Institute of postgraduate childhood
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Effect of Perinatal Asphyxia on Thyroid Stimulating Hormone and Thyroid Hormones and Their Relation to Cranial Ultrasonographic Findings

Thesis
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DEDICATION

TO

MY Mother, for all support, kindness and unlimited care

she gave me. From her; I understood the

meaning of persistence.

TO

My sweetest heart Randa and my beloved

Tarek; for being so tolerant. To them I

dedicate my whole life wishing them a bright future.

Contents

Abstract

Aim:

The aim of this study is to compare serum concentrations of thyroid hormone TT3, FT4 and TSH found in the umbilical cord blood of term newborns with and without asphyxia and those found in their blood collected between 18-24 h after birth. A further aim was to find the association between severity of hypoxic –ischemic encephalopathy and altered thyroid hormones and TSH levels, another aim was to find the relationship between abnormal cranial ultrasounds and altered thyroid hormones.

Design: Case control study

Patients and methods:

The cases comprised 30 term newborns (Apgar score </= 3, </= 6 at the first and five minutes after birth, umbilical cord blood pH<7.2) who required bag and mask ventilation for at least one minute immediately after birth.
The controls comprised 30 term newborns (Apgar score >6,>/= 8 at the first and five minutes after birth, umbilical cord blood pH> 7.2) cord blood and blood samples were collected after birth and 18-24h after birth for analysis of TT3, FT4, TSH by radioimmunoassay.

Results:

There were decreases of TSH, TT3, and FT4 of asphyxiated group at 18-24 h after birth compared to control group. In addition asphyxiated newborns with moderate and severe hypoxic ischemic encephalopathy presented significant lower levels of TSH, FT4 and TT3 than mild cases of hypoxic ischemic encephalopathy .Cases showing changes in cranial ultrasound altered lower levels of TSH, FT4 and TT3 than cases with normal cranial ultrasound.

Conclusions:

Our data suggests that lower FT4, TT3 are secondary to lower TSH levels in asphyxiated newborns and there is a relationship between lower of thyroid hormones and abnormal cranial ultrasound.

Keywords:

Asphyxia, hypothyroidism, thyroid hormones, thyrotropin.

List of Abbreviations

ACTH	Adrenocorticotropic Hormone
AAP	American Academy of Pediatrics
ACOG	American College of Gynecology
ATP	Adenosine triphosphate
B P	Blood Pressure
CB	Cord blood
CBF	Cerebral blood flow
CK	Creatinine Kinase
CK-BB	Creatinine Kinase brain bound
CNS	Central nervous system
Co cl2	Cobalt chloride
CP	Cerebral palsy
CT	Computed Tomography
CTnT	Cardiac Tropoin T
CVP	Central Venous Pressure
D1	Type I Iodothyronine deiodinase
D2	Type II Iodothyronine deiodinase
D3	Type III Iodothyronine deiodinase
DIC	Disseminated Intravascular Coagulation
DFO	Desferroixamine
DV	Diastolic Volume
ECG	Electrocardiogram
EEG	Electroencephalogram
FT4	Free Tetra-iodothyronine
GIT	Gastrointestinal tract
HIE	Hypoxic Ischemic encephalopathy
HCO3	Bicarbonate
Hge	Hemorrhage
HIF	Hypoxic inducible Factor
HR	Heart Rate
IQ	Intelligent Quient
IL	Interleukin 6

IVH	Intraventricular Hemorrhage
LDH	Lactate Dehydrogenase
MRI	Magnetic Resonance Imaging
MRS	Magnetic Resonance Spectroscopy
MR	Mental Retardation
NAA	N-acetyle aspartate
NEC	Necrotizing Enterocolitis
NSE	Neuro-specific enolase
O2	Oxygen
PA	Perinatal asphyxia
PO2	Partial Oxygen Pressure
PCO2	Partial Carbon dioxide Pressure
PET	Position Emisson Tomography
PT	Prothrombin Time
PTT	Partial Thromboplastin Time
PVT	Periventricular Leukomalacia
RI	Resistive index
rT3	Reverse triiodothyronine
SIADH	Syndrome of Inappropriate Antiduiretic Hormone secretion
SPECT	Single photon Emission Tomography
S.V	Systolic Volume
TBG	Thyroid Binding Globin
Tg	Thyroglobin
T3	Triiodothyronine
TT_3	Total Triiodothyronine
T 4	Tetraiodothyronine
TSH	Thyroid Stimulating Hormone
Wt	weight
UA/Cr	Uric acid/Creatinine
US	Ultrasonography
VLBW	Very low birth weight

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Introduction

Perinatal asphyxia is a relative common life threatening condition and the most important cause of neurological morbidity and mortality in preterm and full term neonates **(**Yasin, et al, 2006**).**

Despite major advances in monitoring technology and knowledge of fetal and neonatal pathology, perinatal asphyxia or more appropriate hypoxic ischemic encephalopathy remains a serious condition that causes significant mortality and long term morbidity (Santina et al, 2009).

During birth, asphyxia occurs when the infant suffers a condition of oxygen deficiency and reduced blood supply. In serious causes of asphyxia, the infant can develop symptoms of brain damage shortly following birth (HIE). In moderate and severe asphyxia lack of oxygen can cause serious damage to brain and other organs (Ewe et al, 2009).

Perinatal asphyxia also triggers a rapid increase in the serum hormones such as catecholamine, glucocorticords A.C.T.H, beta endorphins, rennin (Nylen and Muller, 2004) it also causes reduction of insulin (Xu et al, 2003).

Little is known about the effect of PA on thyroid hormones despite its important. Thyroid hormones play an important role on the synthesis of mitochondrial enzymes and structural elements in addition it stimulates thermogenesis, water and ion transportation, It also potentiates the action of catecholamine and stimulates growth and development of various tissues including the brain and skeleton (Brown, 2009).

The thyroid hormones increase oxygen consumption, stimulate protein synthesis and affect carbohydrate, lipid, and vitamin metabolism (Stephen et al, 2008).