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## Rickets

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### Summary

- Rickets is a preventable bone disease that affects infants and young children and causes soft and weakened bones.
  - Rickets is caused by a lack of vitamin D, calcium or phosphorus.
  - Vitamin D deficiency can occur as a result of having dark skin, lack of exposure of the skin to sunlight, nutritional deficiencies and disorders of the liver, kidney or small intestine.
  - Treatment options include improved sunlight exposure, diet, vitamin D and mineral supplements.
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Rickets is a bone disease that affects infants and young children. The child's growing bones fail to develop properly due to a lack of vitamin D. This can result in soft and weakened bones, fractures, bone and muscle pain, and bony deformities. You can help protect your child from the effects of rickets by understanding their risk factors for vitamin D deficiency and taking steps to prevent it.

Children with naturally dark skin or inadequate exposure to sunlight are among those most commonly affected. Having a mother with vitamin D deficiency also increases a child's risk. Other causes may be nutritional deficiencies and disorders of the liver, kidney or small intestine. A similar condition can occur in adults, but this is called osteomalacia.

Although rare, rickets is on the increase among Australian children. Overuse of sun protection, due to increased concerns about skin cancer risks, is thought to be one reason for the increase.

If you think your child has rickets or is at risk of vitamin D deficiency, it is important to consult your family doctor or health care provider. They can help you decide on an appropriate treatment plan for your child.

### Signs and symptoms

Signs and symptoms of rickets can include:

- Painful bones, muscle weakness, cramps and spasms
- Slowed growth and development
- Increased risk of broken bones, including spontaneous breaks that occur by themselves without pressure or trauma
- Dental problems such as teeth failing to form or being slow to emerge, deformed teeth or soft tooth enamel
- Prominent forehead and a large front fontanelle (soft spot) in infants
- Deformities of the skeleton such as bowed legs, kyphosis ('hunch-back'), scoliosis (sideways curves of the spine), outward jutting breastbone or abnormal skull shape.

### A range of causes

Some of the contributing factors and causes of rickets include:

- Not enough exposure of the skin to sunlight
  - Skin colour – the skin pigment in children with naturally dark skin tends to absorb less sunlight than fair skin
  - Lack of vitamin D or calcium in the diet
  - Exclusive breastfeeding (without vitamin D supplements) of infants whose mothers have vitamin D deficiency
  - Disorders of the intestine, liver or kidneys that prevent the body from absorbing vitamin D or converting it into its active form
  - Disorders that reduce digestion or absorption of fats, as vitamin D is a fat-soluble vitamin.
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## **The role of vitamin D**

Our body needs vitamin D to help it absorb calcium and phosphorus. These minerals are essential for the growth and development of strong, healthy bones. Lack of vitamin D reduces the body's ability to control the levels of these vital minerals and increases a child's risk of developing rickets.

About 80 per cent of our vitamin D comes from exposure to the sun. When direct sunlight hits our skin, the ultraviolet radiation converts a skin substance called 7-dehydrocholesterol into vitamin D. There are also very small amounts of vitamin D in some foods. However, food sources alone are usually not enough to maintain the levels of Vitamin D that our body needs.

Once vitamin D is made in the skin or absorbed from food through the intestine, it is changed into its active form – a hormone – by the liver and kidneys. It is then available to help our body build strong bones and teeth, through the process of 'mineralisation'.

## **High-risk groups**

Children who may be at increased risk of rickets due to vitamin D deficiency include children who:

- Are born to women with a vitamin D deficiency
- Cover most of their body for religious or cultural reasons
- Are sick, disabled or unable to spend time outdoors for other reasons
- Never go outside without sunscreen
- Have naturally very dark skin
- Have some medical conditions such as certain bowel diseases
- Are on vegetarian, dairy-free or lactose-free diets.

## **Diagnosis**

Rickets may be diagnosed using a number of tests including:

- Physical examination
- Blood tests
- Long bone x-rays
- Bone scans.

## **Treatment**

Treatment options for rickets include:

- Improved sunlight exposure
- Improved diet that includes adequate intake of calcium and vitamin D
- Oral vitamin D supplements – these may need to be taken for about three months
- Special forms of vitamin D supplements – for people whose bodies can't convert vitamin D into its active form
- Treatment for any underlying disorder
- Surgery to correct bone deformities.

High-dose supplements of vitamin D are available in Australia. These require special prescription by a doctor. The use of this special form of vitamin D supplement may be the most effective option for the treatment of rickets. Your doctor can advise you about this.

## **Long-term outlook**

Bones that are poorly mineralised respond very quickly to dietary supplementation with calcium and vitamin D. Improvements can be seen on x-ray after only a few days of treatment.

If rickets is treated when the child is young, there is every chance that the skeletal deformities will disappear as the child matures. However, the deformities and reduced height will be permanent if the child goes through puberty without treatment.

## Prevention

You can help protect your child from the effects of rickets by understanding their risk factors for vitamin D deficiency and taking steps to prevent it. Suggestions include:

- **Sunlight** – a sensible balance of sun exposure and sun protection can protect against vitamin D deficiency without putting your child at risk of skin cancer. The recommended amount of sunlight each day is a few minutes of sunlight exposure before 10am and after 3pm each day (from September to April) and two to three hours of sunlight exposure over the week (from May to August). Always protect your child's skin from the sun during peak UV times with clothing, shade and/or sunscreen.
- **Diet** – include food rich in vitamin D and calcium in your child's diet. Foods naturally containing vitamin D include oily fish (especially sardines, salmon, herring and mackerel), liver and egg yolks. Foods 'fortified' with vitamin D include some margarines and some milks (including fortified baby formula milk).
- **Supplements** – consult with your child's doctor or health provider about whether your child should be prescribed supplements.

## Be SunSmart

UV radiation levels vary depending on location, time of year, time of day, cloud coverage and the environment. Babies and young children need extra protection due to their sensitive skin. Australia's high UV radiation levels mean that most children get more than enough Vitamin D, even when outdoors for very short periods with small amounts of skin exposed.

People with very dark skin may need three to four times longer in the sun than people with fair skin. This is because the pigments in dark skin slow down the chemical reaction that leads to the production of vitamin D.

Children who are outdoors for prolonged periods of time, have very fair skin or have a family history of skin cancer may need to use sunscreen outside the recommended hours. Talk to your doctor for further information.

## Where to get help

- Your doctor
- Maternal and child health nurse
- Paediatrician
- Endocrinologist
- Dietitians Association of Australia Tel. 1800 812 942

## Things to remember

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