

Vitamin D Dosage Guide for Children and Young People

What is Vitamin D?

Vitamin D is essential for healthy bones, and to control the amount of calcium in our blood. It is important at every stage of life, but especially for rapidly growing infants and teenagers and for pregnant and breastfeeding women.

What is the natural source of Vitamin D?



Most people get little Vitamin D in their diet. Only a few natural

foods such as oily fish and eggs (20 – 40 units per egg) contain significant amounts of Vitamin D. A few foods are fortified with small amounts of Vitamin D (e.g. some yoghurts and breakfast cereals). All formula milks are fortified, but plain cow's milk is not fortified in the UK. Breast milk generally contains little Vitamin D. Sunshine is the main source of Vitamin D. However, Vitamin D can only be made in our skin by exposure to sunlight when the sun is high in the sky. Therefore in most of the UK from November to March, and in Scotland from October to April, Vitamin D cannot be made from sunshine.

Standard Vitamin D supplement dose for healthy term babies, children and teenagers

A daily dose of 400 units Vitamin D is safe for all age groups, and is consistent with the recommendations of the UK Scientific Advisory Committee on Nutrition (SACN) (1), the National Osteoporosis Society (2) the British Paediatric and Adolescent Bone Group (BPABG) (3) and a Global consensus statement based on a recent literature review (4).

1. SACN Vitamin D and Health report
2. Vitamin D and Bone Health
3. British Paediatric and Adolescent Bone Group's position statement on vitamin D deficiency
4. Global Consensus Recommendations on Prevention and Management of Nutritional Rickets

Pregnant and breastfeeding mothers should take 400 units daily. If a breastfeeding mother was not taking these supplements or is known to be deficient herself, her baby should start Vitamin D supplements soon after birth. A healthy term baby born to a mother who is taking appropriate supplements can wait until a month of age before starting supplements. The recommended dose for babies is 300 – 400 units daily.

Note: A dose of 10 micrograms of Vitamin D is 400 units.

Some “over the counter” vitamins for children and young people

Category

Dose and frequency

Examples of preparations

Newborn up to one month

300 - 400 units daily

Abidec, Dalivit, Baby Ddrops NHS ‘Healthy Start’ Vitamins

1 month – 18 years

400 units - 1,000 units daily

Abidec, Dalivit, Boots Vitamin D, Ddrops, Holland & Barrett SunviteD3, DLux oral spray, SunVitD3 and Vitabiotics tablets

Disclaimer: The RCPCH does not endorse any particular commercial product; those listed are examples of products in usage in the UK. Check your local Trust guidelines for specific recommendations.

Different forms of Vitamin D

There are two types of Vitamin D: Ergocalciferol (Vitamin D2) and Colecalciferol (Vitamin D3). For daily treatment, both D2 and D3 are equally effective (consensus statement 4). Vitamin D2 is a plant product and Vitamin D3 is obtained from fish or mammals. Nevertheless, many sources of Vitamin D3 are acceptable to vegetarians and those adhering to a Halal or Kosher diet as the main commercial source is lanolin. Lanolin is the oil of sheep's wool and most religious authorities do not class it as a meat product.

Whether ingested orally or made in the skin under the action of Ultraviolet light, Vitamin D is converted to 25(OH)Vitamin D in the liver. This is then converted in the kidney and other body tissues to 1,25-(OH)2VitaminD, which is also known as Calcitriol and is the form with metabolic effects. “Activated Vitamin D” preparations such as Calcitriol or Alfacalcidol SHOULD NOT BE USED for the treatment of simple Vitamin D deficiency. They should only be used for the treatment of complex cases by specialists. They are ineffective in treating simple Vitamin D deficiency and can cause severe adverse effects, particularly hypercalcaemia. Simple Vitamin D is safe and is the treatment for D deficiency.

Medical assessment of an individual child's Vitamin D requirement

A dose of 400 units daily is appropriate for most children. Most children do not need a medical assessment or a blood test. Advice should be given that all children require Vitamin D from sun, diet or supplement. If a child has risk factors for deficiency or symptoms suggesting rickets or other rare deficiency syndromes then a medical assessment is required.

Assessing a child

Characteristics

Management

No risk factors

No investigations: *Lifestyle advice and prevention dosage (400 units daily)

Risk factors (e.g. dark skin or sun avoidance, history or family history of previous deficiency, low calcium diet)

*Lifestyle advice and prevention dosage (400 units daily)

Risk factors AND symptoms or signs

Blood tests and/or xray, treatment doses (see below)

* Lifestyle Advice: Vitamin D and the Sun Consensus statement 2010

This represents the unified views of the British Association of Dermatologists, Cancer Research UK, Diabetes UK, the Multiple Sclerosis Society, the National Heart Forum, the National Osteoporosis Society and the Primary Care Dermatology Society:

Vitamin D is essential for good bone health and for most people sunlight is the most important source of vitamin D. The time required to make sufficient vitamin D varies according to a number of environmental, physical and personal factors, but is typically short and less than the amount of time needed for skin to redden and burn. Enjoying the sun safely, while taking care not to burn, can help to provide the benefits of vitamin D without unduly raising the risk of skin cancer. Vitamin D supplements and specific foods can help to maintain sufficient levels of vitamin D, particularly in people at risk of deficiency.

Blood tests

Blood levels of Vitamin D do not need to be measured routinely. The recommended dosage (400 units daily) is safe and should be given to all children. The only children requiring blood levels are those with rare disorders such as rickets or unexplained symptoms including seizures and cardiomyopathy in infants, and poor growth in children and muscle weakness at any age.

If a blood test is required 25hydroxyVitaminD should be measured as it is the only reliable marker of body stores. The blood test requires about 2ml of serum and costs approximately £20. Basic bone biochemistry (calcium, phosphate and alkaline phosphatase) is often normal despite significant Vitamin D deficiency. High alkaline phosphatase implies rickets. The units for 25hydroxyVitaminD are nmol/L in the UK, but ng/ml in the USA. 50nmol/L = 20ng/ml.

A blood level of 25hydroxyVitaminD below 25nmol/L is called deficient. A blood level above 50 nmol/L is generally regarded as sufficient, although some laboratories give reference ranges up to 75 or 80. In practice symptoms of Vitamin D deficiency in individuals with blood levels more than 50nmol/L are rare, so 50 nmol/L is becoming widely accepted as the appropriate blood level to aim for.

In the few children that require a blood test, it can be helpful to measure Parathyroid hormone (PTH) on the same blood specimen. PTH is produced in the neck glands when the parathyroid calcium-sensing receptors detect a low level of blood calcium. Therefore PTH levels are a helpful measure of calcium and Vitamin D status. A high level of PTH in children is usually due to Vitamin D deficiency or a lack of calcium in the diet. Other causes (e.g. parathyroid tumours or renal failure) are rare.



Calcium

Although sunshine is the usual source of Vitamin D, diet is the source of calcium. It is particularly important to prevent Vitamin D deficiency in children with limited calcium intake. Children with allergies or fussy diets and especially young people with autism are at risk of rickets due to calcium / Vitamin D deficiency.

Treatment of deficiency with symptoms

Children with rickets, hypocalcaemia or other significant symptoms due to Vitamin D deficiency, and children with blood levels below 25 nmol/L should be prescribed treatment doses of Vitamin D before starting long-term supplements.

Treatment Dose

Category

Vitamin D dose and frequency

Duration

Up to 1 year

1,000 units - 3,000 units Daily

4 – 8 weeks

1 year - 12 years

3,000 units - 6,000 units Daily

4 – 8 weeks

12 - 18 years

6,000 units - 10,000 units Daily

4 – 8 weeks

The same effect may be achieved by multiplying the dose by 7 and giving it weekly. In older children, especially if compliance is a concern, a single dose can be used (multiply daily dose by 30). It is essential to check the child has a sufficient dietary calcium intake, and that a maintenance Vitamin D dose follows the treatment dose (see Standard Vitamin D supplement dose above) and is continued long-term.

Follow-Up: Some recommend a clinical review a month after treatment starts, asking to see all vitamin and drug bottles. A blood test can be repeated then if it is not clear that sufficient vitamin has been taken.

Vitamin D is prescribable as Colecalciferol Liquid 3,000 units/ml. Tablets or capsules of 400, 1,000, 10,000, 20,000 units are also prescribable (e.g. Fultium, InvitaD3). Combined “Calcium and Vitamin D” tablets are available but unless the patient has insufficient calcium intake it is often better, and cheaper, to prescribe a pure Vitamin D product.

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After treatment, children who were deficient or insufficient should continue long-term supplements at least until completion of growth, unless lifestyle changes to provide a reliable intake from diet and sun exposure.

Treatment of relatives

If a patient is diagnosed with Vitamin D deficiency the family should be screened or treated. As a minimum, screening should take place by taking a history, and prevention advice given. Investigation of other family members by blood testing is seldom indicated.

Overdose of Vitamin D

Adverse effects of Vitamin D overdose are rare but care should be taken with multivitamin preparations as Vitamin A toxicity is a concern. Multivitamin preparations often contain a surprisingly low dose of Vitamin D.

Vitamin D toxicity is exceedingly rare below serum concentrations of 375nmol/L. Massive overdose causes hypercalcaemia but there is no agreement on the threshold concentration or amount of Vitamin D that results in toxicity. In adults, prolonged daily intake of Vitamin D up to 10,000 IU or serum concentrations of 25(OH)D of up to 240 nmol/L appear to be safe. SACN has accepted the European Food Safety Authority recommendations of a safe upper limit of 1,000 units/day for infants up to 1 year of age, 2,000 units/day for children aged 1-10 years and 4,000 units/day for those older than 10.

EFSA : [Scientific Opinion on the Tolerable Upper Intake Level of vitamin D](#)

SACN: SACN Vitamin D and Health report

However, long-term ingestion of high dose supplements may have risks such as kidney stones. Caution is required in any child or young person with a granulomatous disease (e.g. tuberculosis or sarcoidosis).

Vitamin D and Bone Health

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