

THE OVERWEIGHT ADOLESCENT

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Obesity is a disorder of energy metabolism involving excessive adipose tissue stores (body fatness), which may be associated with medical or psychosocial morbidity. The prevalence, as well as the severity of obesity in adolescents is increasing at an alarming rate, making it one of the most serious health problems affecting this age group.

According to data from the National Health and Nutrition Examination Survey (NHANES 1999-2000), approximately 30% of adolescents are at risk for overweight (≥ 85 th %tile but <95 th %tile), and 14% of these severely overweight, or obese (≥ 95 th %tile).¹ Although all racial and socioeconomic groups are affected, higher rates were noted in African American females and American Indian and Hispanic youth of both genders.^{2,3}

SIGNIFICANCE

Adolescent overweight is associated with significant immediate and long term health risks.⁴ Adverse metabolic changes associated with excess body fat begin early. Intra-abdominal or central distribution of body fat appears to be independently and more closely associated with adverse health risks than total body fat, or deposition of fat in the gluteal or thigh area.^{5,6} Potential medical complications of overweight during adolescence are included in Table 1.⁴

TABLE 1
Medical Complications Associated With Adolescent Overweight

- Insulin resistance and hyperinsulinemia
- Type 2 diabetes mellitus
- Elevated total and LDL cholesterol and triglyceride levels
- Lowered HDL cholesterol level
- Aortic and coronary artery fatty streaks, lesions and calcification
- Hypertension
- Gallstones
- Hepatitis
- Sleep apnea
- Pickwickian syndrome
- Asthma
- Orthopedic problems (slipped capital epiphyses)
- Menstrual dysfunction
- Polycystic ovary syndrome
- Pseudotumor cerebri

The psychosocial risks of adolescent overweight may also be significant and potentially severe. In a society that values thinness, overweight youth are often subject to discrimination, ridicule and victimization. Possible psychosocial consequences of adolescent overweight are listed in Table 2.^{4,7}

TABLE 2
Potential Psychosocial Consequences of Adolescent Overweight

| | |
|--|--|
| Lifelong negative body image and low self-esteem | Engagement in high risk behaviors such as tobacco and alcohol use or early sexual activity |
| Depression or dysthymia | |
| Isolation and loneliness | Fewer years of education* |
| Feelings of rejection | Higher rates of poverty* |
| Nervousness or anxiety | Lower household income* |
| An external locus of control | Lower marriage rates |

*significant consequences for females only

Overweight in adolescents also has potential long-term complications:

- Overweight in adolescents frequently continues into adulthood.
- Up to 80% of adolescents may remain overweight as they mature, particularly if severely overweight or if they have an obese parent.^{4,8}
- Obesity is the second leading cause of preventable death in the United States⁹ and is an established, independent risk factor for a variety of chronic health conditions such as cardiovascular disease, type 2 diabetes, hypertension, gallbladder disease, and some types of cancer.^{4,8,10,11}

Overweight during adolescence has been shown to be a stronger predictor of mortality risk related to cardiovascular disease than being obese as an adult.¹² Even if no longer obese, having been obese as an adolescent increases the adult risk of atherosclerosis, coronary artery disease and stroke in both genders, as well as colorectal cancer and gout in males and osteoarthritis in females.¹³ Body mass index at age 18 has been shown to be an independent predictor of longevity.¹³

ETIOLOGY

Obesity is a complex condition involving genetic, hormonal, metabolic and environmental factors.¹³ Conditions such as hypothyroidism, hypercortisolism and hyperpituitarism are rare causes of overweight among youth, and are associated with growth retardation rather than the accelerated rate of biological development seen in exogenous obesity.¹³ Adolescent overweight and decreased insulin sensitivity have recently been associated with intrauterine malnutrition during fetal hypothalamic appetite center and sympathetic nervous system development.¹³ The interaction of genetically determined body size and fatness with an environment of low energy expenditure and caloric excess is the primary cause of adolescent overweight.

Low Level of Physical Activity

A decrease in physical activity level appears to be a significant contributor to the current rise in obesity prevalence in this population during the past two decades.³

- Only about 1/3 of high school students participate in daily physical education classes, in which approximately 30% of class time is spent in actual physical activity.¹⁴
- Moderate to vigorous physical activity rates are lowest among female and minority adolescents.¹⁵
- Lack of safety in neighborhoods may make it difficult for some adolescents to be physically active.
- Sedentary activities such as television and video viewing, computer games and internet activities have increased.
- The average adolescent watches 24 hours of television per week. Higher levels have been noted in African American and Hispanic youth. Each hourly increment of TV watching has been associated with a 2% increase in overweight prevalence in adolescents.¹⁵⁻¹⁷
- Television viewing has been linked to increased body fatness in youth.¹⁷ This may be related to replacement of physical activity and/or increased energy consumption while watching TV, or in response to advertisement of foods high in sugar and fat.

Excess Energy Intake

Over time, even modest daily increases in energy and fat, coupled with low levels of physical activity can contribute to excess weight.

- Overweight adolescents have been noted to consume higher levels of sweetened drinks and whole and 2% milk, and have lower intakes of water.³
- In a prospective study of young adolescents, the odds of becoming overweight increased 1.6 times for each additional can or glass of sugar-sweetened beverage consumed on a daily basis.¹⁸ Teens consuming 3 servings of sweetened beverage per day were at 5 times the risk of being overweight than those consuming no sweetened beverages. Unlike energy consumed from solid foods, energy from liquids may not be compensated for by a reduction in subsequent energy intake.
- The current marketing trend of larger portion sizes (e.g., super-sized fast food meals, 24 oz soft drinks, grab bags of chips, king-sized candy bars and over-sized pizzas) has contributed to excessive caloric sugar and fat intakes in adolescents.
- Although USDA guidelines require that School Lunch and Breakfast Program meals comply with the Dietary Guidelines, meals served in many schools through school stores, snack bars and vending machines continue to serve items such as shakes, ice cream, nachos, cookies, candy, soft drinks, fruit drinks, French fries and chips.
- Approximately 85% of youth have dietary fat intakes that exceed the recommendation of less than 30% of calories from fat.¹⁹

- Fruit and vegetable consumption is frequently low. Diets low in fiber and high in refined carbohydrates have been shown to be associated with increased insulin levels and weight gain in youth.²⁰
- Replacing meals with snacks high in sugar and fat may increase hunger and the likelihood of overeating later in the day.
- Frequent, restrictive dieting may contribute to slowed metabolic rate, binge eating and weight gain.²¹

SCREENING

Annual measurement of weight and height without shoes and determination of body mass index (BMI) and BMI percentile for gender and age is recommended for children and adolescents. Smoothed BMI percentile curves based on nationally representative data are available from the Centers for Disease Control and Prevention, National Center for Health Statistics for use with youth up to age 20.²²

- BMI reflects muscle and skeletal mass as well as adipose tissue, but correlates with subcutaneous and total body fatness in youth. Adolescents who are muscular (e.g., athletes) or who have a large bone structure, frequently have a high BMI without having excess body fat.
- An expert panel on pediatric obesity has recommended that youth with a BMI above the 95th percentile for gender and age be considered overweight. Those with a BMI above the 85th, but below the 95th percentile are considered at risk for overweight.²³
- Some researchers have defined overweight in youth as above the 85th BMI percentile.¹ Many adolescents at this BMI percentile will look significantly overweight, will demonstrate at least one obesity-related risk factor, and may benefit from intervention.
- Excess body fatness can be differentiated from a high BMI related to lean tissue by measuring triceps and subscapular skin fold thicknesses. BMI values above the 95th percentile for gender and age are consistent with obesity.²³

ASSESSMENT

After ruling out rare genetic or endocrine related causes of overweight, review of the parameters in Table 3 is helpful in the evaluation and management of excess body weight in adolescents.

TABLE 3
Factors to Include in the Assessment of Weight Status of Adolescents

Physical Aspects

Amount and distribution of body fat
 Acanthosis nigricans (darker, velvety pigmentation and thickness in neck folds, armpits, arm crease and waist area associated with insulin resistance)
 Gynecomastia (males)
 Sexual maturity rating
 Exercise tolerance/impediments

Obesity-Related Complications

Orthopedic problems
 Menstrual dysfunction/PCOS (polycystic ovarian syndrome)
 Hypertension (using a large blood pressure cuff)
 Glucose intolerance (fasting blood glucose)
 Insulin resistance/metabolic syndrome
 Dyslipidemias (fasting lipid panel)
 Sleep disturbances or hypoventilation disorders
 Gallbladder disease

Family History of Obesity and Related Complications

Hypertension
 Type 2 diabetes mellitus
 Cardiovascular disease
 Stroke
 Dyslipidemias

Weight History

Age at onset of weight concerns
 Pattern of weight gain
 Traumatic events that may be precipitating factors (e.g., family death, parental separation or divorce, illness or injury, abuse, move or change of school)

Physical Activity

Hours per day of sedentary activities (e.g., TV and video viewing, computer use, reading, listening to music, art, homework, napping, talking on the telephone)
 Exercise type, intensity, frequency and duration, including organized and recreational sports, physical education classes and use of health clubs, community centers and home exercise equipment
 Physically active daily routines (e.g., walking the dog, walking home from school, cutting the grass, employment)
 Activities avoided because of body mechanics or self consciousness (e.g., swimming)
 Family activity patterns

Previous/Current Weight Loss Attempts

Dieting; use of fad diets
 Restrictive eating/meal skipping
 Diet pill/herbal supplement use
 Purging (vomiting, laxative abuse, excessive exercise)
 Cigarette smoking to control weight

Psychosocial Aspects

Depression, stress, anxiety
 Isolation
 Teasing
 Body image, self esteem level
 Coping strategies
 Disordered eating (binge, out of control, night time, compulsive or emotionally-based eating)
 School attendance, performance
 Locus of control (internal vs external)
 Sociocultural attitude towards obesity
 Family concern, support and commitment to lifestyle change
 Level of concern, motivation, goals and stage of readiness for behavioral change. (Encouraging a weight management program in the absence of readiness could negatively impact self esteem and future weight loss efforts.)²³

Dietary Intake

Foods and beverages usually consumed, including types, amounts and frequency (note that "juice" may mean fruit drinks, punches or KoolAid)
 Pattern of food intake (meals, snacks) including interval between eating
 Location of food intake and others present (e.g., alone after school, at restaurant where employed)
 Schedule affecting dietary intake(e.g., activities, employment)
 Fast food, snack food and sweetened beverage consumption (e.g., iced tea, lemonade, fruit drinks and punches, soft drinks), including package and container size)
 Access to and use of free/reduced school meals, snack bar, school store, vending machines
 Family eating environment, including members who purchase and prepare food, meals eaten together, distractions (e.g.,TV on), use of convenience, take out, fast food and buffet restaurants, etc.
 Hunger and satiety level and response to cues

INTERVENTION

Obesity is a chronic disease requiring long term management and support from respectful, sensitive and compassionate providers who believe that success is possible.²³ Adolescent overweight may be most effectively managed with interdisciplinary care that addresses the medical, nutritional and psychosocial aspects of this complex condition. Goals of overweight management in adolescents are listed in Table 4.²³

TABLE 4
Goals of Adolescent Overweight Management

| |
|---|
| Promotion of sustained healthy physical activity and eating patterns Resolution of or improvement in medical complications Weight loss or stabilization to ultimately achieve a BMI below the 85th percentile for age and gender Psychosocial well-being |
|---|

Promotion of Healthy Physical Activity Patterns

Regular physical activity has multiple health and psychosocial benefits.¹⁶ Some of these are included in Table 5.

TABLE 5
Potential Benefits of Physical Activity

| |
|--|
| Improved sense of well-being and self-confidence Appetite suppression Maintenance of muscle tissue and loss of body fat Reduction in health risks associated with excess weight Lowered blood glucose level Lowered total and LDL cholesterol Increased bone strength Reduction in depression and stress Increased energy expenditure Increased metabolic rate Improved insulin sensitivity Increased HDL cholesterol Reduced blood pressure |
|--|

Overweight youth often have a low exercise tolerance, are self-conscious about their bodies and athletic ability, and have a negative attitude towards physical activity. A gradual increase in intensity and duration of body movement that is achievable and enjoyable will minimize muscle soreness and encourage activity.

Physical activity goals include:

- Limiting sedentary activities to one or two hours per day.
- Increasing physical activity (aerobic, lifestyle, strength training) to at least 30-60 minutes, 6-7 days per week.
- There is some evidence that frequent, short sessions of exercise (e.g., 10 minutes three times per day) may be as effective for weight loss as 30 minutes of continuous exercise.²⁴
- Strength training every other day will increase muscle mass, which is metabolically more active and requires more energy to maintain, than fat tissue.
- Lifestyle physical activities may be as effective as structured exercise in promoting weight loss. An emphasis on lifestyle, social and enjoyable activities may encourage long-term exercise patterns.

Promotion of Healthy Eating Patterns

Food selection according to the daily food guide for youth is recommended, emphasizing choices lower in calories, fat and refined carbohydrates and higher in fiber (see Table 6).

| Food Group | Servings/Day |
|---|---------------------|
| Whole grains | 6-8 |
| Vegetables, vegetable juices | 5 |
| Fresh fruits | 3 |
| 100% fruit juice | ≤1 |
| Dairy products (fat free/1%) | 3-4 |
| Chicken, turkey, fish, lean meats and substitutes | 3-4 (oz) |
| Fats/oils | 3 |
| Sweets/desserts | ≤1 |

Healthy eating goals include:

- Limiting refined grain products (e.g., white bread, sweet cereals, pasta and rice), desserts, candy, fruit juices and sugar-sweetened beverages, since foods that promote rapid glucose absorption may promote higher insulin levels and increased food intake in overweight adolescents.²⁰
- Limiting total carbohydrate to compensate for insulin resistance, when present.
- Inclusion of sources of protein and moderate amounts of monounsaturated or polyunsaturated fat at meals and snacks to increase satiety.
- Avoidance of excessive intakes of fat free/diet foods to increase satiety and moderate energy intakes.

- Limiting fat intake to 25-35% of total calories and emphasizing unsaturated sources such as olive or canola oils and soft margarines.
- Limiting portions to recommended serving sizes (as defined by the Food Guide Pyramid; see Chapter 6).
- Eating five to six small meals/snacks per day, including breakfast, to minimize hunger and overeating and to increase metabolic efficiency.
- Eating slowly, only to satiety, and avoiding fullness.
- Increasing water intake to 8-10 cups per day and limiting 1% or fat-free milk to 4 cups, fruit juices to 1 cup and sweetened drinks (such as fruit drinks, lemonade, and soft drinks) to 0-1 cup per day.
- Avoiding dieting and restriction of favorite foods, which can lead to binge eating or eating disorders, slowed metabolic rate and increased fat cell storage.²¹ Rigid diets or severe energy restriction may also be associated with anxiety and depression, and in young adolescents, impaired growth and delayed sexual maturation.²⁵ Consumption of a variety of foods, including favorite foods, in moderate portions should be emphasized.
- Avoiding harmful weight loss practices such as purging, diet pill use and fad diets.

Resolution of or Improvement in Medical Complications

Increased physical activity, healthier food choices and a reduction in body weight will improve, and in some cases alleviate, medical complications associated with obesity. Some of the health outcome goals of adolescent overweight management are included in Table 7.

TABLE 7
Health Outcome Goals of Adolescent Overweight Management

| | |
|-----------------------|---|
| Fasting blood glucose | <100 mg/dL |
| Total cholesterol | <170 mg/dL |
| LDL cholesterol | <100 mg/dL |
| Triglycerides | <150 mg/dL |
| HDL cholesterol | >40 mg/dL (males); >50 mg/dL (females) |
| Blood pressure | <90th percentile for gender and age (See Chapter 11) |

Source: Third Report of the National Cholesterol Education Program (NCEP) National Cholesterol Education Program (NCEP). Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults, NIH Publication 02-5215. September 2002. <http://www.nhlbi.nih.gov/guidelines/cholesterol/atp3full.pdf>.

Promotion of a Healthier Body Weight

- Weight stabilization is an appropriate goal in young adolescents who are still growing (see Section 1) or in those who have been experiencing rapid weight gain. This will allow a decrease in the proportion of body fat to lean tissue as growth in height occurs. Weight progress can be monitored by a decrease in BMI percentile.
- A gradual weight loss of 1/2 to 2 pounds per week is recommended for older adolescents, or for young adolescents who are severely obese and/or who have medical complications related to overweight.
- While normalization of body weight may be an unachievable goal for some adolescents, most can reach a weight consistent with a BMI below the 85th percentile.
- Even modest losses of 5-10% of body weight have been shown to reduce insulin resistance, improve glucose tolerance and lower blood pressure and serum lipids in adults.²⁶

Promotion of Psychosocial Well-Being

Many overweight adolescents have a negative body image, low self esteem, and anxiety or depression. In addition, they may have experienced a sense of failure in previous, unsuccessful weight management efforts. Goals to improve psychosocial health include:

- Understanding and acceptance of genetically determined body size and shape.
- Realistic expectations for weight change.
- Healthy coping strategies.
- Stress management.
- Assertive communication.
- Improved social skills.

COUNSELING

Frequent contact at one to two week intervals for reinforcement of goals, and monitoring of progress is most likely to result in positive outcomes. Adolescents who attain weight or BMI goals will need periodic follow-up to sustain healthy physical activity, eating and weight patterns. Topics to address when counseling the adolescent are listed in Table 8.

TABLE 8
Counseling the Overweight Adolescent— Topics to Address

Health risks of overweight (in a motivating and nonthreatening manner) for adolescents who are not yet ready to make behavioral changes²³

Improvement in body image and self esteem (see Chapter 13)

Relaxation techniques

Assertiveness training

Social skills development

The relationship between energy balance and expended to body weight

Health risks and ineffectiveness of rigid dieting, rapid weight loss, diet pills and products and purging.

Risks of cigarette smoking to control weight, including hyperlipidemia and abdominal deposition of fat²³

Incorporating physical activity into daily routine

Healthy fast food and snack choices

Label reading and appropriate portion sizes

Hunger and satiety cues

Healthier alternatives to emotionally-based eating

Managing high risk situations

Small changes in food habits can make a difference

Specific recommendations related to increasing physical activity levels and improving dietary quality are listed in Tables 9 and 10.

TABLE 9
Suggestions For Incorporating Physical Activity Into Adolescents' Daily Lives

Walk the dog (or a neighbor's dog).

Get a newspaper route.

Cut the grass with a push lawnmower.

Shovel snow.

Rake leaves.

Bike/roller blade reasonable distances instead of getting a ride or driving.

Walk to and/or home from school.

Get off the bus a few stops sooner.

Walk to the store or to a friend's house.

Use hand weights while watching TV.

Do calisthenics during TV commercials.

Use stairs instead of elevators.

Do household chores to fast music.

Park at the far end of the parking lot.

Take a walk with friends, parents, or siblings.

Take a sibling or neighbor to the park and play with them.

TABLE 10
Healthy Fast Food and Snack Suggestions

FAST FOOD

Salads with low fat dressing
 Small hamburgers
 Small cheeseburger
 Small roast beef sandwich
 Grilled chicken sandwich
 Small sub sandwich (e.g., chicken, turkey, ham, roast beef, seafood/tuna)
 Burrito
 Chicken/beef taco
 Small order of fries
 Frozen yogurt/soft serve ice cream cones/parfaits
 Thin crust veggie/cheese/chicken/ham pizza
 Roasted chicken
 Chili
 Small shake
 Diet coke
 Skim/1% milk
 Orange juice

SNACKS

Baked chips, low fat cheese sauce and/or salsa
 Whole wheat tortilla, low fat shredded cheese and salsa (quesadilla)
 String cheese
 1/2 peanut butter, turkey or ham sandwich (whole wheat bread)
 Veggies and low fat dip
 Low fat yogurt and fruit parfait or sundae
 Frozen yogurt fruit smoothie
 1/4 cup nuts
 Fresh fruit
 Spicy V8® juice
 Fruit juice and club soda
 Diet soda

Teens may feel overwhelmed by having to make dramatic changes in food intake. Table 11 illustrates several small behavior changes that can be suggested

TABLE 11
Small Changes Can Make a Difference

Substituting a 12 oz for a 20 oz soft drink per day can result in an energy deficit of 36,500 calories, enough to lose 10 lbs of weight in a year.

Substituting a 20 oz diet for a 20 oz regular soft drink per day can reduce caloric intake by over 102,000 calories; equivalent to a weight loss of 29 lbs in a year.

Switching from 4 cups per day of 2% to 1% milk can save more than 3,000 g of fat (the amount in almost 8 lbs of butter); resulting in a weight loss of nearly 8 lbs in a year.

Eating a regular hamburger and a small order of fries instead of a Big Mac and super-sized fries once a week can save over 39,000 calories in a year, which could cause a weight loss of 11 lbs.

Family Support

Physical activity and food habits are complex behavioral patterns determined by cultural, familial, environmental and peer influences. Adolescent overweight is a family issue. The overweight adolescent needs the positive support and role modeling of all family members and their commitment to making necessary changes in activity and food patterns with the adolescent. Overweight youth with nonsupportive or dysfunctional families are likely to have a poorer prognosis.

Topics to address with parents/care givers, particularly of young adolescents are listed in Table 12.

TABLE 12
Counseling Topics For Caregivers of Overweight Adolescents

Creating a positive activity environment including regular family activities which involve social, noncompetitive movement and exercise; family health club memberships, if economically feasible; youth memberships at the YMCA/YWCA (scholarships available), encouragement to participate in school, church and community activities.

Creating a positive food environment such as healthful foods purchased and prepared; at least one meal eaten together per day with pleasant conversation and the television not on; healthful snacks available.

Creating a positive emotional environment by not allowing any teasing or negative or disparaging remarks by any family member; appropriate limit-setting; commitment of all family members to make necessary changes in food and activity patterns with the adolescent; provision of non-food incentives and rewards for positive behavioral changes; allowing the adolescent to make his/her own choices regarding the types and amounts of foods eaten; participation in family therapy, when recommended.

Counseling Techniques

Incorporating motivational interviewing and considering stage of readiness for change (see Chapters 5 and 6), as well as behavioral change strategies,²⁷ may be most effective in helping adolescents achieve long term healthier activity and eating patterns.

Behavioral change strategies:

- Identifying and altering cues and opportunities for excess caloric intake and inactivity by establishing new routines (for example, consuming high fat snacks while watching television can be modified by limiting eating to the kitchen only).
- Establishing achievable, yet challenging short term goals.
- Using written contracts to promote desired changes.
- Self-monitoring by keeping activity and food intake logs.
- Using incentives and non-food rewards for achievement of goals.

REFERRAL

Adolescents who are severely overweight, have associated morbidity, or who do not respond to treatment may benefit from intensive counseling from a registered dietitian or nutritionist. Those with complex psychosocial issues may require counseling from a mental health professional. Referral to a public health nurse or coordination with the school nurse may also help to provide ongoing care and follow-up.

PREVENTION

The increasing prevalence and severity of adolescent overweight, its significant immediate and long term consequences, and the difficulty in successfully managing this complex condition make the prevention of obesity in youth a priority. Preventive strategies include:

- Lifetime, noncompetitive activities in physical education classes.
- Strong nutrition education components in health and family and consumer science curricula.
- Competitively priced healthful food choices in school cafeterias, snack bars, stores and vending machines.
- School fundraisers involving healthful alternatives to candy, cookies, etc.
- Healthful alternatives to items such as candy, soft drinks, and donuts used as rewards in classrooms.
- Increased availability of youth scholarships for YMCA/YWCA memberships or summer camps.
- Increased opportunities for low/no cost physical activities at youth centers, community centers and churches.

RESOURCES

National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), NIH

Do You Know the Health Risk of Being Overweight

<http://www.niddk.nih.gov/health/nutrit/pubs/health.htm>

National Heart, Lung and Blood Institute (NHLBI), NIH

http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/

Centers for Disease Control and Information

<http://www.cdc.gov/nccdphp/dnpa/obesity/index.htm>

The US Surgeon General's Office

<http://www.surgeongeneral.gov/topics/obesity/default.htm>

Partnership for Healthy Weight Management

<http://www.consumer.gov/weightloss/>

American Obesity Association

1250 34th Street, NW

Suite 300

Washington, DC 20037

202-776-7711

<http://www.obesity.org/>

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