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1 Vitamin D supplementation for women before and during pregnancy: an
2 update of the guidelines, evidence and role of the primary care practitioner

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12

13 **Abstract**

14 Maternal vitamin D deficiency is common, influenced by ethnicity, and can result in low
15 vitamin D levels in the newborn. Universal vitamin D supplementation of 10ug/day is
16 recommended to all pregnant women regardless of risk factors. Testing of vitamin D
17 levels should be reserved for women who have symptoms suggestive of deficiency.
18 Primary care practitioners should encourage women to take vitamin D supplementation
19 throughout pregnancy and signpost eligible, low household income women to the
20 'Healthy Start' scheme. Ineligible women can purchase vitamin D supplements over the
21 counter but there is a need for clarity in the national position of whether or not to
22 prescribe these supplements to pregnant women.

23

24 **Introduction**

25 UK National Institute for Clinical Excellence (NICE) guidance (2014) advises that 10ug
26 vitamin D should be taken by all women throughout pregnancy starting: 'ideally prior to
27 conception.' However the terminology used and practicalities of implementing this
28 advice can be confusing, as can the role of the primary care practitioner regarding the
29 provision of supplementation. This article summarises the evidence and related
30 guidance on managing vitamin D status in pregnant women and provides an update on
31 the ways in which women can obtain the necessary supplements.

32 **Background**

33 Vitamin D is integral to calcium homeostasis and bone health but it also has multiple
34 other sites of action throughout the body, including the pancreas, skin, intestine and
35 immune system. In the UK dietary sources of vitamin D are limited and account for only
36 10-20% of the total body store; natural sources include oily fish, egg yolk and red meat
37 whilst fortified foods include infant and toddler formula milks, some breakfast cereals
38 and margarines. The majority of vitamin D is from skin synthesis following exposure to
39 sunlight, however in the UK the necessary wavelength of ultraviolet radiation is only
40 available between April and mid-October^{1,2}.

41

42 Most laboratories measure serum 25-hydroxyvitamin D as a reflection of current
43 vitamin D stores, which equates to the levels produced cutaneously and through diet.
44 Serum levels of 50nmol/L or higher of 25-hydroxyvitamin D are considered sufficient to
45 maintain adequate bone health in the general population¹. Severe vitamin D deficiency
46 is a serum level of <25nmol/L 25-hydroxyvitamin D, and results from the National Diet
47 and Nutrition Survey suggest that around a fifth of adults in the UK are severely
48 deficient. Risk factors particularly relevant to pregnant women include having darker
49 skin and wearing clothing which covers most of the skin³. Amongst antenatal
50 populations rates of vitamin D deficiency are estimated to range between 13-64%,
51 depending on ethnicity⁴.

52 The Scientific Advisory Committee on Nutrition¹ published a report in 2016 examining
53 the most recent evidence regarding vitamin D and health. They concluded that maternal
54 serum 25(OH)D concentration correlates with that of the neonate, and reflects the
55 provision of a 'store' of vitamin D to supplement the exclusively breast-fed infant, given
56 that breast milk is not a significant source. Therefore mothers with low levels of vitamin
57 D are more likely to have babies who are also deficient. The consequences of this are
58 less clear. Maternal vitamin D supplementation was found to reduce neonatal
59 hypocalcaemia. However research findings examining the associations between
60 maternal vitamin D levels and other conditions hypothesised to correlate, such as
61 gestational diabetes, pre-eclampsia, low birth weight and cognitive developmental

62 issues are inconsistent, with most studies having significant methodological limitations
63 and small sample sizes.

64

65 **Current Guidelines**

66 In light of what is known about the high levels of vitamin D deficiency in pregnant
67 women, and the fact that maternal vitamin D stores reflect those of the neonate, the
68 Department of Health recommends that all pregnant women take a supplement
69 containing 10ug vitamin D *throughout pregnancy*⁵. Whilst the effects of vitamin D
70 deficiency and supplementation during pregnancy is an area which still requires further
71 research, supplements are considered very safe and the recommended daily intake is
72 well below levels which have potential to harm^{1,4}.

73

74 There is no evidence to support routine screening for vitamin D deficiency in pregnant
75 women, even in high-risk groups. Testing for serum vitamin D costs around £20,
76 therefore universal supplementation is considered more cost-effective³. Measuring
77 vitamin D levels during pregnancy should only be done if appropriate as part of routine
78 clinical management; in the antenatal population this will primarily be patients with
79 hypocalcaemia or symptoms potentially attributable to severe deficiency (generalised
80 musculoskeletal pain, proximal muscle weakness, hyperalgaesia, a waddling gait). Some
81 of the milder symptoms may occur frequently in pregnant women, but it is worth
82 considering vitamin D deficiency as a common, treatable cause of low-level antenatal
83 morbidity. Those with confirmed vitamin D deficiency will require replacement rather
84 than standard supplementation, which is beyond the scope of this article².

85

86 **The role of the primary care practitioner**

87 All women should receive advice at their booking visit about the importance of vitamin
88 D supplementation throughout pregnancy, but the Department of Health also specifies
89 that healthcare professionals have a responsibility to 'take particular care to check that
90 women at greatest risk of deficiency are following the advice during pregnancy'⁵.

91 Free antenatal vitamins containing the recommended dose of vitamin D are available
92 through the UK 'Healthy Start' scheme, to eligible women from their 10th week of

93 pregnancy (Box 1). This scheme provides coupons to exchange for vitamins (as well as
94 vouchers for free fruit, vegetables, cow's milk and infant formula). Women need to fill in
95 a form which can be obtained from midwives and health visitors, by calling the helpline
96 or printing it off online, and it must be signed by a healthcare professional. Women then
97 receive coupons in the post to exchange for vitamins at distributing organisations, such
98 as Children's Centres, however local availability varies⁶. Limited evidence on the uptake
99 of Healthy Start supplements suggests it is lower than 10% of those entitled³; reasons
100 cited include lack of awareness of the scheme amongst both healthcare practitioners
101 and eligible women, difficulty of access and a complex distribution system.
102 Furthermore, women can only claim the coupons from 10 weeks gestation, contrary to
103 guidance which recommends vitamin D supplementation throughout pregnancy.
104 Women who do not qualify for the 'Healthy Start' scheme can purchase vitamin D
105 supplements over the counter. The national position regarding the prescription of
106 vitamin D for those ineligible for Healthy Start is ambiguous; it is not explicitly
107 recommended and yet NICE guidelines advise that at risk groups should receive free
108 supplements³.

109

110 **Conclusion**

111 Maternal vitamin D deficiency is common and can result in low vitamin D levels in the
112 newborn. Universal vitamin D supplementation of 10ug/day is recommended to all
113 pregnant women and preferably periconceptually, regardless of risk factors. Testing of
114 vitamin D levels should be reserved for women with symptoms suggestive of deficiency.
115 Primary care practitioners should encourage women to take vitamin D supplementation
116 throughout pregnancy and signpost eligible women to the Healthy Start scheme.
117 Ineligible women can purchase vitamin D supplements over the counter but there is a
118 need for clarity in the national position of whether or not they can also receive them on
119 prescription.

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122 Academic Clinical Fellow in Primary Care.

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143

Box 1: Eligibility for the UK 'Healthy Start' Scheme

At least 10 weeks pregnant or have a child under four and they or their partner claim:

- Income Support, or
- Income-based Jobseeker's Allowance, or
- Income-related Employment and Support Allowance, or
- Child Tax Credit (*with a family income of £16,190 or less per year*), or
- Universal Credit (*with a family take home pay of £408 or less per month*)

Additionally: all pregnant women and girls under 18, irrespective of benefit claims