Measurement of Plasma Aldosterone and Urinary Lactate/Creatinine Ratio for the Early Identification of Newborn Infants at Risk for Hypoxic-Ischemic Encephalopathy

THEISES

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In Pediatrics

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٢٠١٠

قياس نسبة الألدوستيرون في الدم والنسبة بين حمض اللاكتيك والكرياتينين في البول للتشخيص المبكر للأطفال حديثي الولادة المعرضين لمرض نقص الأكسجين بالمخ

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بسم الله الرحمن الرحيم

(اللَّهُ الَّذِي خَلَقَكُم مِّن
ضَعْفٍ ثُمَّ جَعَلَ مِن بَعْدِ
ضَعْفٍ قُوَّةً ثُمَّ جَعَلَ مِن
بَعْدِ قُوَّةٍ ضَعْفاً وَشَيْبَةً
يَخْلُقُ مَا يَشَاء وَهُوَ
الْعَلِيمُ الْقَدِير)

(سورة الروم:٥٤)

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LIST OF ABBRIVATION

AAP :	The American Academy of Pediatrics
ACOG :	American College of Obstetricians and Gynecologists
ACTH:	Adrenocorticotrophic hormone
ADH:	Antidiuretic hormone
AMPA	٢-amino-٣-(٥-methyl-٣-oxo-١,٢- oxazol-٤-yl)propanoic acid
ANG II:	Angiotensin II
ARF:	Acute renal failure
ATN:	Acute tubuler necrosis
BBB:	Blood brain bariar
BD:	Base deficit
BP:	Blood pressure
BUN:	Blood urea nitrogen
CBF:	Cerebral blood flow
CHIF:	Corticosteroid hormone-induced factor
CK-BB:	Creatine kinase brain fraction
CK-MB:	Creatinine kinase myocardial bound
CNS:	Central nervous system
CPP:	Cerebral perfusion pressure
CPR:	Cardiopulmonary resuscitation
CrCl:	Creatinine clearance
CT:	Computed tomography
CUS:	Cranial ultrasonography
DIC:	Disseminated intravascular coagulation
DIC:	Disseminated intravascular coagulopathy
EAA	Excitatory amino acid
ECHO:	Echocardiography
EEG:	Electroencephalography
EPO:	Erythropoietin
ENaC:	Epithelial sodium channel
ER:	Endoplasmic reticulum
FHR:	Fetal heart rate
GABA:	Gamma aminobutyric acid
GFR:	Glomerular filtration rate
GR:	Glucocorticoid, receptors
HIE:	Hypoxic ischemic encephalopathy
HIS:	Hypoxic ischemic syndrome
ICP:	Interacranial pressure
IL:	Interlukin
IGF-١:	Insulin-like growth factor ١
IPPV:	Intermittent positive pressure ventilation

IUGR:	Intrauterine growth retardation
Ki-Ras:	Kirsten Ras
L/C:	Lactate/creatinine
LO:	Lactate oxidase
MR:	Magnetic resonance
MRI:	Magnetic resonance imaging
NBQX:	٢,٣-dihydroxy-٦-nitro-٧-sulfamoyl-benzo[f]quinoxaline-٢,٣-dione
NCC:	Na^+/Cl^- cotransporter
NEC:	Necrotizing enterocolitis
NICU:	Neonatal intensive care unit
NHE٣:	Sodium-hydrogen exchanger ٣
NMDA	N-methyl-D-aspartate
NO	Nitric oxide
Pcr:	Plasma creatinine
PI٣K:	Phosphatidylinositol ٣-kinase
PSD-٩٥:	Postsynaptic density protein ٩٥
PVL:	Periventricular leukomalacia
RAAS:	Rennin-angiotensin-aldosterone system
RALES:	Randomized Aldactone Evaluation Study
RBF:	Renal blood flow
SD:	Standard deviation
SIADH:	Syndrome of inappropriate antidiuretic hormone hypersecretion
Sgk:	Serum- and glucocorticoid-inducible kinase
SHC:	Selective Head Cooling
SHRsp:	Spontaneously hypertensive rats
TCA:	Tri-chloro-acetate
γgtp:	Gamma glutamyl transpeptidase activity
٤-AP:	٤-aminophenazone

INTRODUCTION AND AIM OF THE WORK

INTRODUCTION

Perinatal asphyxia is an important cause of neonatal mortality and subsequent neurologic disabilities among the infants who survive. Newborn infants who sustain an acute interapartum hypoxic ischemic insult of sufficient magnitude to result in long-term neurologic sequelae have variably recognizable clinical encephalopathy during the first days of life **(Snyder and Cloherty, ٢٠٠٤).**

These infants have evidence of derangements in many organs. Their cerebral function is depressed at birth and remains depressed for days or weeks, and they frequently have seizures soon after birth. Hypoxic ischemic encephalopathy develops in one third of asphyxiated newborn **(Zarifi et al., ٢٠٠٢).**

Mild encephalopathy carries a better prognosis, although in moderate and severe encephalopathy the risk of death or neurologic sequelae increases greatly. For clinical intervention, it is important to identify infants at a high risk for brain damage soon after birth.

Several indicators of brain damage have been investigated in the last decade **(Nagdyman et al., ٢٠٠٣).**

AIM OF THE WORK

In the present study, our aim is to measure the plasma aldosterone levels in cord blood and peripheral blood collected ١٨ to ٢٤ hours after birth, and the urinary lactate and creatinine concentration within the first six hours after birth in asphyxiated and normal term newborn infants to determine their sensitivity and specificity for the early identification of infants in whom hypoxic-ischemic encephalopathy is likely to develop.

REVIEW OF LITERATURE