Serum Hepcidin as a Predictor for Blood Transfusion in Septic Preterm Neonates

THESIS

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Abstract

Background: Anemia is a serious public health problem affecting 2 billion people worldwide, particularly infants and young children in developing countries where its etiology is multifactorial.

Hepcidin inhibits the cellular efflux of iron by binding to, and inducing the degradation of ferroportin, the sole known iron exporter in iron transporting cells.

Aims: The aim of this study is to determine if Hepcidin could be used as a predictor for recurrent blood transfusions in septic preterm neonates and to study its relation to frequency and amount of packed RBCs transfusions.

Patients and Methods: This is a case- control study, conducted at Ain Shams NICUS from Novembre till 20th Decembre 2016. The study was conducted on 70 preterm neonates accordin to sample size calculation using EPI program using sensitivity of Hepcidin 70% + 10%, C.I 95% and power of the study 80%.

Results: 50 preterm neonates compromised the septic group while 20 preterm neonates compromised the control group.

Conclusion: Serum Hepcidin is higher in septic preterm neonates compared to non –septic preterm neonates, Morover it is higher in septic preterm neonates with frequent blood transfusion comapred to infrequent blood transfusion. Serum Hepcidin correlates with duration of hospital stay.

A cut-Off level of serum Hepcidin 7 ng/ml may be a good predictor for the need of frequent blood transfusion in septic preterm neonates.

Recommendations: Hepcidin may be used as a marker for prediction for need of frequent blood transfusion in septic preterm neonates so we can use single donor methods.

Further investigations are needed for more assessment of Hepcidine level and it's correlation to need for blood transfusion and it's frequency using more sample size and on different population and for longer durations.

Keywords: Serum Hepcidin, Blood Transfusion, Septic Preterm Neonates

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List of Abbreviations

AI	: Anemia of inflammation
CDC	: Centers for Disease Control
CPD	: Citrate phosphate dextrose
EOS	: Early-Onset Sepsis
EPO	: Erythropoietin
ID	: Iron deficiency
IUGR	: Intra uterine growth retardation
MAP	: Mean airway pressure
MCHC	: Mean corpuscular hemoglobin concentration
NICU	: Neonatal intensive care unit
NS	: Neonatal sepsis
PRBC	: Packed red blood cells
PT	: Preterm infants
RBC	: Red blood cell
RE	: Reticuloendothelial
SAGM	: Saline adenine glucose mannitol
VLBW	: Very low birth weight

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Introduction

Anemia is a serious public health problem affecting 2 billion people worldwide, particularly infants and young children in developing countries where its etiology is multifactorial ***(Robert and Means, 2013).***

Preterm birth rates have been reported to range from 5% to 7% of live births in some developed countries, but are estimated to be substantially higher in developing countries. These figures appear to be raising ***(Brabin et al., 2013).*** Anemia occurs frequently in premature infants, which makes this population prone to transfusion treatments. Packed red blood cells are the most frequently administered blood products to newborns, and these transfusions are generally necessary in two situations:

1. To guarantee adequate tissue oxygenation during intensive care treatment.
2. To treat significantly symptomatic anemia.

(Freitas and Franceschini, 2012).

The repercussions of transfusions and the adoption of policies to reduce blood transfusions have become enormous challenges because more premature newborns survive anemia. Preterm infants with gestational ages <30 weeks, birth weights <1,000 g, or severe infectious diseases are candidates for blood transfusions ***(Brunella and Franceschini, 2012).***

Hepcidin is a 25– amino acid disulfide-rich peptide produced primarily by the liver and secreted into the circulation and acts as a systemic iron-regulatory hormone by regulating iron transport from iron-exporting tissues into plasma ***(Nicolas et al., 2002).***

Hepcidin inhibits the cellular efflux of iron by binding to, and inducing the degradation of ferroportin, the sole known iron exporter in iron transporting cells ***(Nicolas et al., 2002).***

If a unit of RBCs is dedicated to one or two preterm infants, a single donor can often provide all the RBCs needed by an infant in the first 6 weeks of life. Such single-donor programs should be the standard practice in blood banks that serve preterm ***(Bell, 2008).*** Unfortunately, these single-donor programs are not yet applied in Egypt. Single-donor RBCs can be served to a limited number of preterm neonates.

Aim of the Work

The aim of this study is to determine if Hepcidin could be used as a predictor for recurrent blood transfusions in septic preterm neonates and to study its relation to frequency and amount of packed RBCs transfusions.