بسم الله الرحمن الرحيم

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تم رفع هذه الرسالة بواسطة /صفاء محمود عبد الشافى

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات: لايوجد

Cord Blood levels of Brain-Derived Neurotrophic Factor (BDNF) In Full Term Neonates at Risk for Iron Deficiency

Thesis

Submitted for Partial Fulfillment of Master Degree in Pediatrics

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2022

سورة البقرة الآية: ٣٢

Acknowledgment

First and foremost, I feel always indebted to **ALLAH**, *the Most Kind and Most Merciful.*

I'd like to express my respectful thanks and profound gratitude to **Prof. Dr. Ola Galal Bader El-Deen El-Farghali,** *Professor of Pediatrics, Faculty of Medicine, Ain Shams University for her keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.*

I am also delighted to express my deepest gratitude and thanks to **Prof. Dr. Mortada El-Sayed Ahmed,** *Assistant Professor of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for his kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.*

I am deeply thankful to **Dr. Nesmahar Tark Abdel Hamed Azzam,** *Lecturer of Pediatrics, Faculty of Medicine, Ain Shams University, for her great help, active participation and guidance.*

I wish to introduce my deep respect and thanks to **Dr. Marwa Adham El-Mohamdy Hasb El-Nabi,** *Lecturer of Clinical Pathology, Faculty of Medicine, Ain Shams University, for her kindness, supervision and cooperation in this work.*

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Cord Blood Hemoglobin (Hb) Levels In Full Term Neonates Of Mothers With Iron Deficiency Anemia (IDA)

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Abstract

Background Iron is a critical micronutrient for tissue oxygenation, cellular metabolism, energy generation, and the metabolism of toxins. Iron transfer from mother to fetus is a regulated process involving iron status in the maternal circulation, its transport across the placenta and subsequent transfer into the fetal circulation.

Objective: To evaluate cord blood Hemoglobin (Hb) levels in neonates of mothers with iron deficiency anemia (IDA).

Patients and Methods: This prospective case-control study was conducted at Ain Shams University Hospitals. It included 60 full terms newborn who were born at Obstetrics and Gynecology Hospital. An informed consent was taken from the mother or case giver before enrollment in the study.

Results: In comparison between cases and controls as regard RBCS parameter, there was no significant difference between cases and controls regarding neonatal Hemoglobin and MCH, but there was significantly lower MCV in cases compared to controls.

Conclusion: There was no relation between the maternal Hb deficient levels and neonatal Hb. The first sign of iron deficiency in neonates reflected in lower MCV in cases, but not reached to decrease Hb levels in neonates.

Keywords: Cord, Blood, Hemoglobin (Hb), Full-Term Neonates, Mothers Iron Deficiency, Anemia (IDA)

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List of Abbreviations

Abb.	Full term
BDNF	Brain-Derived Neurotrophic Factor
CBC	Complete blood count
CDC	Centers for Disease Control and Prevention
CNS	Central nervous system
CS	Cesarean Section
DCV	Dense core vesicle
DMT1	Divalent metal transporter 1
ELISA	Enzyme-linked immunosorbent assay
ER	Endoplasmic reticulum
F2	Ferrous
F3	Ferric
FPN	Ferroportin
Hb	Hemoglobin
HCP-1	Heme carrier protein 1
Hct	Hematocrit
ID	Iron Deficiency
IDA	Iron Deficiency Anemia
IDMs	Infants of diabetic mothers
IUFD	Intra uterine fetal death
LTF	Lactoferin
MCH	Mean corpuscular hemoglobin
MCV	Mean corpuscular volume
MMP	Matrix metalloproteinases
NGF	Neural growth factor
NICE	The National Institute for Health and Care Excellence

List of Abbreviations Cont...

Abb.	Full term
NVD	Normal Vaginal Delivery
SD	Standard deviations
SG	Spiral ganglion
TGN	*Trans*-Golgi network
TrkB	Tyrosine kinase b receptor
UTI	Urinary tract infection
WBC	White Blood Cell
WHO	World Health Organization

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Cord Blood Hemoglobin (Hb) Levels In Full Term Neonates Of Mothers With Iron Deficiency

Abstract

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INTRODUCTION

Iron is a critical micronutrient for tissue oxygenation, cellular metabolism, energy generation, and the metabolism of toxins ***(Crichton et al., 2001)***. Iron and iron-containing enzymes in the brain are involved in neuronal energy metabolism, myelination, and neurotransmission ***(Lozoff and Georgieff, 2006).***

For over 25 years, Iron Deficiency Anemia (IDA) in early life was found to affect brain iron content and cause cognitive and behavioral deficits in early childhood ***(Walter, 1994).*** Later work found that IDA during the fetal or early postnatal period leads to persistent deficits in learning and memory, emotional regulation, social behavior, and overall neurophysiologic development ***(Christianet al., 2010; Chang et al., 2013).***Additionally, early-life ID is associated with increased risk of developing neuropsychiatric disorders ***(Insel et al., 2008; Doom et al., 2018).***Despite the identification and correction of ID, these deficits persist into adulthood ***(Lukowski et al., 2010)***, indicating early life as a critical window for brain development when adequate iron supply is required for proper growth and development. However, screening for and treatment of ID, per clinical practice, is not performed until 9–12months of age, a time when it may be too late for some infants ***(Phillips et al., 2020).***

Therefore, by the time anemia is detected, the brain may have already been iron deficient for some time, particularly during critical periods of neurodevelopment. In this regard, recent research has turned to exosomes as carriers of potential molecular markers ***(Properziet al., 2013).***

Exosomes are small, cell-derived vesicles that shuttle proteins and nucleic acids between cells and play an important role in intercellular communication ***(Van Nile et al., 2006; Schory and Bhantngar, 2008)***. Prenatally, BDNF has important roles in axon growth, morphologic Differentiation, and neurotransmitter expression ***(Huang and Reichardt, 2001)***. Postnatally, BDNF supports neuron survival, promotes synaptogenesis, and is important for learning and memory ***(Bekinschtein et al., 2008).***

BDNF can be found in blood Exosomes, providing an opportunity to non-invasively assess the state of brain development ***(Mustapic et al., 2017)***.

Aim of the Work

The objective of this study: is to evaluate cord blood-derived Levels of exosomal Brain-Derived Neurotrophic Factor (BDNF) in neonates at risk for Iron Deficiency (ID).