



## **Nutrition for Children and Adolescents**

Last Updated : 08 June 2006

### **Introduction**

To develop to their optimal potential, it is vital that children are provided with nutritionally sound diets. Diet and exercise patterns during childhood and adolescence may spell the difference between health and risk of disease in later years. Different stages of the life cycle dictate differing nutrient needs.

### **What are the most important nutrituonal considerations in the first year of life?**

In the first 12 months of life a baby will triple its weight and increase its length by 50 per cent. These gains in weight and height are the primary indices of nutritional status and their accurate measure at regular intervals are compared with standard growth charts. These measurements are important tools for monitoring a child's progress particularly during the first 6 to 12 months of life.

Breast-feeding on demand remains the ideal form of feeding for healthy babies who are born at term. Human milk provides optimum nutrition for growth and development. The first 4-6 months are a period of very rapid growth, particularly for the brain, and the amino acid and fatty acid composition of breast milk is ideally suited to meet those needs. Breast milk also contains anti-bacterial and anti-infection agents, including immunoglobulins, which have an important role to play in boosting immune function. The colostrum, which is the fluid produced by the mammary gland during the first few days after birth, is rich in protein and has high levels of minerals and vitamins. Colostrum also contains antibodies, anti-infection agents, anti-inflammatory factors, growth factors, enzymes and hormones, which are beneficial for growth and development.

Breast-feeding is strongly advocated for physiological, psychological and emotional reasons. There is no reason why breast-feeding should not continue for as long as it is nutritionally satisfactory for mother

and child up to 2 years. However, with changing lifestyles and the availability of commercially prepared formulae, prepared formulae are generally safe provided that an approved infant formula is used under strict hygiene conditions. The infant formulae attempt to mimic as far as possible the composition of human milk and their use must comply with guidelines laid down by the European Union and the World Health Organization. Formula-fed infants also need to be demand fed and the formulae must be made up exactly according to the manufacturer's instructions for optimal growth. Special attention has to be taken to sterilise all the feeding equipment to reduce the potential risk of contamination, because formula-fed babies do not have the same degree of immunological protection as breast-fed babies.

## **When should solid foods be introduced?**

Introduction of complementary solid food is usually a gradual process over several weeks or months, starting at about 6 months of age. The exact timing is determined by the individual infant and mother, and reflects the fact that breast milk will suffice in those first months but will no longer be able to provide adequate nutrition by itself as the baby grows. The introduction of complementary foods by about 6 months is important to ensure normal chewing and speech development. The quality, number and variety of solid feeds can be increased gradually at a pace that will be generally dictated by the child. Cereals are generally the first foods that are introduced into the infant's diet (mixed with a little breast milk or formula), with purées of vegetables and fruits and meats to follow. By exclusive breast feeding up to 4 to 6 months of age, the likelihood of allergies is lessened. Foods that are more likely to cause allergic reactions in sensitive children, such as egg whites and fish, are generally introduced after 12 months of age.

With present changes in lifestyle, commercially available baby food plays a growing role in the diet of children and should therefore meet strict standards of quality and safety. The convenience and variety of foods available make them a good option to use to complement home-prepared foods. Commercial baby foods are prepared from fresh fruits, vegetables and meat with no added preservatives and must meet very strict standards.

An important consideration in the first year of life is the amount of iron supplied in the diet and iron deficiency anaemia is routinely screened for during infancy. The use of an iron-fortified formula or cereal, and the provision of iron-rich foods such as pureed meats can help to prevent this.

## **What are the most important nutritional considerations for toddlers (1-3 years of age?)**

During these years, a child begins to take on its own unique personality and to exert its independence by moving around freely and choosing foods to eat. Although the child is still growing, the rate of growth is slower than in the first 12 months of life. At the end of the third year of age, girls and boys will have achieved about 50 per cent of their adult height.

During this period a child becomes able to drink through a straw and eat with a spoon, and frequently they become "fussy" eaters. The provision of a variety of foods will allow the child to choose from a range of foods with differing tastes, textures, and colours to help satisfy their appetite. The most important factor is to meet energy needs with a wide variety of foods.

Food intake will be influenced increasingly by family eating patterns and peers. Early food experiences

may have important effects on food likes and dislikes and eating patterns in later life. Meal times should not be rushed and a relaxed approach to feeding will pave the way for healthy attitudes to food.

## **What are the most important nutritional considerations in school-aged children?**

After 4 years of age, a child's energy needs per kilogram of bodyweight are decreasing but the actual amount of energy (calories) required increases as the child gets older. From 5 years to adolescence, there is a period of slow but steady growth. Dietary intakes of some children may be less than recommended for iron, calcium, vitamins A and D and vitamin C, although in most cases deficiencies are unlikely, as long as the energy and protein intakes are adequate and a variety of foods, including fruit and vegetables, are eaten.

Regular meals and healthy snacks that include carbohydrate-rich foods, fruits and vegetables, dairy products, lean meats, fish, poultry, eggs, legumes and nuts should contribute to proper growth and development without supplying excessive energy to the diet.

Children need to drink plenty of fluids, especially if it is hot or they are physically active. Water is obviously a good source of liquid and supplies fluid without calories. Variety is important in children's diets and other sources of fluid such as milk and milk drinks, fruit juices and soft drinks can also be chosen to provide needed fluids.

## **What are the most important nutritional considerations for adolescents?**

The nutritional requirements of young people are influenced primarily by the spurt of growth that occurs at puberty. The peak of growth is generally between 11 and 15 years for girls and 13 and 16 years for boys. The nutrient needs of individual teenagers differ greatly, and food intake can vary enormously from day to day, so that those with deficient or excessive intakes on one day may well compensate on the next. In this period of life, several nutrients are at greater deficiency risk including iron and calcium.

### **Iron**

Among adolescents, iron-deficiency anaemia is one of the most common diet-related deficiency diseases. Adolescents are particularly susceptible to iron deficiency anaemia in view of their increased blood volume and muscle mass during growth and development. This raises the need of iron for building up haemoglobin, the red pigment in blood that carries oxygen, and for the related protein myoglobin, in muscle. The increase in lean body mass (LBM), composed mainly of muscle, is more important in adolescent boys than in girls. In preadolescent years, LBM is about the same for both sexes. Once adolescence starts, however, the boy undergoes a more rapid accumulation of LBM for each additional kilogram of body weight gained during growth, ending up with a final LBM maximum value double that of the girl. Other factors contributing to elevated iron needs are increased body weight and the beginning of menstruation for girls. All these factors should be taken into account when assessing iron needs in this group of age.

One of the most important diet considerations during adolescence is an increase in the intake of iron-rich foods such as lean meats and fish as well as beans, dark green vegetables, nuts and iron-fortified cereals and other grains. Iron from animal foods (known as haem iron) is much better absorbed than iron from non-animal sources (non-haem iron). Adolescents following vegetarian diets are therefore at an increased risk of iron-deficiency. However, vitamin C (e.g. from citrus fruits) and animal proteins (meat & fish) assist in the absorption of non-haem iron.

## **Calcium**

The skeleton accounts for at least 99% of the body stores of calcium and the gain in skeletal weight is most rapid during the adolescent growth spurt. About 45% of the adult skeletal mass is formed during adolescence, although its growth continues well beyond the adolescent period and into the third decade. All the calcium for the growth of the skeleton must be derived from the diet. The largest gains are made in early adolescence, between about 10-14 years in girls and 12-16 years in boys.

During peak adolescent growth, calcium retention is, on average, about 200mg/day in girls and 300 mg/day in boys. The efficiency of calcium absorption is only around 30% so it is important that the diet supplies an adequate calcium intake to help build the densest bones possible. The achievement of peak bone mass during childhood and adolescence is crucial to reduce the risk of osteoporosis in later years. By eating several servings of dairy products, such as milk, yoghurt and cheese, the recommended calcium intake can be achieved.

As well as a good dietary supply of calcium, other vitamins or minerals, like vitamin D and phosphorous, are needed for building up bones. Physical activity is also essential, particularly weight-bearing exercise, which provides the stimulus to build and retain bone in the body. Activities such as cycling, gymnastics, skating, ball games, dancing and supervised weight training for at least 30-60 minutes a day, three to five times a week can help build bone mass and density. Making the right dietary and lifestyle choices early in life will help young people develop health-promoting behaviours that they can follow throughout life.

## **Food habits: why are regular eating patterns and snacks important?**

Dietary habits, which affect food preferences, energy consumption and nutrient intakes, are generally developed in early childhood and particularly during adolescence. The home and school environments play a major role in determining a child's attitude to, and consumption of individual foods.

Teenagers, as well as being exposed to periodic food fads and slimming trends, tend to skip meals and develop irregular eating habits. One of the most frequently missed meals is breakfast. Studies show that breakfast plays an important role in providing needed energy and nutrients after an overnight fast and can aid in concentration and performance at school.

Snacks generally form an integral part of meal patterns for both children and teenagers. Younger children cannot eat large quantities at one sitting and often get hungry long before the next regular mealtime. Mid-morning and mid-afternoon snacks can help to meet energy needs throughout the day. Fast-growing and active teenagers often have substantial energy and nutrition needs and the teaching of food and nutrition in the school curricula will enable children to have the knowledge to make

informed choices about the foods in their regular meals and snacks.

## Energy needs

Normally, the energy requirements of adolescents tend to parallel their growth rate, and individuals meet their energy needs by means of their appetite with adequate precision. As a result, the majority of adolescents maintain energy balance, and a varied food intake provides sufficient nutrients to ensure optimal growth and development.

Stress and emotional upsets however can seriously affect the energy balance in adolescents, resulting in the consumption of too little or too much food. Mild or severe infections, nervousness, menstrual, dental or skin problems (acne) can result in alterations of appetite, and those adolescents on marginal diets are the most vulnerable. Emotional stress is often associated with food faddism and slimming trends, both of which can lead to eating disorders such as anorexia nervosa.

On the other hand, the prevalence of overweight and obesity in children and adolescents is now a major nutritional problem and the condition is likely to persist into adulthood. Developing adolescents are particularly concerned about their body image and excessive weight can have profound effects on their emotional well being as well as on their physical health. The cause of obesity is multifactorial and socio-economic, biochemical, genetic, and psychological factors all closely interact.

Lack of activity plays an important role in the development, progression and perpetuation of obesity in adolescence. Surveys of young people have found that the majority is largely inactive and health professionals and governments are now encouraging higher levels of physical activity among children and adolescents. Physical inactivity does not only have a prime role in the development of overweight and obesity, but also on the development of chronic diseases such as heart disease, certain cancers, diabetes, hypertension, bowel problems and osteoporosis in later life. In addition, physical activity is related to improvements in body flexibility, balance, agility and co-ordination and strengthening of bones. The current recommendation is for children to try to be physically active for at least 60 minutes daily. To know more about physical activity, [click here](#).

## Bibliography

Calvo, E. B.; Galindo, A. C.; Aspres, N. B. (1992). Iron status in exclusively breast-fed infants. *Pediatrics*, 90(3):375-379.

- Department of Health and Social Security (1988). Present day practice in infant feeding: 3rd Report. Report on Health and Social Subjects 32. HMSO, London.
- EEC Commission Directive on infant's formulae and follow-on formulae (1991). Official J. European Communities No. L175/35-49.
- Freedman, D. S.; Dietz, W. H.; Srinivasan, S. R.; Berenson, G. S. (1999). The relation of overweight to cardiovascular risk factors among children and adolescents to cardiovascular risk factors among children and adolescents: the Bogalusa Heart Study. *Pediatrics*, 103:1175-1182.

- Gregory, J.; Lowe, S.; Bates, C. J.; Prentice, A.; Jackson, L.V.; Smithers, G.; Wenlock, R.; Farron, M., (2000). National Diet and Nutrition Survey: young people aged 4-18 years, vol. 1. Report of the Diet and Nutrition Survey, TSO, London.
- International Life Sciences Institute (2000). Overweight and Obesity in European Children and Adolescents. Causes and consequences- prevention and treatment. pp. 1-22. ILSI Europe, Brussels, Belgium.
- James, J. (1991). Iron deficiency in toddlers. Maternal and Child Health, 16:309-315.
- Stordy, B. J.; Redfern, A. M.; Morgan, J. B. (1995). Healthy eating for infants-mothers' actions. Acta Paed, 84:733-741.
- Walter, T., Dallman, P.R., Pizarro, F., Velozo, L., Pena, G., Bartholmey, S.J., Hertrampf, E., Olivares, M., Letelier, A., Arredondo, M., (1993). Effectiveness of iron-fortified infant cereal in the prevention of iron deficiency anaemia. Pediatrics, 91(5):976-982.
- Wardley, B. L.; Puntis, J. W. L.; Taitz, L. S. (1997). Handbook of Child Nutrition. 2nd Edition. Oxford University Press, Oxford.
- Weaver, C. M. (2000). The growing years and prevention of osteoporosis in later life. Proceedings of the Nutrition Society, 59:303-306.
- World Health Organization (1990). Prevention in childhood and youth of adult cardiovascular disease: time for action. WHO, Geneva.

## **Annex**

### [10 healthy lifestyle tips for kids](#)

## **1. Enjoy your food**

Try to eat lots of different foods every day for variety and enjoyment. Share foods with family and friends.

## **2. Breakfast is a very important meal**

Your body needs energy after a long sleep so breakfast is important. Foods that are high in carbohydrates, such as bread, cereals and fruit, make good breakfast choices. Skipping meals, especially breakfast, can lead to out-of-control hunger, often resulting in helpless overeating. Skipping breakfast can also cause you to lack concentration for schoolwork.

### **3. Eat lots of different foods**

A variety of different foods every day is the recipe for good health. You need 40 different vitamins and minerals for good health and no one food can supply all of them. There are no "good" or "bad" foods so you don't need to miss out on foods you enjoy. Just make sure you get the right balance by eating a wide variety of foods. Balance your choices over time!

### **4. Base your food choices on carbohydrates**

These foods provide needed energy, vitamins and minerals. Foods that are high in carbohydrates include pasta, breads, cereals, fruits and vegetables. Try to include some of these foods at every meal as around half of the calories in your diet should come from them.

### **5. Eat fruits and vegetables at each meal**

You can enjoy fruits and vegetables at meals and as tasty snacks. These foods provide vitamins, minerals and fibre. You should aim to get at least 5 servings of fruits and vegetables a day.

### **6. Fat facts**

Everyone needs some fat in the diet for good health. However, too much fat, especially saturated fat, can be bad for our health. Saturated fat is found in full fat dairy foods, pies, pastries, fatty meats and sausages. Balance your food choices-if you eat a high-fat meal at lunch, try to choose low-fat foods for dinner.

### **7. Snack choices**

Snacks help to provide energy and nutrients. Choose from a variety of snacks such as fruits, dairy, biscuits, cakes, crisps, nuts and chocolate. Make sure to vary your choices to keep the balance in your diet and don't snack but have proper meals.

### **8. Quench your thirst**

You need to drink plenty of liquids because half of your body is made up of water. At least 6 glasses of fluid a day are needed, more if it is very hot or you are exercising. Water and milk are great but variety is fun too.

### **9. Care for your teeth**

Care for your teeth by brushing them at least twice a day. Foods high in starch or sugars can play a role in tooth decay if they are eaten too frequently throughout the day so don't nibble or sip drinks all day.

### **10. Get moving**

Being fit is important for healthy hearts and strong bones so get active. Try to do something every day and make sure it's something you enjoy so you stick with it. Too many calories and not enough activity

can result in weight gain. Moderate physical activity helps burn off those extra calories. You don't have to be an athlete to get on the move!