Vitamin D: UK sunlight is not enough for toddlers – the role for GPs in preventing deficiency

**Abstract**
Sunshine exposure and diet alone do not provide adequate vitamin D for vulnerable groups in the UK. To prevent deficiency and the health consequences, GPs should be advising appropriate supplements for all infants, toddlers and pregnant and breastfeeding women. GP practices could distribute the low cost Healthy Start supplements to all their clients.

**Keywords**
vitamin D, deficiency, infants, toddlers, supplementation

**Vitamin D Deficiency is re-emerging in UK Infants and Toddlers**

Vitamin D deficiency in toddlers and infants is preventable but in the absence of appropriate advice from healthcare professionals it is re-emerging in the UK, particularly in young children with pigmented skins in inner city areas.

Vitamin D deficiency decreased after the Second World War when cod liver oil (rich in vitamin D) was given free to all mothers and young children. However in the last few decades, when low cost vitamin D supplements have not been available to recommend to families not in receipt of benefits, rickets and cases of hypocalcaemic seizures in infants and toddlers, caused by vitamin D deficiency, have increased.1

Most pregnant women are unaware that they should take a vitamin D supplement for their health and that of their baby. If a supplement is not taken during pregnancy the infant is more likely to be born deficient of vitamin D, which is probably the main cause of clinical problems in infants and toddlers.

**What is Vitamin D?**

Vitamin D is sometimes called the ‘sunshine vitamin’. It is found in very few foods and the main source in the UK is cutaneous synthesis in the presence of sunlight when outside. The ultraviolet rays of wave length 290-315nm convert...
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7-dehydrocholesterol in the skin to pre-vitamin D$_3$. These rays do not pass through glass.

The two main forms of vitamin D are:

- vitamin D$_3$ (cholecalciferol) produced by cutaneous synthesis and provided by the diet and some vitamin supplements
- vitamin D$_2$ (ergocalciferol) provided by some supplements and found in very small amounts in mushrooms.

Both forms of vitamin D are metabolized in the liver to 25-hydroxyvitamin D which is a stable metabolite that is then converted in the kidney to, the active form of the vitamin. Research indicates that 1,25-di-hydroxyvitamin D$_3$ is more active than the D$_2$ form.

Vitamin D is a fat-soluble vitamin and is stored in adipose tissue when cutaneous synthesis and dietary intakes exceed daily requirements. Stores are used during the winter months when the critical wavelength in sunlight is insufficient for cutaneous synthesis.

Vitamin D excess as a result of excessive sunshine exposure does not occur because under these conditions previtamin D is degraded into inactive photoproducts.

Functions

The most commonly described function of vitamin D is regulating calcium and phosphorus homeostasis. Vitamin D controls intestinal absorption of calcium and phosphorus and regulates the deposition and reabsorption of calcium, in and out of bony tissues, to maintain blood calcium levels within a normal range.

Vitamin D also has a role in immune function, growth and defence against infections.

Vitamin D Deficiency:

Blood serum or plasma is used to measure vitamin D levels. Considerable debate continues regarding cut offs for vitamin D sufficiency and insufficiency. Some experts propose sufficiency as >50nmol/L of 25-hydroxy vitamin D$_3$ in the serum or plasma, while others consider 75-125nmol/L may better reflect vitamin D sufficiency. In the UK very low vitamin D status is currently defined as less than 25nmol/L (Table 1). Below this concentration there is a risk of rickets in children and osteomalacia in adults.

Clinical manifestations of extremely low levels of vitamin D are:

- hypocalcaemic seizures in infants
- rickets – soft, poorly formed and misshapen bones seen in growing children
- muscle pain and weakness leading to delayed development and growth
- cardiomyopathy
- Osteomalacia in adults.

There are also associations between low vitamin D levels and higher rates of cardiovascular disease, inflammatory and autoimmune diseases, some cancers and other chronic diseases including:

- type 1 & 2 diabetes
- allergy
- upper respiratory tract infections and wheeze including asthma
- infectious diseases
- multiple sclerosis
- rheumatoid arthritis
- dementia
- cancers
- heart disease.

The risk of severe pre-eclampsia in pregnant women is higher in those with low levels of vitamin D and evidence is emerging of a link between sudden infant death syndrome (SIDS) and low vitamin D levels. However, the role of vitamin in the aetiology of these conditions is controversial and as yet unproven.

Sources of Vitamin D

The principal source of vitamin D is cutaneous synthesis in the presence of sunlight as few foods contain vitamin D.

1. Sunlight

The ideal time to spend outside each day to ensure adequate vitamin D levels is not easy to define as cutaneous synthesis depends on:

- Season – Sunlight of the critical wave length for cutaneous vitamin D synthesis only reaches the UK between April and September. It is absorbed by the atmosphere during winter months
- Latitude – In the south of the UK there is more sunlight of the critical wavelength than the north
- Weather – Less vitamin D is synthesised on cloudy days than on bright sunny days
- Air Pollution – Reduces the critical UV light waves available for skin synthesis
- Time Spent Outside – Light with this wavelength cannot pass through glass so use must be outside in the daylight for cutaneous synthesis to occur
- Time of Day – More vitamin D is synthesised when sunlight is most intense in the middle of the day compared to early morning and late afternoon
- Colour of Skin – Darker skins require more time in the sun to synthesise the same amount of vitamin D as light skins. Children of Asian, African and Middle Eastern ethnic origin are more likely to have lower vitamin D levels than Caucasian children
- Lifestyle – Time spent outside during the summer months, with bare skin exposed facilitates vitamin

| Table 1. Unit conversion factors for concentrations of vitamin D in blood, food and supplements |
|--------------------------------------------------|-----------------|
| Serum and plasma levels of 25-hydroxyvitamin D  | 2.5nmol/L       |
| Food and supplements                              | 1µg             |
|                                                  | 40 International Units (IU) |
Vitamin D synthesis, which is greatly diminished when most skin is covered by clothes, as can be the fashion or in the case in girls and women with certain religious and cultural traditions

- Sunscreen Use – Blocks over 98% cutaneous synthesis of vitamin D.

Advice on the use of sunscreen

Concern over the balance between having sufficient sun exposure to produce vitamin D, and over-exposure leading to burning of the skin and an increased risk of skin cancer, has led to confusion of public health messages. To provide balanced, evidence-based advice, a consensus statement on vitamin D has been produced by several organisations with concerns in this area (CRUK 2010) (Figure 1).

2. Foods (Table 2)

Very few foods naturally contain vitamin D. Oily fish is the most significant source. Eggs and meat provide very small amounts and breast milk provides extremely small amounts, the amount depending on mother’s own vitamin D levels.

3. Fortified foods (Table 2)

Foods in the UK that are fortified with vitamin D include:

- margarine – fortification has been a legal requirement since the Second World War
- a few breakfast cereals
- some brands of yogurts
- formula milks – infant formulas, follow-on formulas and growing up milks
- evaporated milk.

In some countries e.g. Finland, Canada and the USA a wider range of foods are fortified with vitamin D, such as fresh cows’ milk, other dairy products, some breads and some fruit juices.

From the mid 1920s when vitamin D’s anti-rachitic properties were proven, many more foods, including baby foods and fresh milk, were fortified with vitamin D. This eradicated the epidemics of rickets in industrialised cities where pollution and indoor lifestyles limited cutaneous synthesis. However, following reports of hypercalcaemia in infants in the UK in the 1950s European governments banned fortification of foods with vitamin D – Canada and the USA did not follow suit. There is some debate as to whether the infants who became hypercalcaemic had a hypersensitivity to vitamin D that caused the condition.

4. Supplements of Vitamin D

When food fortification was banned in the UK universal supplementation of young children with cod liver oil continued but was later replaced by vitamin drops for children and tablets for women containing vitamins A, C & D. Following reforms of the Welfare Food Scheme, these free supplements were restricted to low income families receiving social benefits but were for sale to others from NHS clinics. During the 1990s several factors caused healthcare professionals to stop recommending the supplements:

- problems with supply
- advice that pregnant women should not take supplements containing vitamin A
- lower incidence of rickets

A sustained campaign is now required to inform healthcare professionals that they should be recommending vitamin D supplements.

<table>
<thead>
<tr>
<th>Table 2. Vitamin D content in UK foods</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food – portion sizes for toddlers</strong></td>
</tr>
<tr>
<td>(Tbs – tablespoons, tsp – teaspoons)</td>
</tr>
<tr>
<td>2-3 Tbs Sardines canned in tomato sauce (45g)</td>
</tr>
<tr>
<td>2-3 Tbs Grilled salmon (45g)</td>
</tr>
<tr>
<td>2-3 Tbs Sardines canned in vegetable oil (45g)</td>
</tr>
<tr>
<td>2-3 Tbs Canned Tuna in oil (45g)</td>
</tr>
<tr>
<td>1 egg (60g)</td>
</tr>
<tr>
<td>2-3 Small thin slices liver (20g)</td>
</tr>
<tr>
<td>½ - 1 slice cooked lamb</td>
</tr>
<tr>
<td>1-2 Small slices chicken (30g)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Fortified foods</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>100 -120mls formula milk for over 1 year</td>
</tr>
<tr>
<td>100 -120mls follow-on formula</td>
</tr>
<tr>
<td>100 -120mls infant formula</td>
</tr>
<tr>
<td>30mls evaporated milk</td>
</tr>
<tr>
<td>3-6 heaped Tbs fortified breakfast cereal (18g)</td>
</tr>
<tr>
<td>1 tsp margarine (5g)</td>
</tr>
</tbody>
</table>

Figure 1. Consensus Vitamin D Position Statement (CRUK 2010)
Supplements of high dose vitamin D for treating deficiency are available on prescription but supplements containing only vitamin D for preventing deficiency are not. Most vitamin supplements for infants, children and pregnant and breastfeeding women sold in the UK include vitamin D along with other vitamins, but the vitamin D content varies. Supplements containing vitamin D alone are available over the counter in some pharmacies and supermarkets (Figure 2 and Table 3).

The Healthy Start supplements are the cheapest supplements and those for women have been reformulated to contain vitamins C, D and folic acid. Primary care, health trusts and health boards have the responsibility to make both of these vitamin products available locally and provide them free to Healthy Start beneficiaries. Sale of them to non-beneficiaries varies from country to country within the UK. In Scotland and Wales, they can be sold at fixed prices but current legislation does not allow this in England. Information for each country is available at: http://www.healthystart.nhs.uk/for-health-professionals/
vitamins/ GP practices could arrange to stock and distribute these supplements.

### Dietary Requirements for Vitamin D

Reference Nutrient Intakes (RNIs) (recommended dietary intakes from the diet and supplements) for vitamin D in the UK were set in 1991 to guarantee sufficiency

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**Figure 2.** Samples of over the counter supplements containing vitamin D

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**Table 3.** Examples of supplements containing vitamin D available over the counter in the UK

<table>
<thead>
<tr>
<th>Age range</th>
<th>Supplement</th>
<th>Vitamin D content/daily dose (µg)</th>
<th>Other nutrients present</th>
<th>Liquid/Tablet</th>
<th>Available on prescription Yes/No</th>
<th>Availability</th>
<th>Cost /2 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants and Toddlers</td>
<td>Healthy Start Children’s vitamin drops</td>
<td>7.5</td>
<td>Vitamins A &amp; C</td>
<td>L</td>
<td>No</td>
<td>NHS Trusts</td>
<td>£1.64 Wales £2.31 Scotland</td>
</tr>
<tr>
<td></td>
<td>Baby D</td>
<td>7</td>
<td>-</td>
<td>L</td>
<td>No</td>
<td>Pharmacies</td>
<td>£5.35</td>
</tr>
<tr>
<td></td>
<td>Abidec</td>
<td>10*</td>
<td>Vitamins A, B, C</td>
<td>L</td>
<td>Yes</td>
<td>Pharmacies and supermarkets</td>
<td>£5.70</td>
</tr>
<tr>
<td></td>
<td>Health Aid Babvits</td>
<td>10</td>
<td>Vitamins A, B, C</td>
<td>L</td>
<td>No</td>
<td>Pharmacies and supermarkets</td>
<td>£10</td>
</tr>
<tr>
<td></td>
<td>Baby D</td>
<td>5</td>
<td>-</td>
<td>L</td>
<td>No</td>
<td>Pharmacies</td>
<td>£6.50</td>
</tr>
<tr>
<td></td>
<td>Boots children’s chewable vitamin D</td>
<td>7.5</td>
<td>-</td>
<td>T</td>
<td>No</td>
<td>Boots stores</td>
<td>£2.60</td>
</tr>
<tr>
<td></td>
<td>Other children’s multivitamins and mineral supplements</td>
<td>7.5 to 10</td>
<td>Multivitamins and minerals</td>
<td>T</td>
<td>No</td>
<td>Pharmacies and supermarkets</td>
<td>£12+</td>
</tr>
<tr>
<td>Pregnant and breastfeeding women</td>
<td>Healthy Start vitamins for women</td>
<td>10</td>
<td>-400µg folic acid and vitamin C</td>
<td>T</td>
<td>No</td>
<td>NHS Trusts</td>
<td>£0.83 Wales £1.14 Scotland</td>
</tr>
<tr>
<td></td>
<td>Boots Vitamin D and Folic acid</td>
<td>10</td>
<td>-400µg folic acid</td>
<td>T</td>
<td>No</td>
<td>Boots stores</td>
<td>£3.80</td>
</tr>
<tr>
<td></td>
<td>Multivitamin and mineral supplements for pregnancy or breastfeeding or preconception</td>
<td>10</td>
<td>Multivitamins and minerals</td>
<td>T</td>
<td>No</td>
<td>Pharmacies and supermarkets</td>
<td>£9+</td>
</tr>
<tr>
<td>Children and Adults</td>
<td>Boots 12.5µg vitamin D</td>
<td>10</td>
<td>-</td>
<td>T</td>
<td>No</td>
<td>Pharmacies and supermarkets</td>
<td>£1.50</td>
</tr>
<tr>
<td></td>
<td>Boots 25µg vitamin D</td>
<td>25</td>
<td>-</td>
<td>T</td>
<td>No</td>
<td>Boots Stores</td>
<td>£3.50</td>
</tr>
<tr>
<td></td>
<td>Multivitamin and mineral supplements</td>
<td>10</td>
<td>Multivitamins and minerals</td>
<td>T</td>
<td>No</td>
<td>Pharmacies and supermarkets</td>
<td>£12+</td>
</tr>
</tbody>
</table>

*Contains ergocalciferol (vitamin D₂) the less active form
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in age groups whose needs may not be met by sunlight alone – that is infants, toddlers, pregnant and breastfeeding mothers, and adults over 64 years of age (Table 4).

Dietary sufficiency is considered vital for:

- infants and toddlers to support their rapid rates of bone growth
- pregnant women to ensure adequate levels of vitamin D for the developing fetus to grow and develop and to lay down stores of vitamin D for the first few months of life
- breastfeeding mothers to support the bone remineralisation that occurs after breastfeeding ceases.

There is currently no RNI for children over three years of age as it was assumed, in 1991 when recommendations were made, that cutaneous synthesis of vitamin D would suffice. This is a subject of debate as low blood levels of vitamin D are found in significant numbers of children and adolescents in the UK. Other countries set dietary recommendations of vitamin D for older children and adults e.g. between 5 and 10µg/day for children in most European countries and 15µg vitamin D for all children in the USA.

The Scientific Advisory Committee on Nutrition (SACN) is currently reviewing the RNIs for vitamin D of the UK population and in late 2013 or 2014 may recommend a RNI for more population groups. This may mean recommended daily supplements for these groups as compulsory food fortification is unlikely to be introduced in the UK as it is in other countries.

**Current UK recommendations on supplementation**

In the UK a balanced diet and sunlight will not necessarily provide vulnerable populations with sufficient amounts of vitamin D to prevent deficiency. National Diet and Nutrition surveys show that few infants, toddlers and children meet their RNI through food alone, and will only attain their RNI when taking adequate vitamin D supplements.

For this reason vitamin D supplements for all children under five and pregnant and breastfeeding women are recommended: the recommendation was recently reinforced in a letter from the Chief Medical Officer to all NHS GPs, midwives and health visitors (Table 5).5

Local variations to these recommendations exist. For example in Birmingham where rising rates of rickets compelled paediatricians to address this problem, Healthy Start supplements have been made available free of charge to all infants from birth, toddlers, pregnant and breastfeeding women. The campaign has been running for several years and disappointingly uptake remains at about 20% of the target population. However, costs for investigating and treating deficiency have reduced significantly. It is important to not overload the individual so tolerable upper levels of Vitamin D are recommended (Table 6).

**Why do critically low levels of vitamin D occur in infants and toddlers?**

Low vitamin D levels in women of child bearing age may be the main risk factor accounting for the rising incidence of vitamin D deficiency in infants and toddlers. A national survey of adults showed that 25% of women of child bearing age have low vitamin D levels2 and this is greater in women with dark pigmented skins; a survey from Wales has reported that about 50% of pregnant women with pigmented skins have low vitamin D levels.4

Infants whose mothers started pregnancy with low vitamin D levels and who did not take the recommended

<p>| Table 4. The UK Reference Nutrients Intake for Vitamin D |</p>
<table>
<thead>
<tr>
<th>Age group</th>
<th>RNI (DH 1991)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age group</td>
</tr>
<tr>
<td>0 - 6 months</td>
<td>8.5</td>
</tr>
<tr>
<td>7 months - 3 years</td>
<td>7</td>
</tr>
<tr>
<td>4 - 64 years</td>
<td>no RNI set</td>
</tr>
<tr>
<td>Pregnant women</td>
<td>10</td>
</tr>
<tr>
<td>Breastfeeding women</td>
<td>10</td>
</tr>
<tr>
<td>65+ years</td>
<td>10</td>
</tr>
</tbody>
</table>

<p>| Table 5. Current recommendations on vitamin D supplementation for mothers and children in the UK5, 6 |</p>
<table>
<thead>
<tr>
<th>Age group</th>
<th>Recommended daily supplement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age group</td>
</tr>
<tr>
<td>Pregnant and breastfeeding women</td>
<td>10</td>
</tr>
<tr>
<td>Breastfed infants from 6 months or from 1 month if the mother’s nutritional status in pregnancy is in doubt</td>
<td>7.5</td>
</tr>
<tr>
<td>Formula-fed infants who are drinking less than 500mls formula milk/day</td>
<td>7.5</td>
</tr>
<tr>
<td>Toddlers 1 - 4 years</td>
<td>7.5</td>
</tr>
<tr>
<td>Preterm infants</td>
<td>A vitamin supplement that includes vitamin D is usually prescribed</td>
</tr>
</tbody>
</table>

| Table 6. Tolerable upper levels of vitamin D |
| Different international bodies have specified different amounts: |
| Tolerable upper level | Age range | Set by |
| Europe | 25µg (1000IU)/day | Infants and children up to 10 years | European Scientific Committee on Food 2002 |
| USA | 50µg (2000IU)/day | Infants | Institute of Medicine USA 2011 |
| | 100µg (4000IU)/day | toddlers and older children | |
vitamin D supplement during pregnancy, are likely to be born with low levels of vitamin D and deficient stores.

Exclusively breastfed infants rely on their stores of vitamin D acquired in utero and on any cutaneous synthesis after birth, because the vitamin D content of breast milk is generally low. It is lower still in the breast milk of mothers who are vitamin D deficient.

Infant formula is fortified with vitamin D but this concentration appears to be inadequate for infants born preterm or with very low stores.

When body stores are low and cutaneous synthesis and dietary sources of vitamin D are limited, vitamin D deficiency is likely to develop in those children with high requirements, such as rapidly growing infants and toddlers.

Supplements of vitamin D would prevent deficiency in these groups but supplement use is extremely limited due to:

- lack of advice from healthcare professionals
- limited distribution points for the Healthy Start supplements which may be in locations that families are unaware of or rarely visit.

**Practice points: GPs’ role in preventing vitamin D deficiency**

Timely advice by GPs and other health professionals to families is critical to preventing vitamin D deficiency and its health consequences.

**1. Advice on vitamin D supplements for mothers, infants and toddlers**

**Mothers and Toddlers**

GPs and other healthcare professionals should recommend a daily supplement containing:

- 10µg (400IU) vitamin D for all pregnant and breastfeeding women
- 7.5µg (300IU) vitamin D for all toddlers.

**Advice for Infants varies:**

- Some NHS trusts advise that all infants should begin a daily supplement of 7.5µg (300IU) vitamin D from birth or within a few weeks. This is safe advice for all infants.
- If the mother has taken vitamin D supplements during pregnancy then her infant may delay taking a supplement until:
  - six months of age if breastfed
  - formula milk consumption has dropped to less than 500ml/day which is often around 11-12 months.

Few infants will be seen regularly around these ages, so advice on vitamin D supplementation needs to be given early and opportunistically.

**2. Distributing Healthy Start vitamin D supplements**

GP practices can stock the Healthy Start supplements for distribution to their clients through an arrangement with their local primary care, health trusts or health boards.

**3. Targeting advice to vulnerable groups**

All families should receive advice about vitamin D, but the populations most at risk of deficiency are:

- Families with darker skins, of Asian, African and Middle Eastern origin
- Infants and toddlers whose mothers:
  - cover up for religious or cultural reasons thereby limiting cutaneous vitamin D synthesis
  - did not take vitamin D supplements during pregnancy and/or while breastfeeding
  - lead mainly indoor lifestyles
- Families living in the northern parts of the UK
- Toddlers who do not have the opportunity to play outside regularly without sunscreen.

**4. Advice on outdoor play and sunscreen use**

Concern about too much sun exposure has resulted in many families with young children using very high factor sun cream throughout the summer months to protect the skin.

It is preferable for parents and carers to get to know how much sun exposure their children’s skin can take without sunscreen before signs of redness appear. For very fair skins this may be a short time in the middle of the day and longer in the morning and late afternoon. Children with pigmented skins are much less likely to burn and these toddlers may not need sunscreen at all in the UK climate.

They are more likely to have lower levels of vitamin D and will benefit from more time outside in the sunlight without sunscreen to make sure they are synthesizing adequate amounts of vitamin D.

**5. Dietary advice**

Including oily fish in meals once or twice each week will increase dietary intake of vitamin D. Oily fish include sardines, pilchards, mackerel, herrings, salmon, trout and fresh tuna. Department of Health advice is to limit oily fish intake to four times per week for boys and twice per week for girls. This is because some oily fish may contain small amounts of toxins that girls can retain into their childbearing years.

**Key points summary**

Vitamin D deficiency is preventable but its incidence and the consequent health problems are rising in the UK.

The main source of vitamin D is cutaneous synthesis which occurs in exposed skin when outside in daylight but only in the summer months April – September in the UK and is blocked by sunscreen.

National diet and nutrition surveys report that low vitamin D levels are found in all age groups in the UK (25% of women of childbearing age) and are more prevalent in those with pigmented skins.

Because cutaneous synthesis, and diet alone do not always protect completely from vitamin D deficiency, the Department of Health and National Institute for Health and Clinical Excellence (NICE) recommend that pregnant women, breastfeeding mothers, and toddlers all take a daily supplement of vitamin D.

These recommendations are not being followed.
Infants and toddlers are at greater risk of vitamin D deficiency if their mother was vitamin D deficient during pregnancy through not taking supplements or low skin exposure to sunlight.

Children with pigmented skins, especially those of Asian, African and Middle Eastern origin, are at greater risk of vitamin D deficiency than white children.

GPs and healthcare professionals should recommend and regularly check that vulnerable groups of their clients are taking appropriate vitamin D supplements.

Vitamin D only supplements for prevention are not available on prescription but a range of over-the-counter supplements are available in pharmacies and chemists.

Vitamin D regulates calcium and phosphorus homeostasis and very low levels of vitamin D in infants and toddlers can lead to:

- hypocalcaemic seizures
- rickets – deformed bones and short stature
- muscle pain and weakness leading to delayed development and growth
- cardiomyopathy.

Vitamin D has a wider role in the body, and deficiency is associated with infectious and autoimmune diseases such as diabetes, allergy and respiratory disease.

Some NHS Trusts in areas with a significant incidence of rickets and hypocalcaemic seizures recommend that all infants begin a daily supplement vitamin D from birth or within a few weeks after birth.

**Declaration of competing interests**

Nothing to declare

**References**


**Further Reading**


**Resources**


(http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_127421.pdf)

Healthy Start Scheme: http://www.healthystart.nhs.uk

www.infantandtoddlerforum.org : Toddler Factsheet 4.7 Preventing Vitamin D Deficiency in Toddlers
Accredited Learning for CPD – go to www.ipcauk.org & follow the links to ‘Clinical Focus’ on the Home page

If you participate in this activity you may place your verifiable performance in your appraisal folder.

You are advised to follow the instructions carefully:
1. CPD activity is only available online.
2. Please complete the CPD activity for the articles PRIOR to reading them.
3. Redo the CPD activity for the articles after reading the issue and assess the gain in your knowledge.
4. The CPD activity related to the articles is classified as verifiable educational activity.
5. On completion of the activity a downloadable certificate can be printed and included in an appraisal folder.

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1. The main source of vitamin D in the UK is............ Select a single option the BEST completes the sentence.
   a. Fresh milk
   b. margarine
   c. Oily fish
   d. Sunshine on exposed skin when inside or outside
   e. Sunshine on exposed skin when outside in the summer months April – October
   f. Sunshine on exposed skin when outside all year round

2. The role of vitamin D is.................... Select the one option that best completes the sentence.
   a. To increase calcium absorption in the gastrointestinal tract
   b. To regulate calcium and phosphorus homeostasis
   c. To maintain good bone health throughout life
   d. As part of the immune system
   e. a, b & c
   f. a, b, c & d

3. National surveys in the UK have identified that vitamin D deficiency is............select the one option that best completes the sentence:
   a. Rare
   b. Seen only in south Asian populations
   c. Seen only in Asian, African and Middle eastern populations
   d. Found in 25% of women of child bearing age in Asian, African and Middle eastern populations
   e. Found in 25% of all women of child bearing age

4. Advising a pregnant mother to eat a healthy balanced diet is good advice........................select the one option that best completes the sentence.
   a. And means she does not require vitamin supplements during pregnancy
   b. But she also requires a folic acid supplement until 12 weeks gestation
   c. But she also requires a folic acid supplement throughout pregnancy
   d. But she also requires a folic acid supplement and a vitamin D supplement until 12 weeks gestation
   e. But she also requires a folic acid supplement and a vitamin D supplement throughout pregnancy
   f. But she also requires a folic acid and vitamin D supplement throughout pregnancy

5. The only reliable source of ensuring an adequate intake of vitamin D for infants is................select the one option that best completes the sentence.
   a. Breast milk
   b. Infant formula milk
   c. A daily dose of a vitamin D supplement containing 5ug
   d. A daily dose of a vitamin D supplement containing 7.5ug

6. If a breastfeeding woman has not taken a vitamin D supplement during pregnancy you would advise her........................select the one option that best completes the sentence:
   a. Not to worry as her breast milk has everything her infant needs for the first six months
   b. To begin taking a vitamin D supplement to increase the level of vitamin D in her breast milk
   c. To give her baby a daily supplement of vitamin D from four weeks of age
   d. To give her baby a daily supplement of vitamin D from four weeks of age and take a supplement herself
   e. To give her baby a daily supplement of vitamin D from six months
   f. To give her baby a daily supplement of vitamin D from six months of age and take a supplement herself
7. The cheapest supplements containing vitamin D are the Healthy Start supplements........select the one option that best completes the sentence:
   a. but their availability is extremely limited
   b. and they are available in wide variety of retail outlets
   c. and they are available for purchase on line from the Healthy Start website www.healthystart.nhs.uk

8. A Somali infant presents with tetany and following investigations hypocalcaemia due to vitamin D deficiency is diagnosed. Select the MOST likely cause(s). Select only ONE option:
   a. Mother’s vitamin D levels were low during pregnancy
   b. Mother did not take vitamin D supplements during pregnancy
   c. Mother did not take vitamin D supplements while breast feeding this infant
   d. Infant has been exclusively breast fed and not given vitamin D supplements
   e. a, b, & d
   f. b, c & d
   g. a, b, c & d

9. A Middle Eastern mother who wears concealing clothing for cultural reasons brings her 16 month old child because she is concerned that he is not yet walking and has repeated infections. What would you advise? Select only one option.
   a. Advise her there is no need to worry
   b. Request a blood test to include the vitamin D level of the child
   c. Request blood tests to include the vitamin D levels of both the child and the mother

10. A Caucasian toddler presents with rickets. The MOST likely cause(s) are which ONE of the following options?
    a. He was breast fed until 12 months of age and then changed to cows’ milk
    b. He spends limited time outside as his abode has no garden and he always travels in a car
    c. Sunscreen is judiciously applied when he does spend time outside in summer months
    d. He has never been given vitamin D supplements
    e. His mother has never taken vitamin D supplements
    f. d & e
    g. a, b, c, d and e