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Vitamin D Status of Preterm Infants at 4 Months Post Hospital Discharge

A thesis presented in partial fulfilment of the requirements for the degree of Masters of Science in Nutrition and Dietetics

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Abstract

Preterm birth and survival rates are increasing in New Zealand and around the world. Preterm infants are subject to shorter gestational lengths and subsequently suffer from decreased nutrient accretion in *utero*. Vitamin D is one nutrient that is accrued in the final stages of gestation. At birth preterm infants rely on an exogenous source of this nutrient to achieve and maintain adequate stores. The vitamin D status of preterm infants after hospital discharge in New Zealand was previously unknown.

The aim of this study was to investigate the serum 25-hydroxyvitamin D (25(OH)D) status of preterm infants at 4 months post hospital discharge, and describe the factors affecting these concentrations.

An observational study of 49 preterm infants (<37 weeks gestation) at 4 months post hospital discharge was undertaken. A capillary blood sample was obtained from infants. Serum 25(OH)D was analysed using ADIVA Centaur Vitamin D Total immunoassay. Questionnaires were used to assess sun exposure behaviours and feeding and supplement use.

In this sample of 49 preterm infants, 28.6% were classified as having insufficient vitamin D status (25(OH)D \leq 50 nmol/L), of these 8.2% were further classified as having mild to moderate vitamin D deficiency (25(OH)D \leq 25 nmol/L). The mean 25(OH)D concentration was 73.8 nmol/L, the range was 16 nmol/L – 314 nmol/L. Vitadol C supplementation had the most significant effect on infant 25(OH)D concentrations. All (n=14) exclusively breastfed infants who did not receive Vitadol C supplements were vitamin D insufficient or deficient on analysis. All infants who received Vitadol C or infant formula were vitamin D sufficient.

Vitamin D deficiency is prevalent in exclusively breastfed preterm infants not receiving vitamin D supplements. Vitamin D supplementation should be considered for all preterm infants as part of New Zealand's child health policy.

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Abbreviations

Abbreviation	Term
1,25(OH) ₂ D ₃	1 α ,25-dihydroxyvitamin D ₃ or Calcitriol
25(OH)D	25-hydroxyvitamin D
25(OH)D D- D-1-hydroxylase	25-hydroxyvitamin D D-1-hydroxylase
IU	International Units
Kg	Kilogram
L	Litres
μ g	Micrograms
Mg	Milligrams
ml	Millilitres
nmol//L	Nanomol per Litre
ng/ml	Nanograms per millilitre
AI	Adequate Intake
AAP	American Academy of Paediatrics
ALRI	Acute lower respiratory infection
ASPEN	American Society of Parenteral and Enteral Nutrition
BMF	Breast milk fortifier
CRP	C-Reactive Protein
DOB	Date of birth
GA	Gestational age
EAR	Estimated Average Requirement
EBM	Expressed breast milk
ELBW	Extremely low birth weight
EN	Enteral Nutrition
ESPGHAN	European Society of Paediatric Gastroenterology, Hepatology and Nutrition
FEBM	Fortified expressed breast milk
INF γ	interferon- γ
IOM	Institute of Medicine
LBW	Low birth weight
MED	Minimal erythematous dose
MOH	Ministry of Health
NHMRC	National Health and Medical Research Council
NICU	Neonatal intensive care unit
Nm	Nanometres
PHARMAC	Pharmaceutical Management Agency New Zealand
PN	Parenteral nutrition
RANZCOG	Australian and New Zealand College of Obstetricians and Gynaecologists
RDA	Recommended daily allowance
RDI	Recommended daily intake
SGA	Small for gestational age
SPF	Sunscreen protection factor
T1DM	Type 1 Diabetes Mellitus
T2DM	Type 2 Diabetes Mellitus
TNF α	Tumour necrosis factor- α
UL	Upper limit

Abbreviation

UVA
UVβ
VDR
VLBW
WHO

Term

Ultraviolet Alpha
Ultraviolet Beta
Vitamin D Receptors
Very low birth weight
World Health Organisation