Nutrition, health and schoolchildren
Bone health

Bone development

Childhood and adolescence are the most important stages of life for bone development. Building strong bones during childhood and adolescence is really important for the maintenance of bone health throughout life, to help avoid skeletal problems such as:

- Rickets (soft bones which can lead to bone deformities in children)
- Osteomalacia (soft bones which can lead to bone pain in adults)
- Osteoporosis (fragile bone disease that can lead to painful and sometimes disabling fractures in later life)

During childhood and young adulthood, bones keep getting denser until they reach what is known as ‘peak bone mass’. This normally happens between the ages 18 and 25 years. As we get older we start to lose bone mass. Therefore, if we ‘bank’ plenty of bone mass during childhood and early adulthood, our bones will be in a better position to withstand the loss of bone mass as we get older. Beside genetic factors that influence peak bone mass, nutrition and physical activity also play an important role in bone development and health.

Diet and bone development

Calcium is essential for normal bone growth in children and adolescents; it is needed to build and maintain strong, healthy bone. Diets containing insufficient amounts may lead to a low bone density, which may affect bone health in later life. During puberty, bones grow quicker than any other time in life. Therefore, total dietary calcium needs are greater. Dietary surveys show that many adolescents (19% of girls and 8% of boys aged 11 to 18 years) may not be getting enough calcium in their diet.

Foods which are a source of calcium include:
- Milk, cheese and yogurts or calcium-fortified dairy-free alternatives
- Calcium-fortified breakfast cereals
- Bread
- Canned sardines
- Green leafy vegetables (such as kale and rocket)
- Dried figs
- Sesame seeds

Vitamin D is required to help your body absorb important minerals for bone health (calcium and phosphorus) and to maintain a normal blood concentration of these minerals that are in turn needed for the normal mineralisation of bone. Research suggests that, on average, around one in five schoolchildren don’t get enough vitamin D. Most people should be able to get all the vitamin D they need by eating a healthy balanced diet and by getting some summer sun.

Food sources of vitamin D are fairly limited, but include:
- Oily fish – such as salmon, sardines and mackerel
- Eggs
- Vitamin D-fortified fat spreads
- Vitamin D-fortified breakfast cereals

We get most of our vitamin D from the exposure of our skin to sunlight, the amount produced being influenced by the season, time of day, pigmentation of our skin and extent of clothing. Short daily periods (about 10 to 15 minutes) of sun exposure without sunscreen during the summer months (April to October, particularly between 11am and 3pm) is enough for most lighter-skinned children to make enough vitamin D, and is less than the time it takes to start going red or burn. Children with darker skin (e.g. African, African-Caribbean or South Asian origin), will need to spend longer in the sun to produce the same amount of vitamin D. It’s important never to let your child’s skin go red or start to burn. The larger the area of skin that is exposed to sunlight, the more vitamin D you will make. Some groups of people living in the UK are more at risk of vitamin D deficiency including children aged between 6 months and 5 years and people who cover up their skin for cultural reasons. Daily vitamin D supplements can reduce the risk of vitamin D deficiency in these population groups.

Most of us (including many children) are not eating the recommended 5-a-day fruit and vegetables and a high intake of fruit and vegetables has been associated with good bone health.

Limited research has suggested some soft drinks, particularly carbonated drinks with caffeine and/or phosphoric acid, may be associated with poorer bone health. However, there is no clear evidence of a detrimental effect. Nevertheless, large quantities of such drinks are not recommended and intake can be reduced by including other drinks in the diet, for example water or low fat milks.

Protein is important for bone health but most of us in the UK are eating sufficient protein and protein-energy malnutrition is rare.

**Physical activity and bone development**

Physical activity is also important for bone development, particularly activities which involve the use of bodyweight working against resistance such as hopping, jumping,
skipping, tennis or gymnastics. Children and adolescents are advised to follow the UK guidelines for physical activity to support good bone health (see factsheet on physical activity).

For teenage girls, the natural production of the female hormone oestrogen, is important for building strong bones. Some teenage girls who train really hard, for example for high level competitive gymnastics or distance running, and aren’t getting enough energy for this from the food they are eating, may produce less oestrogen and have a lower bone mass. Skipped menstrual periods or a delay in getting their first period may be a sign of low oestrogen levels.

**Eating disorders and bone development**

Eating disorders, such as anorexia, most commonly develop in the teenage years. The bones are still growing and strengthening at this time and eating disorders can affect their development. This is particularly the case for teenage girls as low body weight can lower oestrogen levels, which may reduce bone density. Poor nutrition and reduced muscle strength caused by eating disorders can also lower bone density. If you think your child may not be eating enough (e.g. have a restrictive diet or an eating disorder), speak to your GP or contact Beat | The UK's Eating Disorder Charity.

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