13.4: Puberty and Nutrition

Skills to Develop

• Summarize nutritional requirements and dietary recommendations for preteens.
• Discuss the most important nutrition-related concerns at the onset of puberty.
• Discuss the growing rates of childhood obesity and the long-term consequences of it.

Puberty is the beginning of adolescence. The onset of puberty brings a number of changes, including the development of primary and secondary sex characteristics, growth spurts, an increase in body fat, and an increase in bone and muscle development. All of these changes must be supported with adequate intake and healthy food choices.

The Onset of Puberty (Ages Nine to Thirteen)

This period of physical development is divided into two phases. The first phase involves height increases from 20 to 25 percent. Puberty is second to the prenatal period in terms of rapid growth as the long bones stretch to their final, adult size. Girls grow 2–8 inches (5–20 centimeters) taller, while boys grow 4–12 inches (10–30 centimeters) taller. The second phase involves weight gain related to the development of bone, muscle, and fat tissue. Also in the midst of puberty, the sex hormones trigger the development of reproductive organs and secondary sexual characteristics, such as pubic hair. Girls also develop “curves,” while boys become broader and more muscular. Beverly McMillan, *Illustrated Atlas of the Human Body* (Sydney, Australia: Weldon Owen, 2008), 258.
Energy

The energy requirements for preteens differ according to gender, growth, and activity level. For ages nine to thirteen, girls should consume about 1,400 to 2,200 calories per day and boys should consume 1,600 to 2,600 calories per day. Physically active preteens who regularly participate in sports or exercise need to eat a greater number of calories to account for increased energy expenditures.

Macronutrients

For carbohydrates, the AMDR is 45 to 65 percent of daily calories (which is a recommended daily allowance of 158–228 grams for 1,400–1,600 daily calories). Carbohydrates that are high in fiber should make up the bulk of intake. The AMDR for protein is 10 to 30 percent of daily calories (35–105 grams for 1,400 daily calories for girls and 40–120 grams for 1,600 daily calories for boys). The AMDR for fat is 25 to 35 percent of daily calories (39–54 grams for 1,400 daily calories for girls and 44–62 grams for 1,600 daily calories for boys), depending on caloric intake and activity level.

Micronutrients

Key vitamins needed during puberty include vitamins D, K, and B₁₂. Adequate calcium intake is essential for building bone and preventing osteoporosis later in life. Young females need more iron at the onset of menstruation, while young males need additional iron for the development of lean body mass. Almost all of these needs should be met with dietary choices, not supplements (iron is an exception). Table \(\PageIndex{1}\) shows the micronutrient recommendations for young adolescents.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
Nutrient & Preteens, Ages 9–13 \\
\hline
Vitamin A (mcg) & 600.0 \\
Vitamin B₆ (mg) & 1.0 \\
\hline
\end{tabular}
\caption{Micronutrient Levels during Puberty}
\end{table}

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<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Preteens, Ages 9–13</th>
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</thead>
<tbody>
<tr>
<td>Vitamin B₁₂ (mcg)</td>
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<tr>
<td>Vitamin C (mg)</td>
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</tr>
<tr>
<td>Vitamin D (mcg)</td>
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<td>Vitamin E (mg)</td>
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<tr>
<td>Vitamin K (mcg)</td>
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<tr>
<td>Calcium (mg)</td>
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<tr>
<td>Folate (mcg)</td>
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<tr>
<td>Iron (mg)</td>
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<tr>
<td>Magnesium (mg)</td>
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<tr>
<td>Niacin (B₃) (mg)</td>
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<tr>
<td>Phosphorus (mg)</td>
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<tr>
<td>Riboflavin (B₂) (mcg)</td>
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<tr>
<td>Selenium (mcg)</td>
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</tr>
<tr>
<td>Thiamine (B₁) (mcg)</td>
<td>900.0</td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td>8.0</td>
</tr>
</tbody>
</table>


### Childhood Obesity

Children need adequate caloric intake for growth, and it is important not to impose very restrictive diets. However, exceeding caloric requirements on a regular basis can lead to childhood obesity, which has become a major problem in North America. Nearly one of three US children and adolescents are overweight or obese. Let’s Move. “Learn the Facts.” Accessed March 5, 2012. [http://www.letsmove.gov/learn-facts/...ldhood-obesity](http://www.letsmove.gov/learn-facts/...ldhood-obesity). In Canada, approximately 26 percent of children and adolescents are overweight or obese. Childhood Obesity Foundation. “Statistics.” Accessed March 5, 2012. [http://www.childhoodobesityfoundation.ca/statistics](http://www.childhoodobesityfoundation.ca/statistics).

There are a number of reasons behind the problem of childhood obesity, including:

- larger portion sizes
- limited access to nutrient-rich foods
- increased access to fast foods and vending machines
• lack of breastfeeding support
• declining physical education programs in schools
• insufficient physical activity and a sedentary lifestyle
• media messages encouraging the consumption of unhealthy foods

Children who suffer from obesity are more likely to become overweight or obese adults. Obesity has a profound effect on self-esteem, energy, and activity level. Even more importantly, it is a major risk factor for a number of diseases later in life, including cardiovascular disease, Type 2 diabetes, stroke, hypertension, and certain cancers. World Health Organization. “Obesity and Overweight Fact Sheet.” Last revised March 2011. http://www.who.int/mediacentre/factsheets/fs311/en/.

Figure 1\PageIndex{2}): Frequent television, computer, and video game usage leads to a sedentary lifestyle, which, along with poor diet, contributes to childhood obesity. Image used with permission (CC SA-By 2.5; Robert Lawton);

A percentile for body mass index (BMI) specific to age and sex is used to determine if a child is overweight or obese. This is more appropriate than the BMI categories used for adults because the body composition of children varies as they develop, and differs between boys and girls. If a child gains weight inappropriate to growth, parents and caregivers should limit energy-dense, nutrient-poor snack foods. Also, children ages three and older can follow the National Cholesterol Education Program guidelines of no more than 35 percent of calories from fat (10 percent or less from saturated fat), and no more than 300 milligrams of cholesterol per day. In addition, it is extremely beneficial to increase a child’s physical activity and limit sedentary activities, such as watching television, playing video games, or surfing the Internet.
Programs to address childhood obesity can include behavior modification, exercise counseling, psychological support or therapy, family counseling, and family meal-planning advice. For most, the goal is not weight loss, but rather allowing height to catch up with weight as the child continues to grow. Rapid weight loss is not recommended for preteens or younger children due to the risk of deficiencies and stunted growth.

Video \(\PageIndex{1}\): Voice of America: Adolescent Obesity Raises Risk of Severe Obesity in Adulthood. This video provides information about the link between adolescent obesity and adult obesity.
Avoiding Added Sugars

One major contributing factor to childhood obesity is the consumption of added sugars. Added sugars include not only sugar added to food at the table, but also are ingredients in items such as bread, cookies, cakes, pies, jams, and soft drinks. The added sugar in store-bought items may be listed as white sugar, brown sugar, high-fructose corn syrup, honey, malt syrup, maple syrup, molasses, anhydrous dextrose, crystal dextrose, and concentrated fruit juice. (Not included are sugars that occur naturally in foods, such as the lactose in milk or the fructose in fruits.) In addition, sugars are often “hidden” in items added to foods after they’re prepared, such as ketchup, salad dressing, and other condiments. According to the National Center for Health Statistics, young children and adolescents consume an average of 322 calories per day from added sugars, or about 16 percent of daily calories. National Center for Health Statistics. “Consumption of Added Sugar among US Children and Adolescents, 2005–2008.” NCHS Data Brief, no. 87, (March 2012). http://www.cdc.gov/nchs/data/databriefs/db87.pdf. The primary offenders are processed and packaged foods, along with soda and other beverages. These foods are not only high in sugar, they are also light in terms of nutrients and often take the place of healthier options. Intake of added sugar should be limited to 100–150 calories per day to discourage poor eating habits.

Tools for Change

The 2008 Physical Activity Guidelines for Americans call for sixty minutes of moderate to vigorous physical activity daily for preteens and teens. This includes aerobic activity, along with bone- and muscle-strengthening exercises. US Department of Health and Human Services. “2008 Physical Activity Guidelines for Americans.” Accessed March 5, 2012. http://www.health.gov/paguidelines/pdf/paguide.pdf. However, many young people fall far short of this goal. Preteens must be encouraged to lead more active lifestyles to prevent or treat childhood obesity. In the United States, the Let’s Move! campaign inspires kids to start exercising. This program, launched in 2010 by First Lady Michelle Obama, works to solve the problem of rising obesity rates among children, preteens, and teens. It offers information to parents and educators, works to provide healthier food choices in schools and afterschool programs, and helps children become more active. One way the program promotes physical activity is by encouraging preteens and teens to find something they love to do. When kids find an activity they enjoy, whether riding a bike, playing football, joining a soccer team, or participating in a dance crew, they are more likely to get moving and stay healthy. You can learn more about Let’s Move! and efforts to encourage physical activity among adolescents at this website: http://www.letsmove.gov.

Concluding Comments

During puberty, preteens experience growth spurts, along with the development of primary and secondary sex characteristics. The daily energy requirements for preteens differ according to gender, growth, and activity level. Girls ages nine to thirteen should consume 1,400 to 2,200 calories per day, and boys should consume 1,600 to 2,600 calories per day. Nutritional concerns for older children include malnutrition and obesity. Preteens should be encouraged to develop good habits, including consuming a healthy diet and regularly participating in sports or an exercise program.
Discussion Starter

1. What would you recommend to help families prevent obesity among their children? What tips would you provide? What lifestyle changes might help? Use the dietary guidelines at this website to discuss suggestions.

http://www.choosemyplate.gov/.