

# Vitamin D deficiency in children



Vitamin D is a vital metabolically active compound that is either synthesised by the body using UVB light or absorbed via the digestive system from certain foods. The role of vitamin D is to facilitate calcium absorption from the gut and maintain calcium homeostasis. Deficiency of vitamin D is implicated in a great number of orthopaedic conditions, including SUFE, Perthes, osteomalacia and fragility fractures.

Age	Recommended daily allowance (RDA)
0-1 year	400 IU (10µg)
1-40 years	600 IU (15µg)

Vitamin D deficiency is very common in the UK due to diet, lifestyle, weather and our northern latitude. It is estimated that 16% of children in the UK will be deficient in vitamin D leading to myriad signs and symptoms.

Typical presentations include:

- Pain: especially lower limb long bone pain that might wake the child up from sleep at night
- Deformity: genu valgum, genu varum or growth retardation
- Development: delay in walking
- Muscle: aches and pains or weakness
- Calcium imbalance: tetany, cardiomyopathy, seizures

## Sunshine requirements:

UVB is required to synthesise vitamin D. This is unfortunately blocked by glass or sun cream thicker than factor 8. However, most people fail to apply sun cream effectively and only 5-30 minutes of direct sun exposure, twice a week, is required for vitamin D synthesis



Figure 1 Image of femur from patient with childhood rickets (top) and normal femur (bottom) from National Museum of Health and Medicine. Reproduced with Creative Commons licence



The reference range for vitamin D has changed recently to be in line with international guidelines. The local recommendation is for children to have a serum vitamin D of more than 50nmoll<sup>-1</sup>. If the vitamin D level is found to be less than this then the treatment regime is to give high dose vitamin D for six to eight weeks followed by maintenance supplementation.

This is detailed in the table below:

**Food high in vitamin D**

Less than 10% of vitamin D is acquired from diet, but foods high in vitamin D include:

- Tuna (85g = 154IU)
- Liver or beef (85g = 42 IU)
- 1 large egg (41 IU, from Yolk)
- Fortified breakfast cereal (330g = 40 IU)

Nottingham Children's Hospital reference ranges	
<b>Normal</b>	>50nmoll <sup>-1</sup>
<b>Insufficiency</b>	30-50 nmoll <sup>-1</sup>
<b>Deficiency</b>	<30nmoll <sup>-1</sup>

Nottingham Children's Hospital vitamin D treatment protocol (Cholcalciferol (D3) or Ergocalciferol (D2))	
<b>Age</b>	Initial treatment (6-8 weeks)
<b>&lt;1 month</b>	1500 IU daily
<b>1-6 months</b>	3000 IU daily
<b>6 months – 12 years</b>	6000 IU daily
<b>&gt;12 years</b>	10,000 IU daily
<b>Followed by maintenance of 400 IU daily</b>	

We ask that you check the vitamin D level in any child with unusual limb or back pains without an obvious deformity. We would request that any level less than 50nmoll is treated as per this protocol and rechecked. If the symptoms still persist then please re-refer. If there is an obvious significant deformity then the level should be checked but should not delay referral.

### References

- National institute of health (USA) Vitamin D for professionals fact sheet: <https://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/> (NB Milk is not routinely fortified in the UK)
- RNOH Vitamin D factsheet: <https://www.rnoh.nhs.uk/clinical-services/paediatric-adolescents/vitamin-d-children>