Iron Status of Preterm Infants after Hospital Discharge

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Abstract

Background: Preterm infants are at an increased risk of developing iron deficiency (defined in paeditaric populations as a ferritin value <12 μg/L or a serum transferrin receptor concentration >2.4 mg/L) after discharge due to their shortened gestational length, increased requirements for rapid growth, and excessive blood losses through phlebotomy. Optimising preterm infant iron status after discharge is important as poor iron status has been associated with negative health and neurodevelopmental outcomes later in life. Only preterm infants born before 32 weeks gestation or with a birth weight less than 1800 g currently receive routine iron supplementation after discharge from Auckland City Hospital; however there is paucity of evidence to determine whether this is best practice.

Objective: To investigate the iron status of preterm infants in Auckland, New Zealand at four months after discharge from hospital.

Methods: Sixty one preterm infants were recruited through Auckland City Hospital. At four months after discharge infant haemoglobin, serum ferritin and soluble transferrin receptor (sTfR) concentrations were measured to assess iron status. Weight, length and head circumference were also measured. Information about iron supplementation and mode of feeding was collected using an online questionnaire. Statistical analysis using independent *t*-tests, Mann-Whitney tests and bivariate correlations were performed.

Results: 16.4% of preterm infants had iron deficiency anaemia (defined in paediatric populations as a haemoglobin less than 110 g/L in conjunction with low iron stores) at four months after discharge, with an additional 6.6% of preterm infants classified as having iron deficiency. No infant had iron overload. Iron supplementation was associated with significantly higher haemoglobin (P<0.001) and serum ferritin (P<0.001) concentrations along with lower sTfR concentrations (P=0.005) at four months after discharge. Iron supplementation was also protective against suboptimal iron status at four months after discharge (P=0.018). Mode of feeding, introduction of

solids, intrauterine growth restriction, and maternal iron status had no effect on infant iron status at four months after discharge. There was also no relationship between growth and iron supplementation or iron status at four months after discharge.

Conclusion: Preterm infants who did not receive iron supplements after discharge had an increased risk of developing iron deficiency and iron deficiency anaemia at four months after discharge. Routine iron supplementation for all preterm infants combined with screening for iron deficiency anaemia after discharge appears to be a safe and effective way to reduce the risk of iron deficiency and iron deficiency anaemia at four months after discharge.

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Table of Contents

List of Tables

List of Figures

Abbreviations

AAP	American Academy of Pediatrics
BMI	Body Mass Index
CHr	Reticulocyte Haemoglobin Content
CRP	C-Reactive Protein
CV	Coefficient of Variance
EDTA	Ethylenediaminetetraacetic Acid
ELBW	Extremely Low Birth Weight
ESPGHAN	European Society of Paediatric Gastroenterology, Hepatology and Nutrition
HIC	High Income Country
LIC	Low Income Country
LBW	Low Birth Weight
ID	Iron Deficiency
IDA	Iron Deficiency Anaemia
IUGR	Intrauterine Growth Restriction
IVF	In Vitro Fertilisation
IVN	Intravenous Nutrition
MCH	Mean Cell Haemoglobin
MCHC	Mean Cell Haemoglobin Concentration
MCV	Mean Cell Volume
MUHEC	Massey University Human Ethics Committee
NHI	National Health Index
NICU	Neonatal Intensive Care Unit
PCV	Packed Cell Volume
RCT	Randomised Control Trial
RDI	Recommended Dietary Intake
sTfR	Soluble Transferrin Receptor
TfR	Transferrin Receptor
TIBC	Total Iron Binding Capacity
VLBW	Very Low Birth Weight

WHO	World Health Organisation
ZnPP	Zinc Protoporphyrin