments”, *Acta Paediatr Suppl* (2005);94(448): pp. 14–22.
28. Parizkova J, “Management through activity”, Burniat W (ed.), *Child and Adolescent Obesity* (2001), Cambridge: University Press, pp. 307–326.
29. Golan M, et al., “Parents as the exclusive agents of change in the treatment of childhood obesity”, *Am J Clin Nutr* (1998);67: pp. 1130–1135.