



**NEONATAL POSTNATAL WARD CLINICAL GUIDELINE**

**Maternal Vitamin D Deficiency**

<b>Scope (Staff):</b>	Midwifery/ Nursing and Medical Staff
<b>Scope (Area):</b>	KEMH Postnatal Wards
<b>Child Safe Organisation Statement of Commitment</b>	
CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.	

**This document should be read in conjunction with this [DISCLAIMER](#)**

Refer to Obstetrics and Gynaecology Clinical Practice Guideline - [Vitamin D Deficiency in Pregnancy](#) for detailed information about the following in vitamin D deficiency:

- Risk factors
- Screening tests
- Treatment in pregnancy
- Follow-up in pregnancy
- Education.

**Background**

UVB rays in sunlight are the most important source of vitamin D (>90%) through synthesis of D3 in the skin. This is variable with

- i. Skin colour: e.g. dark skinned individuals require greater exposure to sunlight compared to light skinned people.
- ii. Skin exposure: covering clothing may predispose to low vitamin D levels.
- iii. Seasonal: during winter UVB may not be sufficient to maintain adequate vitamin D levels in southerly latitudes. Normal use of sunscreens do not result in low vitamin D.

Small amounts of vitamin D are available from diet

- i. Fish (herring, mackerel, sardines, tuna, salmon) is the main natural food source, besides eggs and fortified foods.
- ii. Breastmilk contains almost negligible amounts of vitamin D. Infant formulas are fortified with vitamin D.

Recommended 25-OH D level is  $\geq 50$  nmol/L at all ages and during pregnancy. Toxic levels are  $>250$ nmol/L with hypercalcemia and suppression of parathyroid hormone.

**Vitamin D status in pregnancy (RANZCOG 2015)**

- Vitamin D sufficiency (serum 25-OH-D level  $>50$ nmol/L).
- Vitamin D insufficiency/ mild deficiency (serum 25-OH-D level 30-50 nmol/L).
- Vitamin D deficiency (serum 25-OH-D levels  $<30$  nmol/L: moderate: 12.5-25nmol/L and severe:  $<12.5$  nmol/L).

## Key Points

- Vitamin D is essential for bone and muscle health. Low vitamin D along with low calcium ± phosphate can cause nutritional rickets. Furthermore, vitamin D has proven benefits in cardiovascular disease, insulin resistance, development of autoimmune disease and some cancers (colon, breast and prostate) in addition to neurodevelopmental benefits in early childhood.
- Sunlight is the most important source of vitamin D at all ages.
- Vitamin D deficiency is common in high risk groups and should be managed through education, behaviour modification and supplementation.
- In Australia, nutritional rickets is generally seen in infants and children with dark skin.
- If a breastfeeding mother is 'at risk' for Vitamin D deficiency and has not been screened in pregnancy, consider commencing baby on vitamin D supplements and levels to be checked by GP at 6 weeks check.
- Recent evidence (*Gallo et al 2020*) indicates that vitamin D supplementation during pregnancy improved maternal and infant 25 (OH) D concentrations and may play a role in maternal insulin resistance and foetal growth.
- If a mother has vitamin D deficiency she should be advised to arrange screening for other family members (particularly children).
- Vitamin D deficient women who are supplemented with Vitamin D should continue maintenance supplementation when levels become within the normal range, until cessation of lactation.
- The American Academy of Paediatrics recommends infants have a minimum intake of 200 IU of Vitamin D a day. The vitamin D content obtained by average consumption when breastfeeding (750mL) will only provide up to 38 IU/day.<sup>2</sup> The neonate is at high risk of rickets with maternal vitamin D deficiency.
- Breastfeeding neonates should be supplemented with 400-500 IU of vitamin D daily until 6 months of age (Tan et al, 2020) if:
  - The mother is dark skinned, veiled, or high risk for vitamin D deficiency.
  - The mother has been treated for vitamin D deficiency in pregnancy.
- Vitamin D stores in the neonate from the vitamin D-replete mother last for at least 8 weeks.
- Neonates of vitamin D deficient mothers who are formula feeding will probably not require supplementation as most formulas in Australia contain 400 IU of vitamin D<sub>3</sub> per litre. Mothers must be advised to ensure the brand contains the recommended supplementation.<sup>1</sup>

## Management

### “AT RISK’ or Mild MATERNAL Vitamin D Deficiency (25-50 nmol/L)

- Women 'at risk' of vitamin D deficiency (eg. women with little exposure to sunlight such as night shift or office workers; veiled or dark skinned women such as belonging to Aboriginal, North African, Indian or Sri Lankan ethnicity), newly arrived refugee, BMI ≥40, or those diagnosed with mild Vitamin D deficiency, will hopefully have been identified either prior to pregnancy or at the time of having 'booking bloods' obtained. In most cases, supplementation will have been commenced and Vitamin D levels normalised on follow-up screening.
- Lee et al report insufficient vitamin D levels in 65% infants born to 'at risk' mothers despite adequate supplementation.

- Most skeletal mineralisation with calcium in the foetus occurs in the third trimester, at which point it is hoped that most cases of deficiency will have been identified through screening blood tests and supplementation commenced. There is little available data to indicate that treatment of infants of mildly Vitamin D deficient mothers with supplementation has a significant impact on medium or long-term outcomes such as neuro-cognitive development or Rickets.
- Until further evidence is available, mildly deficient mothers should be recommended to commence Vitamin D supplementation and their infants monitored for appropriate growth and development.
- Maternal vitamin D level (at booking/ 28 weeks, **whichever is later**) to be considered for decision around infant supplementation.
  - If level **≤50 nmol/L** or minimal/ no antenatal care, infant should be supplemented with Cholecalciferol 500 IU (0.1 mL of a 5000 unit/mL solution).
  - If levels are >50nmol/L or the mother has not received screening or supplementation with vitamin D, then check if any of these risk factors exist (veiled, dark skinned, newly arrived refugee), if yes, then infant needs supplementation with Cholecalciferol 500 IU (0.1 mL of a 5000 unit/mL solution) and levels to be checked at 3 months of life.
- Formula fed infants are **unlikely** to require supplementation, but should be monitored for clinical symptoms of deficiency during the first year also.
- Other family members, including other children, should also be monitored by the GP for clinical evidence of Vitamin D deficiency.

### **Moderate (<25) - Severe (<12.5) MATERNAL Vitamin D DEFICIENCY**

Infants of mothers with moderate to severe Vitamin D deficiency (< 25 nmol/L) should be treated with Cholecalciferol 1000 IU (0.2 mL of a 5000 unit/mL solution) **for 3 months**.

In severe cases, particularly in 'at risk' families or in cases of persistent severe Vitamin D deficiency in the breastfeeding mother, consideration may be given to assessing the infant's metabolic status after three months with serum Ca, PO<sub>4</sub>, ALP and Vit D levels.

Ongoing requirement for Vitamin D supplementation may be considered until establishment of solids and should be discussed with a Paediatric Endocrinologist.

Infants born at KEMH to mothers, who are or have been moderate to severely deficient in Vitamin D during pregnancy, should be prescribed Cholecalciferol supplementation as above. Biochemical testing prior to commencement is not necessary. This is particularly important in infants who are breast fed, rather than formula fed, as formula contains significantly higher Vitamin D levels than breast milk. The mother and infant should be followed up by their GP.

- [GP Follow-up letter](#)
- Also refer to [Quick Reference Guide](#)
- Refer to Obstetrics and Gynaecology Clinical Practice Guideline - [Vitamin D Deficiency in Pregnancy](#) for other women who are at risk for deficiency. The neonate may need a supplement depending on maternal history.

**References and related external legislation, policies, and guidelines**

1. <https://www.health.gov.au/resources/pregnancy-care-guidelines/part-g-targeted-maternal-health-tests/vitamin-d-status> (accessed 25th January 2021)
2. Gallo S, McDermid JM, Al-Nimr RI, Hakeem R, Moreschi JM, Pari-Keener M, Stahnke B, Papoutsakis C, Handu D, Cheng FW. Vitamin D Supplementation during Pregnancy: An Evidence Analysis Center Systematic Review and Meta-Analysis. **J Acad Nutr Diet.** 2020 May;120(5):898-924.e4
3. Tan ML, Abrams SA, Osborn DA. Vitamin D supplementation for term breastfed infants to prevent vitamin D deficiency and improve bone health. **Cochrane Database Syst Rev.** 2020 Dec 11;12:CD013046.
4. Uday S, Naseem S, Large J, Denmeade R, Goddard P, Preece MA, Dunn R, Fraser W, Tang JCY, Högl W. Failure of national antenatal vitamin D supplementation programme puts dark skinned infants at highest risk: A newborn bloodspot screening study. **Clin Nutr.** 2020 Dec 11:S0261-5614(20)30667-1.
5. Munns C, Zacharin MR, Rodda CP, al e. Prevention and treatment of infant and childhood vitamin D deficiency in Australia and New Zealand: a consensus statement. **Medical Journal of Australia.** 2006;185(5):268-72.
6. Misra M, Pacaud D, Petryk A, et al. Vitamin D Deficiency in Children and Its Management: Review of Current Knowledge and Recommendations. **Pediatrics.** 2008;122:398-417.
7. Whitehouse A, Holt BJ, et al. Maternal serum vitamin D levels during pregnancy and offspring neurocognitive development. **Pediatrics.** 2012; 129(3): 485-93
8. Kovacs CS. Maternal vitamin D deficiency: Fetal and neonatal implications. **Seminars in Fetal & Neonatal Medicine.** 2013; 18: 129-35.
9. Marshall I, Mehta R, Petrova A. Vitamin D in the maternal-fetal-neonatal interface: clinical implications and requirements for supplementation. **The Journal of Maternal-Fetal & Neonatal Medicine.** 2013; 26(7): 633-38
10. Taylor JA, Geyer LJ, Feldman KW. Use of supplemental vitamin D among infants breastfed for prolonged periods. **Pediatrics.** 2010; 125(1):105-11

**Useful resources (including related forms)**

[GP Follow-up Letter](#)

This document can be made available in alternative formats on request for a person with a disability.

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