CLINICAL PRACTICE GUIDELINE
KEMH Postnatal Wards

Maternal Vitamin D Deficiency

This document should be read in conjunction with the Disclaimer

Background Information

Refer to Obstetrics and Gynaecology Clinical Practice Guideline - Vitamin D Deficiency in Pregnancy for detailed information about vitamin D deficiency:

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

Key Points

- If a breastfeeding mother is 'at risk' for Vitamin D deficiency and has not been screened in pregnancy she should be advised to arrange screening for herself and the neonate at the 6 week postnatal check. The GP should be advised of this recommendation in the discharge information.
- 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.[2] 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 12 months of age 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 D3 per litre. Mothers must be advised to ensure the brand contains the recommended supplementation.[1]

Background

Vitamin D has long been recognised as a major factor responsible for skeletal mineralisation through its role in maintaining calcium homeostasis under the influence of parathyroid hormone (PTH). An ever increasing range of physiological and metabolic functions for vitamin D and its metabolites have been identified, with diverse roles in immune-regulation, cardiovascular function and neurodevelopment (Marshall). Deficiency of this important hormone has been linked with increased risk of Type 1 Diabetes, respiratory infections, malignancy and cardiovascular disease, in addition to the its traditionally recognised role in the development of rickets (Perrine).

The term born infant skeleton contains approximately 30 gm of calcium, the large majority of which is accreted during the third trimester (Kovacs). A significant proportion of this calcium is obtained from the maternal diet, as intestinal absorption is increased up to two-fold from early in pregnancy. The impact of both maternal deficiency of Vitamin D during pregnancy and its correction by oral supplementation on both the fetus and the lactating infant remains equivocal (Kovacs). Several studies have failed to identify a significant relationship between measures of maternal 25(OH) Vit D and neonatal indices such as birthweight, head circumference, length or cord calcium levels. Anthropometric parameters from infants aged 9 months also showed no relationship with maternal levels, whilst children aged 9 years demonstrated a lower bone mineral content in cases of maternal 25(OH) Vit D <27.5 nmol/L during pregnancy. The authors postulated early programming of childhood bone mass during *in utero* life as a possible mechanism (33 in Kovacs). A study recently published from researchers in Perth, using Raine Study data collected during 1989-1991 suggested that infants of mothers with vitamin D deficiency during pregnancy have a two-fold increase risk in delayed language development. It is worth bearing in mind that many factors likely to alter the prevalence of Vitamin D deficiency in women at KEMH have occurred since that time, including altered sun exposure and skin protection behaviours, as well as a population demographic with dark-skinned and veiled women recognised as being at higher risk for Vitamin D deficiency.

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; veiled or dark skinned women), or 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. Although there is the potential for the fetus to experience compromised transport of 25(OH) Vit D3 in such cases, most fetal demands are met via maternal stores and are unlikely to be compromised unless the maternal level of deficiency is significant. Most skeletal mineralisation with calcium in the fetus 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. If concerned, consideration should be given to supplement breast fed infants of 'at risk' or mildly deficient mothers with Cholecalciferol 500 IU (0.1 mL of a 5000 unit/mL solution). 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, PO4, 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

1. 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.
2. 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.
3. Whitehouse A, Holt BJ, et al. Maternal serum vitamin D levels during pregnancy and offspring neurocognitive development. **Pediatrics**. 2012; 129(3): 485-93
4. Kovacs CS. Maternal vitamin D deficiency: Fetal and neonatal implications. **Seminars in Fetal & Neonatal Medicine**. 2013; 18: 129-35.
5. Perrine CG, Sharma AJ, et al. Adherence to Vitamin D recommendations among US infants. **Pediatrics**. 2010; 125 (4): 627-32
6. 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
7. Taylor JA, Geyer LJ, Feldman KW. Use of supplemental vitamin D among infants breastfed for prolonged periods. **Pediatrics**. 2010; 125(1):105-11

Related WNHS policies, procedures and guidelines

Obstetrics and Gynaecology Clinical Practice Guideline - Vitamin D Deficiency in Pregnancy

GP Follow-up letter

Quick Reference Guide

Document owner:	Neonatal Directorate Management Committee		
Author / Reviewer:	Neonatal Directorate Management Committee		
Date first issued:	August 2011		
Last reviewed:	27th June 2017	Next review date:	27th June 2020
Endorsed by:	Neonatal Directorate Management Committee	Date endorsed:	27th June 2017
Standards Applicable:	NSQHS Standards: 1 Governance		
Printed or personally saved electronic copies of this document are considered uncontrolled. Access the current version from the WNHS website.			